‘Uniting the Empire’: the Australian Beam Wireless Service at Rockbank and Fiskville.

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SUMMARY: Together with aviation, ‘wireless’ was the marvel of the early twentieth century. For isolated Australia, its promise of international communication was acutely felt. Its ‘antipodean’ location, the greatest distance possible from Britain and its Marconi Company, saw it play a critical part in tests for long distance communication. Australia may have initiated at least one of these trials, and then raced the world to apply the short-wave system for marine and broadcasting services. Politically also, Australia pushed the boundaries. Its unyielding opposition to a conservative British Imperial Wireless Chain proposal, in which it would be at the mercy of a series of vulnerable relays, was inspired by the vision of ET Fisk of AWA. Australia’s ‘one hop’ solution was accepted, and the 1927 opening of the Beam Wireless established the world’s longest distance radio link. While the Ballan and Rockbank stations arrays and equipment no longer survive, remarkably intact landscaped accommodation quarters and Spanish Mission buildings are proud testament to this achievement.

Introduction

Isolation from the Western hemisphere provoked Australia to a significant part in the unfolding story of long distance point-to-point wireless telegraphy. As with aviation, that other marvel of the early twentieth century in which Australians such as the Smith brothers, Kingsford-Smith, Ulm and Hinkler were blazing new trails and setting new flight distance records, wireless enthusiasts and professional engineers such as ET Fisk of AWA (Amalgamated Wireless Australasia Ltd) were probing the most distant horizons of radio transmission.

While the death-defying heroics of Australia’s ‘knights of the air’ had their special glamour, ‘the mysteries of wireless’ were equally fascinating. The breakneck speed of technical development raised amazing possibilities for both international and broadcast communication, and participation by the whole community was inexpensive and easy. The public was gripped. The story of the Australian Beam Wireless, virtually forgotten today, was a part of this wireless craze, and received enthralled media attention during the 1920s.

For me the story began to unfold when I came across the remnant former Beam Receiving Station at Rockbank to the west of Melbourne during the course of a municipal heritage study, and consequently, the near identical former Transmission Station near Ballan (this complex was later named ‘Fiskville’). While nothing remains of the technical buildings at Rockbank, the distinctive architect-designed accommodation complex, set in a classic 1920s period garden, is something of an unexpected oasis within the dry empty plains of Melbourne’s west. The story behind the facilities is equally exceptional.

The Advent of Long Distance Wireless Telegraphy

Telegraph cables provided the world’s first international communications system, and Australia had been connected to Europe via submarine cables through Darwin in 1872. With the opening of the Ballan and Rockbank Beam Wireless stations in 1927, providing direct commercial telegraphy communication across the British Empire, the longest ‘wireless’ span in the world was bridged.

In contrast to ‘broadcasting’, which had made its first Australian appearance in Sydney in 1923, the ‘beam’ wireless concentrated and directed narrow signals to equivalent facilities at far distant places. Morse code radio signals were transcribed onto tapes and then into the written word by similar high speed machinery as was used by the telegraph cable systems. Although broadcasting was no doubt the most famous radio achievement of the age, telegraphy ‘via beam’ was the Australian achievement that appears to have been more highly celebrated by our engineers and politicians at the time.

The story began in 1888 when Heinrich Herz discovered the existence and reflecting qualities of electromagnetic waves. In 1895 Guglielmo Marconi patented the process of wireless telegraphy. The most important initial application of this revolution was communication between ships and the mainland.

The 12th December 1901 was an historic date. Until this time wireless communication was being conducted with shipping and islands over relatively short distances. By transmitting radio signals all the way across the Atlantic Ocean, from the high powered station Poldhu in Cornwall to Newfoundland, Marconi showed that, counter to mathematical theory, electromagnetic waves appeared to follow the curvature of the earth. At the time scientists did not know of the reflecting properties
of the ionosphere. In 1902 scientists in England (Heaviside) and the United States (Kennelly) simultaneously postulated the existence of reflective properties in the earth’s atmosphere, but these theories were not proven until in 1924 Edward Appleton discovered the ionosphere.5

In the meantime Marconi continued with his trans-Atlantic experiments and in October 1907 built permanent radio transmitters and receivers at Canada (Glace Bay and Cape Cod, Novia Scotia) and Ireland (Clifden). The battle between long-distance wireless and the cables had been joined.6

Intending to capitalise on these achievements, ‘The Marconi Company’ (The Marconi Wireless Telegraph Company Ltd, situated at Chelmsford, Essex) in 1906 suggested to the Colonial Office that it could construct a chain of high-powered stations to link British colonies and dependencies with the motherland.7 Several such proposals were rejected until, in 1910, with war-clouds gathering, the British Parliament accepted a proposal modified in that ownership would be retained by the state. The ambitious scheme would link the British Empire by an ‘Imperial chain’ of 18 (originally) radio stations in Egypt, India, Malaya, China, Australia and Africa, which would be erected, maintained and operated by the Marconi Company. In 1911 negotiations regarding the contract were under way, but progress was delayed by the ‘Marconi Scandal’, an intrigue in which some parliamentarians were accused of approving the scheme to benefit personally by their shares in the Marconi company. When they were eventually cleared the government established a technical commission to review the contract, by which time war had intervened and the project was shelved.8

Developments in Australia

Between 1899 and 1901 all the Australian colonies and states, led by South Australia, built experimental wireless telegraph installations to communicate over distances of a few kilometres, sometimes with nearby ships.9

On 12th July 1906 the Marconi Company installed demonstration transmitting and receiving equipment at Queenscliff (Victoria) and Devonport (Tasmania) in an attempt to entice the Australian government. The technical demonstration across Bass Strait succeeded, but the government did not purchase the equipment or approve the service.10

Australia’s focus at this time was maritime safety. In 1910 the Huddart Parker Line installed the first radio equipment in Australian merchant ships, and the Postmaster General granted a licence to the Australasian Wireless Company to operate a station in Sydney for the purpose of telegraphy tests with ships. In the same year the Maritime Wireless Telegraph Co. in Sydney, operated by Catholic missionary priest Father Archibald Shaw, described as the largest wireless company in Australia, was transmitting up to 2,400 miles by 1911. In 1911 John Graeme Balsillie was appointed the PMG Engineer for Radiotelegraphy, with a mission to establish a chain of coastal wireless stations across Australia. On 8th February 1912 Australia’s first government owned coastal radio station commenced operation from Melbourne’s Treasury Gardens. By the outbreak of war in 1914 a network of 19 coastal stations had been established.11

Two of the first of these coastal stations were the high-powered Applecross (Perth) and Pennant Hills (Sydney) stations, with high (122 metre) aerial towers. In addition to their coastal functions these original two long-range facilities communicated across the continent for fleet communication, defence intelligence and other government purposes.12 During the First World they kept a searching watch on all wavelengths between 1,000 and 24,000 metres.

The stations, equipped by the Telefunken Company, were built in 1912 by Australasian Wireless Ltd of Sydney (whose tender price was less than a quarter of that of the Marconi Company). In 1913 the English Marconi company and its competitor Australasian Wireless company (with links to Marconi’s rival, the German Telefunken company) settled their commercial dispute and merged, forming Amalgamated Wireless (Australasia) Ltd, with exclusive Australasian rights to present and future patents of both the Marconi and Telefunken companies.

While the prime task of the new AWA had been to develop wireless for shipping, from 1923 it had become the designer, builder and supplier of Australia’s first radio broadcasting stations’ transmission equipment. By 1926, protected by its unique relationship with the Australian Government, AWA could boast that it was ‘the second largest wireless organisation in the British Empire’.13 In Australia (and the Pacific region) it became an icon through its manufacture of radio, and then television, receivers. By 1944 it had 6000 employees and was one of the largest organisations in Australia.14

Leading the AWA charge was (later Sir) Ernest Thomas Fisk, whose name was ‘synonymous with the development of radio in Australia.’ Born in England in 1886, Fisk came to Australia in 1911 as resident engineer representing the Marconi company, trying to persuade ship owners to fit Marconi equipment. In 1913 he was appointed AWA’s first general and technical manager; in 1916 he became managing director, and in 1932 chairman.15

Fisk, AWA and Long-Distance Wireless

In later years, after the successful opening of the Beam Wireless Service via Ballan and Rockbank in 1927, AWA managers recalled the vision and tenacity of ET Fisk. Very soon after his arrival in Australia, they said, he had
realised that the greatest use of wireless telegraphy to Australia would be for trans-oceanic communication:-

‘His work since then has been the constant pursuit of a great objective - the mighty purpose of his life - the establishment and development of a vast trans-ocean service between Australia and Canada, South Africa and India. Visualising this scheme both as an International and Imperial necessity, he has backed it with unlimited faith, and against almost overwhelming opposition striven tenaciously for its accomplishment.’

Although a great champion of Crown and Empire, Fisk had never supported the British proposal for the Imperial Wireless Chain. He believed this ‘chain relay’ of stations across the Empire, a maximum 2000 miles (3200 km) apart, would be too vulnerable. Before reaching Australia messages would need to be handled through Egypt, India and Singapore, potentially unstable nations. In addition, the cumulative delays would be unacceptable, and the costs so high as to be non-competitive with cable. For Fisk the only practical approach was ‘a one-hop transmission and reception’.17

The Australian experience of the advances in wireless technology during the First World encouraged Fisk in this vision. In particular, the amplifying and oscillating properties of the three-electrode valve (Fleming 1904, De Forest 1906) had transformed the capabilities of wireless. But the practical application of the valve was very slow, and for most of the first two decades of the twentieth century time wireless telegraphy relied essentially on ‘the spark system’ for transmission, and magnetic, crystal and electrolytic detectors for reception.18 The impact of valves became dramatically evident in Australia when, after the installation of thermionic valve receivers early in the war, operators at Applecross in Perth began to intercept propaganda messages broadcast from the powerful German transmitter at Nauen near Berlin.19

As a consequence of these interceptions, in 1916 Fisk, in England, initiated experiments with his colleagues at the Marconi Company. With approval of the Admiralty, test transmissions were arranged from the trans-Atlantic station at Caernarvon, Wales. Over several months of trials in 1918 Fisk received signals daily from the Welsh station on equipment he had installed at his home in the Sydney suburb of Wahroonga. ‘Satisfied that the feasibility of direct wireless communication between Britain and Australia had now been confirmed, he decided the time had come for a public demonstration.’20 Prime Minister WM Hughes, in London, willingly collaborated with Marconi and the Admiralty. On 22nd September 1918 the first public wireless telegraphy communication was sent from England to Australia, a widely publicised patriotic message by Hughes regarding the performance of Australia’s troops. The receiving apparatus had been designed by Fisk and built by AWA. The wavelength for these transmissions was 14,300 metres.21

In Marconi’s later telling of this historic event in an international article, the achievement was portrayed as the climax of the author’s marshalling of technology. He listed the technological developments – thermionic valves, balanced tuned circuits, electric filters, power amplifiers and ‘directional radiators’ – that he had honed to ensure a regular telegraphic service across the Atlantic: ‘…thus also, in 1918, I could for the first time in history communicate from England to Australia, i.e almost as far as the antipodes, over a distance of about 20,000 kilometres (12,500 miles).’22 In a much later statement again, this time directed to the Australian radio industry, Marconi paid tribute to Fisk as his collaborator and ‘assistant’ in his endeavours to give the Commonwealth a cheap and speedy connection to Britain. Fisk in turn referred to his ‘revered tutor and great friend the Marchese Marconi’.23

After the 1918 transmission AWA collaborated with Marconi’s experiments into the strength of both long and short wave signals received at distant places. Although in 1917 Marconi had resumed his early experiments with short-wave,24 for years afterwards the Marconi Company experiments in which AWA collaborated related to long-wave wireless. During 1920 and 1921, results compiled at a Marconi/AWA ‘listening in’ station at Koo-wee-rup east of Melbourne indicated that direct long-wave radio links were possible across the globe.25 At Koo-wee-rup AWA carefully measured the signal strengths of many international stations using new techniques of six stage radio frequency amplification and two stages of audio amplification. The results showed that wireless signals could be received over long periods each day from New York, Rome, England and Europe, and were consistent enough to assure regular wireless contact between England and Australia.26

But long-wave was not the future. By one account the first successful transmission of cheaper short-wave signals from the Marconi Station at Poldhu Cornwall to ‘Mr Fisk’s experimental station Sydney’, took place in January 1924.27 Another account has it that in February 1924 AWA engineers in Sydney received a cable from the Marconi Company asking them to accept signals from Poldhu on the 90 metre wavelength. On 6th March the signals were clearly heard on an AWA-built receiver designed especially for this wavelength, and a whole series of tests began with shorter and shorter wavelengths. It was found that the 25 metre wavelength gave the best results. So successful were these trials that, by May 1924, Marconi successfully implemented a series of short wave telephony trials to Australia.28

Then followed a series of exhausting experiments conducted between the Marconi Company in Great Britain and AWA in Australia, in which the results of nightly communication on different wavelengths were recorded. While research into the reliability and efficiency of short-wave wireless, which promised to revolutionise the whole
industry, was raging worldwide, the question was of greatest importance to Australia, whose government (along with others in the proposed Imperial Wireless Chain) was about to plunge a huge amount of money into long-wave stations of tremendous power. Australia’s ‘distance from Britain’ required it to have a reliable and economical communications system:-

‘Thus urged, our operators worked harder than ever, and it was with their help that Marconi was able to prove that it was more economical and just as reliable to send and receive short-wave messages over long distances as long wave messages. Thus, for once, our geographic position was an advantage, and we were able to get a little ahead of progress in other parts of the world.’

But, in fact, since c.1922, well before Marconi’s first international long-distance short-wave transmission and subsequent research program, AWA had been conducting its own successful domestic short-wave research program. Sydney research engineers under AWA’s chief engineer AS McDonald had built and installed transmitters to operate on various wavelengths from 10 to 100 metres. Its transmissions were intercepted at points throughout Australia and New Guinea in order to establish the best wavelengths for different distances and different times of day. ‘Two important discoveries’ were made:- that it was necessary to use different wavelengths at night and during the day; and that by transmitting the same signal on two slightly different wavelengths, ‘fading’ could be entirely eliminated.

AWA took an important additional step by applying its short-wave expertise to marine wireless telegraphy. When the rest of the world was researching and trialling, AWA went ahead and successfully applied short-wave to practical international communications. In 1924 a special transmitter was erected at Pennant Hills, and specially designed apparatus installed on the RMS Niagara, with stunning success. Exceedingly cost-effective two-way communication was maintained with the vessel all the way to its destination in Vancouver, across 7000 miles (11,300 kilometres) of the Pacific Ocean, a record in marine wireless communication. In 1926 the SS Jervis Bay, using AWA short-wave equipment, maintained daily communication with Pennant Hills all the way from Sydney to London and return: another resounding result. Using a wavelength of 34 metres this record distance was able to be achieved with only 0.5 kilowatt of power, compared with the 1000 kw of power used by the giant new Rugby station, on a 18,740 metre wavelength, in England. As a consequence of these working trials, short-wave transmitters were quickly installed on all of the Union SS Company’s trans-Pacific fleet.

In a time when trial and error - the empirical documentation of reception conditions (such as ‘fading’ and ‘atmospherics’), of different wavelengths, in different parts of the globe - was at least as important as theory, Australia’s distance, technical competence and enterprise were critical. Marconi had been fascinated by the question of whether it would ever be possible to transmit radio signals around the world ‘as far as the Antipodes … even to far-off Australia … the greatest possible distance that can be covered by radio on this little earth of ours.’ Fisk’s view was simpler still: ‘here in Australia we have more to gain from the development of radio than many other countries have.’ The personal friendship (Marconi was the godfather to one of Fisk’s sons) and professional association of Fisk and Marconi appears to have been significant in research into long distance wireless communication.

**Australia and the Imperial Wireless Chain**

The milestone 1918 transmission from England to Australia was of political as well as technical significance. It captivated, or perhaps confirmed, Prime Minister WM Hughes’ allegiance to the cause of wireless. Of the ‘two great achievements of the modern world, aviation and wireless’ said Hughes in his speech to the 1936 Radio Foundation Day celebration, aviation ‘stands for war’, while wireless had ‘knitted the Empire closer together’, and might help deliver peace to the world. ‘I remain now as I was in the beginning one who may be counted as its most zealous devotee’ he said.

Wireless was commonly envisaged by its pioneers of as a means of uniting the world. Marconi wanted ‘to bring the world together; I want people to communicate all over the world’. Within Australia a much-expressed benefit of wireless was the unification and strengthening of Empire. While ET Fisk’s vision was of the development of wireless in Australia, he was also an unwavering advocate of Empire, and active in the NSW Royal Empire Society. ‘No scientific discovery offers such possibility for binding together the parts of our far-flung Empire, and for developing its social, commercial and defence welfare’ he said. In his 1936 speech former Prime Minister Hughes recalled how he and Fisk had discussed how radio would unite ‘all the dominions of the British Empire’.

After the War, the Marconi Company and AWA submitted proposals to the British and Australian governments for direct long-wave wireless telegraphy across the Empire. The proposal however was at odds with the 1919-20 English ‘Norman Report’, which supported the British Post Office’s more conservative proposal for very high powered long-wave wireless stations no more than 2000 miles (3200 km) apart, with relay stations in Egypt, India, Singapore and then to Darwin or Perth. Hughes did not want Australia to be at the butt end of a very long chain of vulnerable foreign stations. He urged the British government to establish a direct service between their countries without delay.

At the June 1921 Imperial Conference in London, Hughes went further. With the support of Fisk, whom he had taken as an adviser, he resolutely resisted the
recommendations of the Imperial Wireless Committee for Henry Norman’s ‘Imperial Chain’ and rejected anything less than a direct service. With opposition at home to the Post Office controlling an Imperial wireless system, the British Government acquiesced. The proposal for Empire relay stations was abandoned and Britain agreed to cooperate in the Australian proposals.40 ‘South Africa and the other Dominions followed Australia’s lead, and supported its proposals.41

Although Prime Minister Hughes was ‘fascinated and fired by the magical potential’ of wireless, there was concern in the Australian Parliament that a foreign company would control national wireless lifeline. Debates about implementing the decisions reached in the Imperial Conference resulted in the establishment of a cross-party ‘Wireless Communications’ Parliamentary Committee in December 1921.

The Committee considered the technical and commercial feasibility of establishing direct long-distance wireless communication, and the competing proposals put by AWA and the Radio Communications Company of London for a joint Government-private partnership to achieve this. Much of its energy was taken up trying to resolve the ‘glaring disagreement’ between these proposals and the 1920 Imperial Wireless Telegraphy Commission finding (the ‘Norman Commission’) that commercial wireless telegraphy was not possible for longer distances than 2000-3000 miles.42

ET Fisk for AWA argued that new developments such as the Franklin (or ‘beam’) aerial, and the company’s research at its Koo-wee-rup ‘listening in’ station, pointed to the practicability of a commercial service. Fisk appears not to have been an impressive witness however. Frank Brennan’s Minority Report pointedly noted that the submission of the representative of the competing Radio Communications Company was ‘by far the most valuable contribution to the inquiry that the Committee had presented to it.’43 The Majority Committee report (17th March 1922) specifically noted that Fisk:- 44 ‘did not give an effective documentary reply’ to the Imperial Wireless Telegraphy Committee’s allegation that a commercial wireless service over such distance was impracticable; could not produce any specifications or plans of the proposed Australian station’; was ‘unable to inform the Committee how the sum of £600,000 [his estimate of the cost of the Australian stations] was made up’; and had to concede that wireless communication was not possible 24 hours a day due to ‘atmospherics’ and ‘fading’.

With the Prime Minister’s longstanding support, perhaps Fisk had little fear of the Parliamentary Committee. Or perhaps this was what his AWA colleague FW Larkins and great publicist had in mind when he referred to the ‘genius’ Fisk as being ‘so far above the crowd that he is frequently misunderstood when he descends to a more earthly level of thought.’45

The committee found that the longest such system then existing in the world (part of the radio relay between the USA and Japan) was only 4,600 miles, well short of what would be necessary for a direct Australian connection. Despite its apparent misgivings about the scheme, the committee also noted that there were currently initiatives around the world aimed at developing long distance wireless. Given the shortcomings of the ‘Norman’ relay scheme (including the ‘doubtful security’ of intermediate stations in Egypt, India and Singapore) it endorsed a variation of the proposed AWA scheme. The Government would acquire a half (but majority) shareholding in AWA, and provide £500,000 for it to construct and operate high-powered Australian stations capable of commercial services to both the United Kingdom and Canada (which would also provide the gateway to North America).46

Committee member Frank Brennan, later attorney-general in the Scullin government, has been described as an individualist who combined a ‘conservative legalism’ with an egalitarian approach to government. These qualities are evident in his dissenting report.47 (Brennan was no doubt one of the many ‘opponents’ over whom - his supporters inform - Fisk had had to triumph in achieving the Beam Wireless system.) He favoured a full government enterprise rather than have the public purse subsidise overseas ‘capitalists’. This was a very respectable position supported by the Australian Constitution, in which power over communications resided in the Federal government, a power reinforced by the 1905 Wireless Telegraphy Act. This principle had also been upheld in British Parliaments over the preceding decades. Noting the significance of the issue to safety at sea, defence, and other matters of national interest, Brennan was concerned that the outcome of the AWA / Marconi proposal would favour ‘pecuniary gain rather than national service’.48

Brennan was also concerned that the long-distance wireless scheme had not yet been shown to be practicable, and that it would be in Australia’s best interest to take a minor role in the current international research, and develop a scheme at the best price when the technology was achieved. ‘The proposal is a gamble, in which the Commonwealth stands to lose heavily.’ ‘It is not courage but recklessness for a young and sparsely-peopled country to entangle itself with agreements as though the results of these experiments were already established facts’, he argued.49

Both Fisk and Brennan appear to have been correct in different respects. Australia, the prime mover in the ‘one hop’ Empire scheme, had been pushed by Fisk and Hughes to the vanguard of long-distance wireless telegraphy.49 Their vision (prescient given the sudden fall of Singapore in 1942) had played a significant role in shaping the Imperial wireless system in the pre WW2 era. Fisk’s faith in the potential of wireless was rewarded with a windfall that was not even mentioned as a possibility during the Parliamentary inquiry. The early-mid 1920s
development of short-wave, low-powered ‘beam’ wireless transmission slashed the projected capital and operating costs of the ‘direct contact’ scheme. Although complete redesign of the scheme was necessary, the success of ‘the Beam’ service (as it became) was now certain.

On the other hand Brennan was right in that Fisk’s scheme was unsubstantiated and pre-emptive. And his argument for full government ownership was validated when immediately after the war the British Empire decided to nationalise its international wireless systems; in Australia the government established the Overseas Telecommunications Commission (OTC) which acquired AWA’s overseas interests including the Rockbank and Ballan stations in 1947. Even the Fisk-Hughes philosophy of direct wireless communication with London being critical for defence purposes seems to have had a limited lifespan. In the late 1940s Empire defence communication was changed from direct connection to an Army Wireless Chain.60 relayed through the various dominions; and developments in communications technology saw the resurgence of cable in the post-war era.

Australia’s leadership in the Empire direct wireless scheme is dramatically evident in the ‘Wireless Agreement’ devised by the Parliamentary Committee and signed on 28th March 1922 by AWA and the Australian government. The agreement required the reconstructed AWA to ‘arrange for the operation of suitable correspondence stations in the United Kingdom’, as well as (within two years) ‘the erection and operation of a station in Canada’.51

Establishment of the Australian Beam Wireless Stations at Ballan (Fiskville) and Rockbank

Soon after the Parliamentary Committee reported a series of technical developments revolutionised the possibilities for long distance radio communications. Marconi’s research into high frequency short-waves (which were much less affected by sunlight, land masses and atmospherics) had climaxed with the successful series of telegraphy and telephony trials with AWA Sydney in 1924. In the same year Edward Appleton began experiments proving the existence of the ionosphere (Appleton layer). And Charles Franklin’s development of directional aerials, which successfully narrowed signals into a ‘beam’, was groundbreaking for long distance point to point communication.52 A new high frequency short-wave service would operate with 2% of the power, three times the speed, and 5% of the cost of the long-wave service originally proposed.

The super-power long-wave stations were discarded, and the 1922 agreement was redrafted. The government’s new agreement with AWA would now cost ₤119,000, compared to the ₤500,000 that had been set aside for long-wave stations.53 The initial Australian government agreement with AWA for the ‘Imperial Wireless Service’54 was modified in two ways. Firstly, the British Government now assumed responsibility for the UK terminal, freeing Australia from this commitment; similarly AWA was not now required to build the Canadian stations.

The system was originally planned to be operating by 1924, but the technical changes meant that designs had to be altered mid-stream, and it was 1927 before the Australian beam stations commenced operation. The first leg of the Imperial Wireless Service (by now called the ‘Beam Wireless’) which opened in October 1926 between Britain and Canada marked the end of the development of high power low frequency transmitting stations, and was a ‘turning point in wireless history’.55 But Britain and Canada had been linked by wireless telegraphy since 1907, and it was not until the opening of the service from Ballan (transmitting) and Rockbank (receiving) stations with Britain in 1927 that the longest ‘wireless’ span in the world was bridged by a regular commercial telegraph service.

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also due to the excellent noise free conditions that exist for the reception of long range wireless signals in that locality’. 57

At the April 1927 Australian Beam Wireless opening an AWA engineer explained that Ballan, high above sea-level, had been chosen not only for technical purposes, but ‘to render the station reasonably safe from attack in war time’. 58 Ballan and Rockbank were also close to Melbourne, allowing easy management. Plans of the system show that the Melbourne control centre, Rockbank (20 miles distant from Melbourne) and Ballan (50 miles distant from Melbourne) were situated in a direct line, which presumably reduced construction costs of the landline between the three centres. 59

Another reason for the selection of Melbourne’s western plains also became apparent a few years later when the Army decided to relocate its Park Orchards and Coldstream radio facilities to Diggers Rest and Rockbank. The flat topography and space at Rockbank permitted the arrays (antennas) necessary for international connection that were impossible in more undulating and treed localities. 60 Also the large tracts of land in single ownership required for these stations were also available in this district which had until recently been part of the vast pastoral estates of the Clarke (and Chirnside) families.

The flat, bluestone-strewn expanse of Melbourne’s western plains in fact became a major centre of wireless in Australia. The establishment of the original Army (later RAAF) airbase at Point Cook to the south of Rockbank in 1913 led to the establishment of RAAF wireless bases there in 1920, and subsequently at nearby Laverton (also a major RAAF wireless training centre), and Werribee (immediately adjacent to Rockbank) where Australia’s largest RAAF wireless station was established. 61 On either side of the Rockbank Beam Wireless station, therefore, were Australia’s primary Army international transmission and reception stations at Diggers Rest and Rockbank, and Australia’s largest RAAF wireless station. At Braybrook to the north-east was AWA’s ‘Radio Centre Melbourne’ – the second largest Radio Centre in the Southern Hemisphere. It comprised Melbourne broadcaster 3LO, transmitters for coastal shipping, coastal radio stations, and the national ‘Beam Feeder’ services to Perth, Adelaide and Brisbane. 62

Under its 1922 agreement with the Federal government AWA was to construct and operate the Australian Beam Wireless stations, but a previous agreement between AWA and the English Marconi company meant that the Marconi Company would be the sole contractor to the Australian stations, and AWA would act as the operating company. 63 Instead of importing new staff to operate the Beam Wireless, in 1925 AWA sent Australian staff to England for training, where they were reported to have impressed with their competence and attitude. 64

In 1925 the ‘Amalgamated Wireless Co., of 167 Queen Street Melbourne’ purchased 1767 acres of land which had originally been part of WJT (Big) Clarke’s vast Rockbank estate. 65 Construction of the ‘Imperial Wireless Communication’ stations commenced in April 1925. 66 On the 16th November 1925 AWA requested the Post Masters General department to supply the private landlines between Queen Street, Rockbank and Ballan. (The installation of this link would create all sorts of technical difficulties and tensions between AWA and the PMG, including the possibility of a delayed opening of the international project. Later, cost disputes also arose between them.67) In November 1926 it was reported that the Rockbank station, corresponding to the Ballan station, and including ‘a number of bungalows and a club house’, had been erected. 68 The Melton Shire ratebooks reported that the AWA complex consisted of a ‘Beam Station and Power House’ and ‘Staff Quarters’. 69

From late 1926 the opening of the service was keenly anticipated in the daily press (curried by AWA press releases), which reported the delays by English Marconi engineers in testing the stations, and provided detailed and technical descriptions of the Ballan and Rockbank stations, their power plants, giant wireless valves, and high lattice steel masts and aerial systems. The media interest appears to have been heightened by anticipation within the radio community that the Beam Wireless would be able to provide more than the simple telegraphy originally anticipated, including ‘picturevision’ and telephony within a matter of months. 70 There was also great public interest in the news that the Beam Wireless would now not only provide ‘instantaneous’ service (as distinct from the delays involved in cable relays), but also reduce the cable telegraphy rates by one third. The opening would be an ‘historic’ event, being the ‘longest direct telegraph service in the world’, and establish the first direct line of communication between Australia and ‘the heart of the Empire’. 71 Prime Minister Bruce expressed his gratification with the impending opening of the system with whose ‘introduction he has been closely associated. 72

In anticipation of the opening it was also noted that the beam stations would soon provide a direct link to Montreal, and from there connect Australia with the United States and South America. Post offices around Australia would receive telegrams to go ‘via Beam’, landlines from the capitals connected to the state Feeder stations, which communicated by wireless to Melbourne and ultimately the international Beam stations. The Melbourne office for sending and receiving telegrams was Collins House, while the messages would be controlled from AWA’s Central Telegraph Office in Queen Street which communicated with Ballan and Rockbank by landline. At the other end of the line ‘Beam messenger boys’ in their special uniforms delivered messages on bicycles. 73
The opening on Friday 8th April 1927 at the Queen Street office was attended by a throng of dignitaries including Prime Minister SM Bruce, the Governor General, and future Prime Minister RG Menzies (with former Prime Minister WM Hughes at the Sydney feeder station). The event generated press headlines of ‘Wireless Magic’, and expressions of amazement by the dignitaries. Hughes ‘spirit seemed to dominate the occasion’, for it was recalled that ‘he was the first to say that Australia must have direct wireless communication with England by means of the all British system’. (Fisk later described Hughes as ‘the great pioneer of Australian communication … whose work in bringing this great thing to Australia is well known and will never be forgotten.’) A new level of ‘inter-Imperial communications’ had arrived. A few days later King George himself dutifully responded that he had been ‘touched and gratified’ at the expression of loyalty that had arrived by wireless from Australia.

The enthusiast’s technical journal *Radio* described the much-heralded opening as a ‘great step forward in the history of radio’. A few days later readers of the *Argus* learnt more of the technicalities of the system, which comprised an aerial that concentrated signals into a beam, localising reception, and enabling transmission by one hundredth of the power that would otherwise have been necessary. The *Victorian Railway Magazine* carried a five page article entitled ‘The Wonders of Beam Wireless’, with photos of the plant, aerials and the central Melbourne office. It explained that the reflectors on antennas could be moved to enable connection with the UK or Canada in either direction around the globe, via either of the great circle routes, depending on the atmospheric conditions (signals carrying better by night). The AWA publicity department (led by FW Larkins) was ready and waiting to provide professional journals such as the *Electrical Engineer* with extensive feature articles on all the technical details and photographs of ‘The Australian Beam Wireless Stations’.

The Australian Beam Wireless commenced service to Montreal Canada, and via it to all the Americas, on 16th June 1928. Even before its opening it was keenly anticipated that the Beam Wireless would be used for ‘radiovision’ - transmitting pictures between continents - ‘probably within the next year’. This occurred first in 1929, but development of a regular service over such a long distance took longer than first anticipated. Nevertheless, when the world’s longest ‘radio-picturegram’ or ‘phototelegram’ service opened between London and Melbourne (Rockbank) in 1934 it was hailed as an immediate success by members of press and public alike. The *Age* described it as ‘the latest remarkable advance that has been made in the field of wireless achievement’.

The picturegrams were used mainly by Australian newspapers. One of the first group of two ‘radio pictures’ received from England was of dashing young Adelaide aviator CJ Melrose beside his plane preparing for the Centenary Air Race. Wireless and aviation had been joined. Two years later Melrose died when after taking off from Essendon Airport his plane crashed just beyond the Rockbank Beam station that received this photograph. In 1946 the first colour picturegram was transmitted from England to Rockbank. By this time the photographs were automatically relayed from Melbourne to New Zealand by radio, and from Melbourne to Sydney by telephone line.

On 30th April 1930 AWA commenced an international ‘Radiophone”- a public radio telephone service, the first wireless telephone service between Great Britain and a Dominion. Whilst in 1927 it had been envisaged that all long-distance communication would be conducted through Ballan and Rockbank, this service was operated from AWA’s Sydney ‘Radio Centre’ at Pennant Hills. In like manner, by the 1930s most of Australia’s other important but shorter overseas links to its Asian and South Pacific neighbours were handled through Pennant Hills.

The Beam Wireless service proved a great success. It undercut the prices of cable telegraph substantially, and within a few months of opening was carrying almost half the UK - Australia telegraphic traffic. AWA described its Beam service as ‘the greatest long-distance telephone service in the world’. Although there was still a role for cable, by 1946 AWA believed its efficient method of communication had saved the country hundreds of thousands of pounds. The Beam Wireless service ‘had proved itself, beyond doubt, as the communications miracle of the age.’

**Developments, and Closure of the Beam**

At the Beam services expanded, so too did the transmitting and receiving facilities at Ballan and Rockbank. Between 1935 and 1947 several new aerials were erected for communication with Montreal, Port Moresby, San Francisco, and the new relay stations at Perth, Colombo and Bombay. During WW2, the Ballan workshop was...
expanded and five instrument makers employed to fabricate high speed telegraph apparatus for the Beam service and the armed forces.\textsuperscript{93}

At the Empire Telecommunications Conference held in London in 1945 it was agreed that British Commonwealth cable and radio services would be amalgamated and transferred to public ownership. The Overseas Telecommunications Commission (Australia) was formed by Act of Parliament in 1946, its responsibility being the maintenance and operation of Australia’s overseas telecommunications services as well as maritime communication. Acquisition began of the communication assets of AWA which had operated the overseas telegraph facilities, as well as Cable and Wireless (C&W) overseas telegraph facilities.\textsuperscript{94} Ownership of Rockbank (and Ballan) was transferred to OTC, which assumed operation of the beam stations in February 1947.\textsuperscript{95}

Sunspot activity in the early 1950s disrupted the international radio circuits, and Australia was virtually isolated for a period of a few days (the cable networks proved inadequate). OTC built two new international radio stations at Doonside and Bringelly, near Sydney, equipped with the latest technology to deal with periods of high sunspot activity. The Fiskville and Rockbank stations were also upgraded with more modern equipment to cope with rapidly increasing demand.\textsuperscript{96}

As Melbourne prepared to host the 1956 Olympic Games, it was estimated that the volume of international radio traffic would triple. One of the emergency measures was the seconding of defence force transmitters and receivers (including the Army stations at Diggers Rest and Rockbank). A series of telecommunications projects was accelerated, an important one of which related to the antenna systems. State-of-the-art rhombics represented a considerable improvement over the Franklin antennas that had originally been employed at the Melbourne Beam stations. Based on the pioneering work of Dr Wilbur Christiansen and W Jenvey of AWA Laboratories (1946), OTC designed the rhombics in a circular pattern for maximum flexibility in geographic and frequency coverage. Jenvey later became Chief Engineer of OTC. OTC engineers also designed high performance transmitting and receiving equipment for the Olympic event, which was successfully manufactured by AWA in Sydney.\textsuperscript{97,98}

A major post-war development was the new multi-channel communications cable.\textsuperscript{99} In September 1956 the first trans-Atlantic coaxial cable came into operation. In 1959 OTC hosted a meeting which laid plans for the first Commonwealth cable scheme, a trans-Pacific co-axial cable known as Compac. In 1961 OTC met with south-east Asian heads of government to plan the Seacom cable, an extension of Compac.\textsuperscript{99}

In October 1957 signals from Sputnik, the first man-made satellite in orbit, were detected by Rockbank and Bringelly. In 1964 OTC was one of 11 founding members of the International Telecommunications Satellite consortium whose aim was to develop a global communications satellite system. In 1966 it opened Australia’s first satellite earth station at Carnarvon in Western Australia, followed by others in Moree (1968), and Ceduna (1969). International communication could now not only be sent directly by radio, but by coaxial cable and satellite relay.\textsuperscript{100}

In 1959 scenes for Stanley Kramer’s major international film about the end of the world, ‘On the Beach’, were shot in the interior of the Rockbank Beam Wireless station.\textsuperscript{101} The end was indeed nigh for the Australian Beam Wireless service. Although some minor new international radio circuits were maintained, ‘the Beam’ was rapidly being superseded by more modern technologies. Ballan and Rockbank continued to send and receive high-speed telegraphy until their closure on 31 May 1969.\textsuperscript{102} The Rockbank station had been jointly used by the military for some time prior to its closure.\textsuperscript{103}

The writings of a former ‘Beamer’ (as the operators at Ballan and Rockbank were known) reveal the powers of reflection that could be unleashed in the bleak isolation of Rockbank:-

‘Here was no bluster of shrilling machines as at Ballan, no noisy powerhouse, no atmosphere of unleashed, untold energy. Here is a purposeful silence - a sense of listening; even the building crouching at the feet of the mighty aerial masts seems to be huddling there with its finger on its lips. For Rockbank is gathering in the power generated in another hemisphere; gathering in, on its sensitive antennae, intangible rays …from an upended framework of inanimate wires on the other side of the world.’\textsuperscript{104}

The Ballan and Rockbank Stations: Then and Now.

The layout of the Ballan and Rockbank stations is very similar. The accommodation quarters constituted the entrance to the sites, and behind them were the radio buildings, arrays, powerhouses, and workshops.

Each station had three lattice steel masts for the ‘Franklin’, or ‘English’, curtain antennas. None of these, or the later rhombic aerials (there were 94 aerials at Ballan when it closed), survive. The Franklin masts were placed 195 metres apart, stood 91.5 metres tall, with cross-arms, and had four stays anchored to buried concrete blocks (some of these anchors survive at Ballan). The aerials were insulated vertical wires hanging from wires suspended between the cross-arms. The height of each aerial and reflector was 60 metres; since they were of identical construction they could be easily interchanged to either transmit or reflect signals in different directions around the Great Circle.
Ballan’s radio buildings (but not the workshops or cooling pond) survive, remodelled for use as the Victorian Country Fire Authority’s training centre. Openings and fenestration are altered, but largely intact, as are the original exposed roof trusses, but no equipment survives. No radio or other technical buildings survive at Rockbank.

Because both sites were relatively isolated (although Rockbank was quite near the Ballarat railway line) and needing staff on-hand 24 hours a day, it was necessary to provide attractive accommodation quarters, and amenities so that staff could be relatively self-sufficient regarding entertainment. The accommodation complexes were virtually identical for both sites, and both remain remarkably intact today.

They are distinguished firstly by their settings, which are enclosed within an arc of thickly planted Monterey cypresses, presumably to protect the quarters from exposure to the winds on Rockbank’s dry plain and Ballan’s high plain. These plantings create a significant impact within the generally featureless surrounding landscapes. All buildings are rendered, and their setting is a classic inter-war style garden, featuring Canary Island palms, privet hedges, lawns and rose beds. The front boundary is a rendered fence with metal gates.

A series of modest period bungalows for married staff are arranged around a central roadway, which leads to, and through, the main building. This building, for bachelor accommodation and recreation (eg pianola, billiard table) etc, is a wide Spanish Mission style building, the distinctive centerpiece of both complexes. It is characterised by an elaborate arched portico and carriage way surmounted with the date AD1926 in Latin numerals, and flanked by minor pedestrian arches. It is crowned by a round ventilation turret. Flanking the portico are recessed verandahs under the main roof that are supported by paired rendered vestigial columns.

The architecture would appear to be a fine example of early twentieth century ‘Commonwealth Departmental style’ architecture (with particular Mission Revival overtones) in a landscape setting. Although I have been unable to verify the architect of the accommodation buildings, its style suggests a link to the Commonwealth Department of Works and Railways which was under the design control of JS Murdoch, Commonwealth Chief Architect and Director General of Works. 105

The Ballan station, with its power generation requirement, was larger, and its accommodation quarters reflect this. It also had tennis courts, and in 1933 a school (recently demolished) was built for 32 children at the station, which around this time was renamed ‘Fiskville’ in tribute to ET Fisk. Ballan retains an impressive narrow conifer avenue, connecting the bachelor accommodation building with the former transmission station some 400 metres behind it.

**Conclusion: Australia and Long Distance Wireless Communication**

‘By the early 1930s Australia was something of a leader in short-wave broadcasting and transmission overseas. This was because Australia still had intimate but very long-distance relations with Britain, and also because of the enormous distances within Australia itself, which only short-wave transmission would cover.’

*Australian Heritage Commission, ‘Linking a Nation’ 2004* 106

The Australian Beam Stations were ‘epoch making in the records of Wireless’.

*FW Larkins, August 1927*

‘The science of wireless has advanced by leaps and bounds during the last few years. Its commercial application has been a veritable triumph, annihilating distance and bringing the most distant parts of the world into wireless contact with the centres of civilisation. In that triumph Australia has not only played a very great part, but in the development of many phases of wireless, has led the world’.

*AWA, ‘Wireless Progress in Australia’ 1930.*

‘The importance of the experiments undertaken to test the practicability of direct communication between England and Australia can be appreciated when it is
remembered that these two countries are almost Antipodean, and direct communication between them necessitated wireless waves travelling half-way round the earth, and when satisfactorily accomplished, would bring all parts of the globe within the field of practical direct communication.'

LA Hooke, paper to World Radio Convention, Sydney, 1938

‘But for the research work of the Marconi and Australian operators on the short waves these would have had to supply ten times the power for communication with England.’

FW Larkins, May 1927

The 1918 wireless telegraphy transmission from England to Australia, and the world record short-wave communications with shipping in 1924 and 1926 were only some of the records established by ET Fisk and AWA in trans-oceanic communication. In 1920 in Sydney and Melbourne AWA had conducted two of the very first public demonstrations of wireless broadcasting anywhere in the world, and on 5th September 1927 followed-up with a famous transmission from Sydney of the first Empire Broadcast Programme to be relayed throughout the British Empire. Another broadcast on 17th October 1927 was claimed by AWA to be the ‘first world-wide programme’. In 1931 AWA launched ‘The Voice of Australia’, the first regular world broadcasting service in the southern hemisphere. These broadcasts were heralded by the kookaburra’s laugh, still used today by Radio Australia.

So much of these achievements were due to ET Fisk, who had not only visualised a direct trans-ocean Empire wireless connection, but had successfully advocated to politicians the need for such a service, and then demonstrated to them its technical feasibility. For Fisk, the ‘epoch making’ establishment of the Australian Beam Wireless system in 1927 was the ‘consummation of his scheme’ and his greatest achievement.¹⁰⁹

Nobel Prize winner the Marchese (Guglielmo) Marconi paid tribute to Fisk’s message in a message to the Radio Foundation Day dinners held in Australian capital cities in December 1936. After acknowledging the achievements of the likes of Herz, Preece and Fleming, he stated that:

‘the name of Fisk in world communications I also acknowledge with much appreciation. The British Empire, and particularly Australia, owes much to this engineer for its efficient system of communications. It was Fisk who collaborated with me in my early endeavours to give the Commonwealth a cheaper and speedier connection with the Homeland. It was he who, in Australia, personally conducted the receiving experiments which led to the first direct connections by both telegraph in 1918, and telephone, in 1924, between England and Australia.’

Marconi also remarked upon Fisk’s establishment of the efficient wireless network of the Western Pacific.¹¹⁰

American and Australian colleagues also paid tribute to Fisk’s foresight and energy. His motivations were described as ‘the good of this great country of ours ... the good of our Empire, and ... the good of humanity at large.’¹¹¹ In 1933 Fisk was appointed to the Order of the Crown of Italy.¹¹² In 1937 he was awarded a knighthood.¹¹³ In 1944 he left AWA to become chief executive of the Electrical and Musical Industries (EMI-His Master’s Voice) group in London. He returned to Sydney in 1952 and died at his Roseville home in 1965.¹¹⁴

Of course AWA’s interest in international wireless communications had not been unique. There were many Australian wireless amateurs, companies manufacturing equipment, and professional wireless engineers pushing and probing the brand new science.¹¹⁵ The approach of the RAAF’s wireless pioneers – independent, energetic and sociable – may be indicative of the Australian contribution to the advance of wireless communication in the era.

On 26th June 1920 the fledgling RAAF wireless group conducted wireless telephony from Melbourne’s Exhibition Buildings across a few city blocks, which it thought was a first in Australia (in fact Fisk had conducted a similar demonstration in Sydney 10 months earlier).¹¹⁶ But their capability was acknowledged when the PMG asked them to monitor signals from the huge new long-wave station at Rugby England.

The move of No.3 Squadron from Point Cook Victoria to Richmond NSW in 1925 then stimulated the move into short-wave. Tests, using matching sets of transmitters and receivers built by Flight Officer Balderson at Point Cook, began on 1st November. ‘In line with national interest’, on 3rd November the results of the Melbourne Cup were able to be successfully transmitted to Richmond.

Not content with such an achievement, the Point Cook RAAF signals staff then turned Balderson’s short-wave equipment to more distant horizons. After several weeks of communication with amateur operators in France and Ireland, they arranged for a test with the RAF, and successfully conveyed a message on 16th June 1926. The RAF Chief of Staff replied congratulating ‘the efficiency of RAAF wireless’, adding that:-

‘the communications established between the two Air Forces by means of their wireless will be of great value to us both and will greatly facilitate that close co-operation which is so essential to Empire.’¹¹⁷

The signals staff had taken this initiative without any direction from the Air Board.

Just as Australia hadn’t invented powered flight, but exhibited great enterprise in stretching the horizons of aviation, Australian initiative played a role in stretching the boundaries of wireless communication. Australia was champing at the bit to connect with the world.

2 Former Prime Minister WM Hughes, looking back at the growth of wireless, and the achievements of ET Fisk and himself. (Radio Foundation Day Honoured in Four Capital Cities in Australia’, Radio Review of Australia, January 1937, pp.24, 27.)

3 Blainey observed that the speedy international radiogram and subsequently telephony ‘snatched away’ some of the excitement of contemporary aviation feats. (Blainey, G 1988, The Tyranny of Distance: How Distance Shaped Australia’s History, revised edition, Macmillan, Melbourne, p.300.)

4 The article by CF Elwell, ‘Radio: Its Past, Present and Future’, in Radio, 13th October 1926, provides a good overview of the development of radio to that date.

5 The Kennelly-Heaviside, or Heaviside Layer, another name for the ionosphere, situated 90-150 km above the earth, and reflects medium frequency radio waves. Its shifting at dawn and dusk was part of the ‘atmospherics’ that frustrated radio reception in the pioneering years.


7 The Appleton Layer, situated 150-1000 km above the earth, and reflects medium frequency radio waves. Its name for the ionosphere, situated 90-150 km above the earth, and reflects medium frequency radio waves. Its shifting at dawn and dusk was part of the ‘atmospherics’ that frustrated radio reception in the pioneering years. The Appleton Layer, situated 150-1000 km above the earth, and reflects medium frequency radio waves. Its shifting at dawn and dusk was part of the ‘atmospherics’ that frustrated radio reception in the pioneering years.

8 Wedlake, GEC 1973, SOS: the Story of Radio-Communication, Wren, Melbourne, pp.76-77


10 Fellows of the Australian Academy of Technological Sciences and Engineering, 1988, Technology in Australia 1788 – 1988: A condensed history of Australian technological innovation and adaptation during the first two hundred years (Australian Academy of Technological Sciences and Engineering, Parkville), p.536

11 Durrant, op cit, pp.19-22

12 ibid, p.18

13 Chairman Sir George Mason Allard, at AWA Annual General Meeting, 29/10/1926 (National Australian Archives, MP 341/1/0, 1938/5723, Box 553)


15 ibid


18 Hall, ER 1978, A Saga of Achievement: The RAAF Story, Bonall, Box Hill North, pp.2-3; Wedlake, op cit, p.83

19 Durrant, op cit, p.32; ‘Applecross Wireless Station Timeline’, provided by Dr Ron Strickland, derived from ‘Conservation Plan Applecross Wireless Station (former)’ prepared by AK Aris, H Burgess and G Noyton for the City of Melville 1999. (It is also said that in November 1914 Applecross Wireless Station received an emergency signal from the Cocos Islands giving the position of the notorious German light cruiser SMS Emden. The station relayed the information to the HMAS Sydney, which located and destroyed the Emden [Australian Heritage Database: Wireless Hill Park, Canning Highway, Applecross WA]. This information probably derives from the original nominator of the place to the Register of the National Estate. While it is also cited in the Friends of Wireless Hill website, it is not included in the Heritage Council of Western Australia Assessment Documentation for Wireless Hill Park.)

20 Durrant, loc cit


22 Senate Guglielmo Marconi, ‘My Early Experiments’, Radio, May 1927, p.9


24 Marconi, 1927, loc cit.

25 Miller, M 1992, The Beamers: A Photographic History of the Beam Radio Service 1927 – 1969, Australian and Overseas Telecommunications Corporation Ltd, pp.4-5. At the time Fisk cited the Koo-see-ru station results to a Parliamentary Committee as evidence of the likelihood that long-distance wireless telegraphy would be possible.

26 Hooke, 1938, op cit, p.2

27 Larkins, August 1927, op cit, p.15

28 Miller, op cit, p.4.

29 Larkins, FW, ‘Keep Step With World Progress’, in Radio, May 1927, p.76

30 AS McDonald & FW Larkins, ‘Short-wave Research Work’, in Radio, November 15, 1927, p.6

31 McDonald & Larkins, 1927, op cit, p.7

32 ‘Marconi’s Predictions All Coming True’, reprinted in Radio, Sep 29th 1926, p.18.

33 Radio Foundation Day, 1937, op cit, pp.17, 19

34 Goot, loc cit


36 ‘Marconi’s Latest Discovery’, in Radio Foundation Day, 1937, op cit, p.27

37 Goot, loc cit

38 Radio Foundation Day, 1937, op cit, pp.24, 27. (This hope was also that of Marconi, who had elsewhere expressed the desire ‘to bring the whole world together’ through developments in radio.)


This sensitivity to the security of its communication links with Britain had a considerable history in Australia. For example, the July 1888 ‘Silencing of the Cables’, when the simultaneous breaking of both undersea cables in the
vicinity of Java galvanised colonial defences as fears rose that it was an act of sabotage in preparation for an attack by the Russian fleet. (Argus, 2/7/1888, 3/7/1888, Age, 4/7/1888) The vulnerability of submarine cables and foreign relay stations was again demonstrated during the First World War.

40 Moyal, loc cit; Goot, loc cit; Parliamentary Committee on Wireless Communication, Record of testimony of Rt Hon WM Hughes, ‘Commonwealth Parliamentary Papers’, 1922, p.20.
41 Hooke, 1938, op cit, p.3
42 Parliamentary Committee, 1922, op cit, p.16
43 ibid, p.13
44 ibid, pp.15-17
45 Larkins, August 1927, op cit, p.10
46 Parliamentary Committee, 1922, passim. The Australian stations were those built at Rockbank and Ballan 1926-27.
49 Eg, Marconi, 1927, op cit, pp.6-11; also Larkins, May 1927, op cit, p.75
51 Parliamentary Committee, 1922, op cit, p.10
52 Radio Foundation Day, 1937, op cit, p.22
54 Chairman Sir George Mason Allard, at AWA Annual General Meeting, 29/101926 (National Australian Archives, MP 341/1/0, 1938/5723, Box 553)
55 ibid, p.8; Mason Allard, op cit.
56 Miller, op cit, pp.5-6
57 National Archives of Australia, MP927/1 (A259/18/442), AMF Minute Paper, February 1946.
58 The Argus, 16th March 1927, p.25
59 There are unsubstantiated stories among people at both Rockbank and Ballan that volcanic base of the areas, and perhaps its iron content, was a factor in the selection of the sites.
60 National Archives of Australia, Department of Army, A259/18/442 (12th January 1943).
61 Hall, op cit, pp.15, 113, 126, 184.
63 McLean, April 2004, op cit, p.6
64 Radio, 1st September 1926, p.29
65 Ratebooks, 1925-26 & 1929-30, Shire of Melton.
66 Radio, 8th December 1926, p.23
67 National Australian Archives, MP 341/1/0, 1938/5723, Box 553. (There were obviously teething problems with the PMG line after the opening, as on 16th April 1927 The Bacchus Marsh and Melton Express reported an incident in which the Ballan station, having lost communication with Rockbank via the landline, was forced to ‘wireless’ the Beam station in England which in turn contacted Rockbank, who received the message ‘almost immediately’.)
69 Ratebooks, 1926-27, Shire of Melton.
70 Eg, The Argus, 16th March 1927, p.25; The Argus, 6th April 1927, p.23.
71 The Herald, 5th April 1927; The Argus, 6th April 1927
72 The Argus, 6th April 1927. Bruce appears to have chaired the 1922 Parliamentary Committee.
73 Miller, op cit, pp.14-15
74 The Herald, 8th April 1927, p.1; The Argus, 8th April 1927, p.20.
75 Radio Foundation Day, 1937, op cit, p.19
76 The Herald, 8th April 1927, p.1; The Argus, 8th April 1927, p.20.
77 The Argus, 11th April 1927, p.16
78 Radio, May 1927, p.12
80 AWA, 1927, ‘The Australian Beam Wireless Stations’ (Part One), in The Electrical Engineer, May 16th, pp.53-56; also Radio, May 1927, op cit, p.19
81 McLean, April 2004, op cit, p.8
82 Radio, 29th September 1926, p.8; Radio, 5th January 1927, p.1
83 McLean, Ian July 2004, ‘Rockbank, Fiskville and the Beam Wireless, Part 2’, Radio Waves, HRSA, pp.12-13; also Miller, op cit, pp.16-17; also Caslon, Australasian Telecommunications Profile: History (Caslon)
84 The Age, 17th October 1934, enthused that ‘the new photogram service brings an entirely new and speedy facility to the Australian businessman, saving at least a month in the delivery of rush documents and pictures, and enables transactions in which photographs, drawings, plans or signatures are concerned to be carried out with telegraphic despatch’ … fashions, music, cheques, balance sheets, legal documents, contracts, birth and marriage certificates could all be transmitted without delay. (This story was featured in the newspaper’s history: The Age: 150 years since 1854)
85 ibid. (The assassination of King Alexander of Yugoslavia in Marseilles, published 17th October 1934, was the other one of this first group of picturegrams, Miller, op cit, p.17)
86 Miller, op cit, p.16
87 Radio, May 1927, p.18
88 Hooke, 1938, op cit, passim; Miller, op cit, p.6; Amalgamated Wireless (Australia) Ltd, 1930, op cit.
89 Miller, op cit, p.12
90 Amalgamated Wireless (Australasia) Ltd, 1930, *op cit*.
91 *ibid*, p.12
92 Miller, *op cit*, p.11
93 *ibid*, p.10
94 Fellows of the Australian Academy of Technological Sciences and Engineering, 1988, *op cit*, p.553 (Chapter 8). In 1989 the Australian Telecommunications Commission was restructured as the Australian Telecommunications Corporation. OTC merged with Telecom in 1992.
95 McLean, July 2004, *op cit*, p.13
96 Miller, *op cit*, p.18
97 *ibid*
99 Miller, *op cit*, pp.18-19
100 *ibid*
101 Miller *op cit*, p.12
102 *ibid*
104 McLean, July 2004, *op cit*, p.10
105 The architectural descriptions of the buildings, and discussion of the source and likely architect of the works, are based on the architectural description of the building provided by Dr David Rowe for the Shire of Melton Heritage Study 2006.
109 Larkins, August 1927, *op cit*, pp.10-11, 74
111 Marconi’s public acknowledgement of a role for Fisk in the famous 1918 long distance demonstration (apparently initiated by Fisk) is a concession of an earlier claim to this achievement as his own.
113 McLean, April 2004, *op cit*, p.5
114 Goot, *loc cit*
115 Amalgamated Wireless (Australasia) Ltd, 1930, *op cit*
116 By the early 1920s, for example, the Post Office Radio Department in Melbourne was able to provide the Parliamentary Committee with an extensive report on its reception of high powered, and ‘valve’, stations around the world (Parliamentary Committee, 1922, *op cit*, p.17)
118 Hall, *op cit*, pp.114-116