

# How Wireless Developed in Australia

## THE EARLY DAYS

Soon after the advantages of wireless telegraphy had been clearly established, interest was taken in its future possibilities in Australia. Tasmania was particularly anxious to establish wireless communication with the mainland, and the Commonwealth Government was approached in October, 1901, with the view of a wireless service between Tasmania and Victoria being undertaken by the Marconi Company, via King Island in the Bass Straits.

In October, 1902, a proposal was submitted by the Marconi Company for the establishment of a wireless service between Australia and New Zealand, but the P.M.G.'s Department opposed the scheme on the grounds that the business was provided for by the Eastern Extension and Pacific cables, and the cable rates were lower than those proposed by the Marconi Company.

In February, 1903, a joint memorandum by the Departmental Electrical Engineers in New South Wales, Victoria, and Queensland regarding the practicability of establishing wireless telegraphy between Victoria and Tasmania, reported:—"There is no doubt that telegraphic communication can be established by the Marconi system between Victoria and Tasmania." No action was, however, taken by the Government at that stage.

## THE FIRST OFFICIAL TESTS.

On June 1, 1903, the Electrical Engineer of the P.M.G.'s Department, Queensland, made the following report, which is particularly interesting, as it relates to the first official tests with wireless telegraphy in Australia:—

"I have to report that trials of the Marconi Apparatus for Wireless Telegraphy have been carried out from time to time in conjunction with the Naval Authorities as opportunity has offered. Communication, satisfactory in every way, has been maintained between Tangaluma (Moreton Island) and the Naval Stores, South Brisbane. Preliminary experiments were not satisfactory owing to the fact that the requisite height of vertical wire was not available. When, however, the vertical wire was increased to the requisite length no difficulty was experienced. The two sets of apparatus used were from the 52 obtained by the Imperial Naval Authorities from the Marconi Company for marine use."

In July, 1903, the Marconi Company offered a Tasmanian service, to do the same work as the cable, at a cost of £5,000.

In April, 1904, the Marconi Company quoted for stations on islands in Torres Straits, but the Government was still undecided what to do in the matter.

Early in 1905 the Admiral commanding the Australian Naval Station recommended the establishment of wireless stations on certain points of the Australian coast, and these recommendations were referred to a conference of electrical engineers of the P.M.G.'s Department which sat in Melbourne. They were also considered by the Defence Department, which requested information regarding the arrangements between the Admiralty and the Marconi Company.

On May 30th, 1905, the Telefunken Company offered to establish a wireless communication between Victoria and New Zealand, and between Sydney and Lord Howe and Norfolk Islands. Proposals were also received by the Government between 1902 and 1905 with regard to the Slabys, Lodge-Muirhead, T. E. Clark, Heinicke, De Forest, and Shoemaker Wireless Systems.

#### PARLIAMENTARY ACTION.

The first parliamentary action with regard to wireless in Australia was taken in October, 1905, when, following similar legislation in Great Britain in 1904, the Federal Parliament passed the Wireless Telegraphy Act, which gave the Commonwealth complete control of wireless activities, with wide powers. The Act remains in force, an amendment having been passed in 1919 embracing wireless telephony as well as telegraphy. Numerous regulations dealing with the licensing of stations, broadcasting, and other phases of wireless have been issued under this Act.

The first land stations in Australia were erected in 1905 at Devonport (Tasmania) and Point Lonsdale (Victoria) by Messrs. Dowsett and Densham, on behalf of the Marconi Company. They carried on communication over a distance of 180 miles. No further steps were taken to develop wireless in Australia until 1907, when a conference comprising representatives of the Commonwealth Defence and Postmaster-General's Departments, together with a representative of the Royal Navy, recommended the immediate establishment of stations at Sydney, Cape York, Port Moresby, and in Torres Straits, with the erection later of stations at Wilson's Promontory (Victoria), Fremantle, Cape Leeuwin (W.A.), Geraldton (W.A.), and on the north coast of Tasmania. In March, 1908, tenders were invited for the installation of stations at Cape York, Thursday Island, Goode Island, Port Moresby, and Fremantle. Five tenders were received, but none were accepted.

In the following year (September 9, 1909) the House of Representatives passed the following resolution, moved by Mr. W. H. Kelly, M.P.:—"That this House is of opinion that wireless telegraphic stations should be immediately established as found desirable round the coasts of Australia, and that our merchant marine should be equipped with wireless installations as an up-to-date means (1) of gaining intelligence of the appearance in Australian waters of a hostile force, and (2) of saving life and property imperilled by accidents upon the sea." Sir John Quick (Postmaster-General) accepted the motion on behalf of the Government, and announced that £10,000 would be placed on the Estimates for wireless telegraphy installations.

### THE FIRST TWO EFFICIENT STATIONS.

With this mandate, the Postmaster-General's Department in October, 1909, took the first step towards the installation of efficient, up-to-date stations. The tender of the Australasian Wireless Company (which owned the rights of the Telefunken Company) was accepted for £4,150 for a station at Perth, and £6,150 for a station at Sydney, the site in the latter city being Pennant Hills, which is still used for the purpose, and is destined to become a large wireless centre in the near future—a powerful broadcasting station, a feeder station for the long-distance beam stations, and a coastal station being concentrated in this area.

The Sydney station was opened on August 19, 1912, and the Perth station on September 30, 1912. Both stations were of the "quenched spark" type.

Small experimental stations had previously been erected under licence at Randwick (Sydney) and King Island (Bass Strait) by Father Shaw, who conducted research work and manufactured wireless equipment under the name of the Maritime Wireless Company, afterwards called the Shaw Wireless Company. The King Island station was closed on the introduction of the Government's own commercial system. There was also a station handling commercial traffic at the Hotel Australia, Sydney, operated by the Australasian Wireless Company, under license during 1911 and 1912.

A conference to consider the development of wireless in the Pacific (to which reference is made elsewhere) took place in Melbourne on December 15, 1909, and this had directed additional attention to the subject.

### NAVAL WIRELESS SCHEME.

In August, 1910, Admiral Sir Reginald G. Henderson had been asked by the Commonwealth Government to report on Australian Naval Defence, and he included wireless in his report, dated March 1, 1911. He recommended a complete scheme of wireless stations as necessary for Australia from a naval point of view, comprising (a) a system of high-power stations for transmission from the central authority to the fleets at sea; (b) a system of medium-power stations for normal ship to shore communication, and also for commercial purposes.

There were to be three high-power stations capable of transmission day or night over 1,250 miles, to be erected at Sydney, Port Darwin, and Perth. Thirteen medium-power stations were recommended at Thursday Island, Port Moresby, Townsville, Brisbane, Port Stephens, Sydney, Westernport, Port Lincoln, Hobart, Beauty Point, Fremantle, Cone Bay (or other port on the New South Wales coast), and Port Darwin. These stations were to be used for commercial work, and be capable of communication over 500 miles on wave-lengths ranging from 600 to 2,200 metres.

Admiral Henderson recommended that the Commonwealth Government should take control of wireless in Australia into its own hands from the first, and erect and operate all the stations required for public and private purposes, being completely independent, including manufacture and training, the control being invested in a special branch of the Post Office.

### FIRST VESSELS EQUIPPED.

The Government had been stimulated to take action by the arrival of steamers from overseas which were equipped with wireless, but were unable to communicate with the mainland because there were no coastal stations. The first merchant ships equipped with wireless to arrive in Australia were the s.s. "Malwa," of the P. and O. Line, the s.s. "Otranto," of the Orient Line, and the s.s. "Bremen," of the Norddeutscher Lloyd. The s.s. "Otranto," in 1911, was able to exchange wireless messages with H.M.S. "Powerful," which was lying in Sydney Harbour, the "Otranto" being 200 miles north-west of Fremantle—a total distance of more than 2,000 miles. This was regarded as a notable achievement at that time. The first Australasian-owned merchant ships equipped with wireless were the s.s. "Riverina," s.s. "Ulimaroa," and s.s. "Zealandia," of the Huddart Parker Line, in 1910. Other Australian inter-State companies, followed, some being equipped by the Australasian Wireless Company, and some by the Marconi Company.

### GOVERNMENT ORGANISATION.

In 1911 Mr. E. T. Fisk (now Managing Director of the Amalgamated Wireless Company) came to Australia to represent the Marconi Company's interests in advancing the science of wireless throughout Australasia, and on behalf of the Marconi Company he submitted a proposal for erecting stations in the Commonwealth. Arrangements had in the meantime been made by the Government to commence its own controlling organisation. The late Mr. J. G. Balsillie was brought from England by the Fisher Government and was appointed Engineer for Radiotelegraphy in 1911. Mr. Balsillie advised against the Marconi Company's proposal, and undertook to produce a system which would not infringe the Marconi patents. In collaboration with Father Shaw, he designed apparatus which was manufactured at the Randwick works, employing a spark system with air blast gaps. Action was taken subsequently by the Marconi Company against the Government for infringement of patents, and the matter was compromised by a payment by the Government. A number of stations were erected round the Australian coast, and in Papua, between 1912 and 1914.

### THE AMALGAMATED WIRELESS COMPANY.

In 1913 Amalgamated Wireless (Australasia), Limited, was formed, absorbing the Australasian Wireless Company and its rights, and possessing the Australasian rights to the patents of the Marconi Company, England, and associated companies in the United States, France, Germany, and elsewhere. The Company was thus in the fortunate position of possessing the exclusive rights in Australasia to the world's principal wireless devices, and was assured in particular of the close co-operation of the Marconi Company and the benefit of its research and business organisation, without any form of financial or other control. The shareholders were drawn mainly from prominent Australian shipping and commercial firms and individuals, and the Directors were leading Australian business and professional men. The Australian share-

holders have, since the inception of the Company, held a considerable majority of the shares.

Mr. E. T. Fisk was appointed general manager of the company, with a seat on the Board of Directors, and three years later was appointed managing director, a position he still holds.

The company immediately took over the whole of the Australasian marine services, which it rapidly extended, and gradually built up a comprehensive wireless organisation in Australia covering all developments, including manufacture. Since the company was formed, in 1913, it has been the only commercial undertaking in Australia to conduct wireless services of any kind. Its various activities are described elsewhere.

### WAR ORGANISATION.

German medium power stations were captured by the Australian Expeditionary Force at Bitu Paka (near Rabaul), and at Nauru, in 1914, and are still in operation.

The Wireless Section of the Expeditionary Force was led by Radio-Commander F. G. Cresswell, and the men and equipment were supplied by the Amalgamated Wireless Company. The demand for these men and equipment was made at 8 p.m. on August 8, 1914, and the entire organisation was completed and shipped by 3 a.m.—seven hours later. Two members of the expedition established a station at Noumea, New Caledonia, and maintained a wireless service with Australia, communication having been interrupted owing to the breakdown of the New Caledonian cable. The work done in capturing the German stations and in operating them and others in various parts of the Pacific during the critical early days of the war was of first-class importance.

Additional stations in the mandated territory were built in 1915.

In 1916 the Navy Department assumed control of wireless in Australia from the Postmaster-General's Department, and continued in charge until October, 1920. During the war much valuable work was done by the wireless branch of the Australian Navy. Apart from the work of ensuring efficient communication between warships and intercepting enemy signals, the Department had to arrange for wireless stations on transports, and trained more than 200 operators for this purpose. The ordinary commercial services, through the coastal and ship stations, were continued, with necessary limitations imposed by the war, with the co-operation of the Postmaster-General's Department.

In 1916 the Commonwealth Government purchased the Shaw Wireless works at Randwick, and the Navy Department, which controlled the works, undertook the manufacture of wireless equipment and also electrical apparatus for the Post Office and other Departments.

It may be here mentioned that during the war a large number of wireless operators and considerable quantities of materials were supplied from Australia by the Amalgamated Wireless Company. Ships were equipped, stations were erected in the Pacific, military pack sets were manufactured,

men were recruited from the commercial services and from the ranks of the experimenters and trained for service in the navy, army, air force and transport services. Equipment, manufactured in the Company's Radio-Electro Works, was supplied to India, Japan and other countries which could not be conveniently reached from Great Britain.

A valuable contribution was thus made to the war resources, not only of Australia but of the whole Empire by the Amalgamated Wireless Company which organised most of this work in conjunction with the Naval and Military Authorities. In this and other ways there was provided support for the prediction that Australia would before long become the most important wireless centre in the Pacific.

Although the Amalgamated Wireless Company was restricted in its development on account of the War and the delays which took place with the completion of the Imperial wireless scheme, every effort was made to build up an organisation which would be prepared to deal with the larger problems of world-wide communication when this was made practicable. It gathered round it an efficient staff, kept in close touch with modern inventions, engaged in research and experiment, which included reception from the high-power stations in different parts of the world, and perfected the commercial side of the work. When the time came in 1921 for real progress the Government found at hand an efficient Australian undertaking well-equipped to present practical schemes.

## **AGREEMENT WITH AMALGAMATED WIRELESS COMPANY.**

### **Co-operation with Government.**

As the result of the discussions at the Imperial Conference, 1921, and the information which the Government had obtained with regard to the possibilities and advantages of direct long-distance wireless communication, including the results of successful reception tests in Australia, the Commonwealth Ministry decided to endeavour to arrange for a direct service between Australia and England independently of plans for a complete Empire chain.

Between 1917 and 1921 the Amalgamated Company had made successful tests in reception of daily messages direct from England and other countries, and in 1919 the Commonwealth Government called for expert reports with regard to a high-power Station in Australia for direct communication with England. Among the sites then suggested for a high-power station was Lake Eyre in Central Australia, the location being selected in order to render the station immune from attack.

From its inception the Directors and Staff of the Amalgamated Wireless Company had adopted a progressive, courageous policy, believing that Australia was destined to be the pivot of the Wireless Systems of the Pacific and Indian Oceans. The Company immediately recognised both the possibilities and the importance of direct communication, and it was fortified in its confidence by the remarkable results attained by its own Staff in long-distance reception, and by the technical support of the Marconi and other companies, whose patents it operated.

Undeterred by opposition from many quarters, the Company concentrated

its energies on preparing proposals for a long-distance scheme. So-called "experts" ridiculed the Company's plans, and the pressure against them was almost overwhelming. The Company, however, ultimately had the satisfaction of seeing the opposition withdrawn, and the cogent arguments and practical proposals submitted by Mr. E. T. Fisk on behalf of the Company, which had been challenged so strongly, were subsequently, in the main, accepted.

Without the foresight, initiative, enterprise, bold advocacy and technical progressiveness of the Amalgamated Wireless Company, it is doubtful if the subsequent course of events would have been shaped so satisfactorily.

The Amalgamated Wireless Company, which had been able to secure guarantees from the Marconi Company, submitted proposals to the Government for the erection of high-power stations in England and Australia, the Government to join the company in the enterprise. A proposal on similar lines had been submitted to the Government prior to the Imperial Conference of 1921 and no doubt influenced Mr. Hughes' action at that gathering. The new proposals were subjected to various modifications, and ultimately took the form of a draft agreement which Mr. Hughes submitted to Parliament. He accepted a proposal of Mr. Charlton, Leader of the Opposition, that the details should be referred to a committee, and the House of Representatives and the Senate passed the following resolution on December 9, 1921:—

"That this House approves of the execution by the Prime Minister of the agreement proposed to be made between the Commonwealth and Amalgamated Wireless (Australasia) Ltd., a draft of which has been laid upon the table of the House, subject to investigation and approval, with such alterations as they may deem necessary by a Committee consisting of six members of this House (two nominated by the Prime Minister, two by the Leader of the Opposition, and two by the Leader of the Country Party) and three members of the Senate."

In the course of the debate, all the Party Leaders condemned the Norman Imperial chain scheme, and the general opinion was that, subject to adequate safeguards, the scheme embodied in the agreement presented a far superior alternative.

#### AGREEMENT SUPPORTED.

In a speech in the House of Representatives on October 5, 1921, in which he discussed the proceedings of the Imperial Conference in a comprehensive review, Mr. Hughes strongly condemned the Norman Scheme, and announced particulars of the scheme submitted by the Amalgamated Wireless Company.

In his speech on December 7, 1921, moving approval of the proposed agreement between the Commonwealth and the Amalgamated Wireless Company, Mr. Hughes provided convincing support for the policy of the Government. He said that it was essential for propaganda purposes that Australia should be able to communicate direct with other countries. He again condemned the Norman Scheme on the grounds of delay and financial loss, and strongly advocated approval of the agreement with the Amalgamated Wireless Company.

Summarising the position, Mr. Hughes stated: "The questions for the

House to consider are these: Are we to accept the Norman Scheme, with its system of relay, and its annual loss of £20,000, on top of which would be the annual loss of £60,000, which the Commonwealth is now incurring and in return get a scheme which will not put us in direct communication with Great Britain, Canada, the United States of America, South Africa and the East. On the other hand, we may secure a scheme in which the Commonwealth will be the principal shareholder, and in which practically all the rest of the shareholders will be Australians domiciled in this country; a scheme which has rights over the Marconi patents, has at its command trained experts, and is managing a profitable business here, in glaring contrast to that which the Commonwealth is managing."

Mr. Charlton, Leader of the Opposition, said: "I agree with the Prime Minister in regard to the discarding of what is known as the Norman Scheme. That scheme was not at all satisfactory, and cannot be compared with that embodied in the agreement before us."

Dr. Earle Page (Leader of the Country Party) said: "I agree with the Prime Minister that the Post Office should not be called upon to handle this matter of dealing with wireless, because we are already showing a loss of about £57,000 per annum on our radio activities, and wireless development is controlled to a large extent by patent rights without which no company could carry on. Of the three proposals before us, the Norman proposition is not worth considering, alongside that which has been submitted by Amalgamated Wireless (Australasia) Limited."

#### PARLIAMENTARY COMMITTEE'S REPORT.

In accordance with the resolutions passed by both Houses of the Federal Parliament, a representative Select Committee was appointed, comprising Mr. S. M. Bruce (now Prime Minister) as Chairman, Mr. W. G. Gibson (now Postmaster-General), Senator R. V. Wilson (now Minister for Markets and Migration), Brigadier-General Senator E. Drake-Brockman, Senator J. D. Millen, and Messrs. J. A. J. Hunter, G. A. Maxwell, J. H. Catts, and F. Brennan.

The Committee reported on March 17, 1922, that separate proposals were submitted by the Amalgamated Wireless (Australasia) Ltd. and the Radio Communication Company, London. The Committee was unable to recommend the adoption of either of these agreements in the form presented, but recommended the Government to execute an agreement with the Amalgamated Wireless Company in an amended form. This agreement was signed on March 28, 1922.

The Committee had log books containing signals intercepted by operators employed by the Amalgamated Wireless Company at its experimental station at Koo-wee-rup, Victoria, placed before it. These showed the receipt of signals of varying intensity over a period of years during certain hours of the day direct from New York Radio Central, Long Island; Koko Head, Honolulu; San Paolo, Rome; Leafield, England; Carnarvon, Wales; Eiffel Tower, Paris; Bordeaux, France; Nauen, Germany; and other stations.

The first long-distance signals intercepted in Australia by a commercial station were messages exchanged between New York and German stations in August, 1916, which were heard at the Pennant Hills Station, Sydney. These



were verified subsequently by the officer in charge of the New York station. This constituted a record at the time for long-distance reception. The Australian naval wireless service also regularly intercepted messages from the German high-power station at Nauen and other distant stations during the later period of the war. The reception from Nauen reached 2,000 words a day.

Mr. W. M. Hughes, Prime Minister, informed the Committee that the British Press was opposed to the Norman Scheme mainly because it would be controlled by the Post Office, and the Imperial Conference held in June, 1921, was divided on that point. He (Mr. Hughes) was not in favour of the Post Office in England or Australia controlling wireless. The position was quite clear to the British Government, and if Australia insisted on a direct service and erected a station, no obstacles would be placed in the way of the Company erecting and working a similar station in England. If such assurances had not been received it is doubtful if the Committee would have approved the agreement.

#### PROVISIONS OF AGREEMENT.

The principal provisions of the agreement were as follows:—

- (1) The Company to increase its capital to £1,000,000 divided into 1,000,000 shares of £1 each, of which the Commonwealth was to be allotted 500,001.
- (2) Seven Directors, three to represent the Commonwealth and three other shareholders, the seventh Director to be selected by a majority vote of the other six.
- (3) No action affecting defence or external affairs or the sale of the Company's business or changes in the status, powers, objects or constitution of the Company to be taken without the consent of the Commonwealth expressed through its representatives on the Board of Directors.
- (4) The Company not to be a party to any commercial trust or combine but always to remain an independent British business.
- (5) Company to construct, maintain, and operate in Australia the necessary stations and equipment for a direct commercial wireless service between Australia and the United Kingdom, including feeder stations.
- (6) Rates not to exceed: Full rate 2/- per word, deferred 1/-, week-end 6d. (minimum 10/- per message), Government 1/-, Press 5d., deferred Press 3d.
- (7) The Company to arrange for the operation of suitable corresponding stations in the United Kingdom.
- (8) Main trunk stations in Australia and the United Kingdom to be provided within two years from the date of the agreement.
- (9) Similar station to be provided in Canada within two years.
- (10) Company to take over and operate Commonwealth radio stations on certain terms.
- (11) Company to enter into an agreement within six months for erection of Canadian and United Kingdom stations. Agreement to contain guarantees approved by the Commonwealth Directors.
- (12) Service to comprise a minimum basis of 20 words per minute each way for 12 hours per day for 300 days a year.
- (13) In time of war or public danger Company, if required, to hand over control of stations, etc., to Commonwealth.

The agreement was much improved from the point of view of the Government as the result of the scrutiny by the Committee, as more stringent guarantees and safeguards and a closer control by the Government were thereby ensured.

A contract was subsequently made with the Marconi Company for the erection of high-power stations in England and Canada and for the erection of a similar station in Australia at a cost of £487,000. All progress with this work was, however, suspended owing to the refusal of the Imperial Government to grant a licence to the Marconi Company for the erection of a high-power station in England in accordance with its contract with the Amalgamated Company. There was no satisfactory response to the representations by the Commonwealth Government that the Imperial Government should honour its acquiescence in July, 1922, of a contract with the Marconi Company and the announcement by Mr. Bonar Law on March 5, 1923, that the Government would issue licences for communication with the Dominions. A proposal that the Australian Government should itself be licensed was also declined.

#### THE BEAM AGREEMENT.

As in England, the development of the beam system completely changed the outlook. The Government and the Company were so satisfied with the prospects of the new system and so impatient with the delay that had taken place, that it was resolved to erect a beam station in Australia and trust to events being shaped sufficiently satisfactorily in England to permit of a reciprocal station being erected in that country. The advantages assigned to the new system seemed so overwhelming that the Government had no hesitation in proposing a fresh agreement with the Amalgamated Wireless Company relieving it of such of its obligations under the first agreement as had been rendered impossible by the circumstances in England or unnecessary by the new system.

The view was taken that it was folly to spend £500,000 on a high-power station when far better results could be obtained with an expenditure of one-fourth that amount, with corresponding savings in maintenance and operating charges, resulting from lower power and simpler construction of the station and equipment. The facts that at least double the speed would be obtained with the new system; that the short waves, aided by a choice of direction, would enable communication to be maintained throughout the 24 hours; and that the directed "beam" would permit a far greater element of secrecy in transmission than would be possible with the broadcasted high-power transmission all strongly appealed to the practical minds of Ministers and Directors. The following technical points also impressed them: (1) the utilisation by stations in different parts of the world of the same wave-length without interference; (2) the utilisation of a valuable band of low wave-lengths which could not be used by the high-power station; (3) greater freedom from atmospheric disturbance; (4) greater facility for wireless telephony which is much more difficult with high-power stations; (5) less fluctuation in signal strength.

The only doubt was whether the system had passed the experimental stage. But the high-power scheme was in no better position so far as Aus-

tralia was concerned—indeed, the low power, short wave tests gave far superior results in strength, continuity and period of reception than the high-power long wave tests had done.

Any system must remain experimental until it has been established on a commercial basis with full equipment. The Government preferred to experiment with an expenditure of £150,000 than with an expenditure of £500,000.

On July 24, 1924, Mr. Bruce explained in the House of Representatives the changed position that had arisen, and stated that the British Government advised the Commonwealth to proceed with both high-power and Beam Stations, but it was decided to proceed only with a Beam Station, in view of the advantages above summarised.

A fresh agreement was accordingly concluded between the Company and the Government dated August 20, 1924, subject to ratification by Parliament, which was granted on September 11, 1924. The main terms were that the Company should be relieved from its obligations to arrange for the provision of stations in the United Kingdom and Canada and to arrange the rates, and from its guarantee to provide a wireless service between Australia and the United Kingdom and Canada. The conditions attaching to this relief were that the Company should enter into an agreement for the erection of a main trunk station capable of providing a commercial wireless service with the United Kingdom and Canada when corresponding stations were erected in those countries with a minimum traffic capacity of 21,600 words per day each way for 300 days per year at an estimated capital cost not exceeding £120,000. Such agreement was to contain guarantees similar to those provided in the original agreement.

The Company was given power to charge not more than one-half of the charges specified in the original agreement for its part in the transmitting to and receiving of messages from the United Kingdom.

The obligations and powers of the Company were thus confined to the Australian end of the system, leaving arrangements for the reciprocal stations to be completed at a later date. The erection of the Canadian station is now far advanced, and work on the English station has been commenced. Traffic agreements are now being negotiated.

In moving the second reading of the Bill ratifying the revised agreement on August 22, 1924, Mr. Bruce reviewed the position on the lines above indicated in a closely reasoned speech. He referred to the undertaking given at the Imperial Conference, 1921, that no obstacle would be placed in the way of Australia making arrangements for a direct service to Great Britain, and the erection of a reciprocal station there. Reference was also made to the statement made by Mr. Bonar Law in March, 1923, which Mr. Bruce stated "has always been interpreted to mean that the British Government was prepared to alter its policy in regard to the issue of licences to private companies or individuals for the erection of stations for communication with the Dominions."

Opposing the high-power station, Mr. Bruce said: "Such amazing developments have occurred in wireless during the past two or three years that by the time a high-powered station had been erected at a cost of nearly £500,000, it

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would probably be obsolete and useless. The Government is confident that it would be a grave mistake in all the circumstances to involve the country in an expenditure of nearly £500,000, to erect a high-powered station when a beam station will provide an equally satisfactory service at a greatly reduced cost."

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