An era in radio communications

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*A slightly condensed version of the Slade Lecture 1968, commemorating the late Ralph Slade, a pioneer in New Zealand radio.**

RALPH SLADE was one of the most important personalities that New Zealand has had in the realm of radio communications. While still a schoolboy he developed an enthusiasm which was to urge him forward to leadership in radio and electronics for more than 40 years. His leadership became established when, as a boy in Timaru in 1922, he received the first signals in New Zealand from North America on 200 metres, and then, two years later, he was the first ever to transmit from this country to the United Kingdom.

Radio in the 1920s

It is interesting to try and visualise the radio scene as it was in New Zealand in the early 1920s. The triode valve had made its appearance but some at least were remnants of the surplus market after World War I. The valves took three or four watts for the filament, mainly as light. Receiving had the benefit of the remarkable sensitivity of the regenerative detector. The signals that could be heard were those of the "spark" era; ships working with the Government Telefunken stations at Auckland, Wellington, and Awarua, and Awanui working on 2000 metres to Apia, Samoa. One or two ships had arc transmitters but in general there was no continuous wave transmission in this part of the world. There was no broadcasting or amateur transmitting, or regulations, except prohibitions under the Post Office Act. In 1921 however, it became possible, after passing a morse test to obtain a provisional receiving permit.

There was little access to technical literature, and no recognised qualifications or instructional facilities, except those concerned with the "spark" system, for ships' operators. Other technical fields were somewhat similar. Effective telephone contact between New Zealand cities was still in the distant future. The latest Ford car was the Model T. Electric power was being generated at Lake Coleridge. Many streets and houses used gas lighting. One advantage that the keen student of radio had was the smallness of the subject. A year or two's intensive study and he could probably learn all there was to learn. Electronics had not been named, nor had it really started.

In 1923 the Government brought out regulations providing for the licensing of broadcasting stations, also amateur and experimental stations. It was in November 1922 that Ralph Slade startled the radio fraternity, both here and abroad, by logging large numbers of American amateur stations—one of the first demonstrations of the spectacular effects of ionospheric transmission, and directly associated with one of the great "break-throughs" of this century, the discovery of the utility of short waves. He joined the staff of the Post Office as an engineering cadet in Dunedin and while there, continued his vigorous amateur transmitting experiments, with higher power and higher frequencies. In the middle of 1924 the late R. J. Orbell took an amateur transmitter on a voyage to England via Cape Horn and conducted tests with New Zealand stations. He was able to hold the signals transmitted by Ralph Slade right into the Atlantic in the vicinity of Pernambuco. Then, about 16 October 1924, he received a cable message saying his signals had been heard in England. This accomplishment led directly to greater efforts by New Zealand amateurs, and, a few days later, F. D. Bell established two-way communication between this country and the United Kingdom, a most significent event. The use of short waves and the technique for transmitting and receiving was well advanced in leading research establishments in Europe and the United States at this time—in fact the elegant "beam" system of C. S. Franklin and Marconi was in the final stages of design, and had been used for short-distance links. But the idea of communicating over really global distances was new, and full marks must go to those who demonstrated it, far in advance of theory to explain it, and whose slender resources had to be balanced by the personal enthusiasm and ability they had developed.

The Influence of Ralph Slade

Ralph Slade continued his Post Office career in Dunedin and in Wellington. One event of interest then was the use of radio after the Murchison earthquake of 1929. Radio came into its own on that occasion, as all contact with the West Coast had been lost and the earthquake was reported through a ship at Westport. The Post Office sent teams to the area with radio equipment, and responsibility gravitated to Ralph Slade who went to the stricken towns and obtained emergency communications pending line repairs. This was the first of many applications of radio in emergencies in this country. The Post Office environment was evidently somewhat unsatisfactory, however, and he decided to leave, to join another prominent amateur experimenter, W. Dawson, in the commercial world, with the firm in which he was identified for the rest of his career. His responsibility increased after W. Dawson's early death and throughout the 1930s it appeared, to an outside observer, that Ralph Slade was an essential element in the growth and standing of his firm.

It is difficult to make brief reference to the position of New Zealand radio in World War II and give it the importance it deserves. The provision of radio equipment for the army, for instance, was by no means simple. Even the elementary radio training equipment was expected to be imported from England because only in that way would the "training manual" be followed correctly. All sorts of difficulties arose. It became recognised however, that radio was important and that the New Zealand radio industry could make a contribution if properly organised. Ralph Slade was appointed Controller of Radio Production and had responsibility and authority to do what was necessary in the industry

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as a whole to produce field and other radio equipment for the Armed Forces. It was a difficult task, to be taken only by someone having the respect of the people he had to control, and with the knowledge and the ability to meet wartime conditions and get the job done. The marvellous contribution made by the New Zealand radio industry testifies to Ralph Slade's success, due to his personal approach, sincerity, knowledge and ability.

The Slade influence was to be perceived in his firm under postwar conditions also. He had an ingrained wish to see the triumphs of science put to use for the benefit of the community and the nation. His association with electronics in its present-day sense had started at the beginning and carried through to the day of electronics applications in almost all fields of endeavour.

The constructive pre-war era

In the period up to about 1940 the dominant factor was private enterprise. To a large extent it hinged on broadcasting, but not entirely. Technical experimenters in the early 1920s undertook amateur inter-communications and broadcasting, and a few permits were granted even before the 1923 regulations came out. At that time the stations identified themselves by giving the name of the firm, e.g., "This is Wellington Broadcasters Ltd., comprising the following firms: Thomas Ballinger, A. R. Christian, and the International Radio Co., broadcasting from the Ford Building, Wellington."

The Radio Regulations 1923 laid down the conditions for amateur and broadcasting transmitters. Broadcasting stations were to be of two types: those that received sustenance from subscriptions, and those that did not. Advertising was regarded as illegitimate.

Large numbers of broadcasting stations sprang up, and some developed quite substantial standards of service. Some proprietors relied on the sales of receivers to meet expenses, e.g., the Auckland Radio Service Co., backed by Spedding Ltd. and Radio Ltd., had a high-grade transmitter at Scots Hall, Symonds Street, and imported a good supply of regenerative receivers from the same manufacturers as the transmitter, for sale to the public. Meanwhile the Government was seeking some private enterprise to tackle the job of providing a Dominion-wide service. William (later Sir William) Goodfellow took it up, with the idea of issuing news to the dairy industry, and he was joined by A. R. Harris of Christchurch, who dealt with the technical and operating side. They soon had a programme of installation under way with ½ kW transmitters at Auckland, Christchurch and Dunedin, and a 5 kW one at Wellington (the most powerful in the Southern Hemisphere). This was the New Zealand Broadcasting Company, the first of the organisations set up with the idea of having a national broadcasting service. Good progress was made but there were many conflicting factors. The monopoly was not a complete one, various pressure groups sprang up, listeners were dissatisfied and, by 1930, the Government decided on a change. This time it was to be a board and the object would be for it to have a monopoly and to rationalise New Zealand Broadcasting. The small private stations were to be taken over or squeezed out, and by the early 1930s only a few remained. A new government in 1935 decided to legitimatise radio advertising and set up a separate government monopoly to exploit it. By this time the board had been dismissed, and the broadcasting service had become a government department. During the war, in the interests of saving staff, the national and commercial services were combined and, in more recent times, owing to the difficulties of operating as a government department, the broadcasting responsibilities have been given to a corporation.

Thus the formative stages of broadcasting in this country were due to the efforts of private enterprise. Good work was done. (It is a pleasure to remember the comparative "high fidelity" of Nimmo's station 2ZW in the early 1930s). But private enterprise was eliminated from the broadcasting scene. It was starved out. Government kept for itself the prerogative of advertising revenue. Monopoly and government control were accompanied by mediocre treatment of a subject that needed alert, vigorous, courageous development. Successive governments have floundered on broadcasting control. This is because they have failed to understand all its basic essentials. Conscious of their ignorance they have become afraid and unwilling to deal with the problems. Unfortunately this is still going on and it seems that it will continue.

In the early days of shortwaves, quite a number of shortwave broadcasting stations came into prominence, e.g. KDKA, PCJJ, 2ME Sydney, and 2AQ, the station of Morton Coutts at Taihape. 2AQ made quite a name in the international experimental field and did a good national publicity job for New Zealand. This could easily have been followed up but nothing was done. A need was felt with the war in 1940, but there was no equipment, no shortwave transmitter in New Zealand except a 1 kW Post Office one and this had to be used in an improvised broadcasting service. Eventually shortwave broadcasting was introduced in 1948, 20 years too late.

The post-war lack of development

In 1935 Wellington's 2YA was increased in power to 60 kW following the policy of trying to get national coverage with a few well-placed medium-frequency transmitters. Even then the imperfections of this policy were known; e.g., the fading characteristics of the frequencies being used, and the wastage of radiated power over the ocean. As the deficiencies in coverage continued there was no alternative to bolstering up the original stations with a large number of intermediate ones. All except one of our frequencies are shared with Australian stations so that high-quality reception is impossible, particularly at night in the winter. All this could be acceptable if it were recognised as one phase of development—but it has been the only development. World practice has turned toward v.h.f. broadcasting, which could have been developing here too for the last 20 years. The longer this is postponed the more costly changes become. There is little doubt that the coverage that our service is giving at present is at a very high cost. The use of stereophonic reproduction of music is now commonplace, as evidenced by its normal provision in disc and tape recordings. Other countries have stereo-radio-broadcast transmissions. But not New Zealand.

The leading technical countries had high-definition television services for several years prior to World War II and the immediate post-war period was the logical time for it to develop here. There was some agitation from the radio manufacturing industry for something to be done. Manufacturers and importers put on full-scale demonstrations, including an ad hoc transmission of the Royal Visit to Wellington in 1953. Keen experimenters tried to get permission to do something and gave demonstrations showing the capacity of New Zealand talent to build transmitters and receivers. Government policy was to delay. An Auckland firm had a licence to transmit experimentally and eventually (in 1958) its transmissions shamed the Government into authorising the Broadcasting Service to conduct similar experiments. They did this so effectively

that the media itself took charge, preventing further hold-ups, particularly from the commencement of the service in 1961. Here we had a technical development for which the country was ready but which was artificially held up. (That it was held up is testified by the mushroom rate of its subsequent growth.) The disturbing aspect of this is that it could happen again, not in the basic service now established, but in improvements.

Fifty years ago we had a communication service with ships at sea in accordance with world standards in all respects. We are not in that position today. In the 1920s gallant efforts were made to provide a service for small vessels that could not justify carrying a skilled operator, so that the ships' officers did the morse operating. This scheme, promoted by the willing cooperation of government, ship owners, and ships' officers was not successful, but the energy put into it reflected the constructive policy of the times. In the 1930s better technique became available with telephony becoming a workable proposition for non-skilled operators. On the initiative of the then Minister of Marine, (the late Rt. Hon. P. Fraser), transmitters for a telephony service on the coast were installed at Auckland, Wellington and Awarua in 1939. Nearly 25 years later this service exists, no worse, no better. World standards in technique have passed it by. Lessons that could be learned from the aeronautical service have gone unrecognised or unheeded. Facilities for a calling device such as the aeronautical Selcall would be an advantage for small vessels, and safety would be enhanced if the channels were tape-recorded at the coast stations. A ready means for off-shore vessels to communicate to the public telephone system would be a useful facility. Large numbers of independent coast stations are now operated by harbour authorities, associations, and other parties, but they have no proper standards and do not participate in a rational scheme of coverage of the coast. Notable service is rendered by some of them owing to individual enthusiasm and ability on the part of the proprietors or operators. An example is the remarkable, magnificent service by Captain James Smith at Port Charles which is a vital contribution to the safety and operation of shipping in that area. All coast stations should adopt modern technique and participate in a scheme of navigational assistance to small vessels, this facility being entirely absent at present. Stations should be inter-connected by leased telephone circuits to ensure ready collaboration. With modern technique a small transceiver is all that is required to talk with a vessel 50 or 100 miles distant. Why should not the shipowner or agent have one on his office desk and the fisherman's wife one in her kitchen to speak with her husband at sea?

Radio for aviation developed in New Zealand in the 1930s. Equipment sufficient for four aerodromes was imported by private enterprise and subsequently taken over and installed by the Government. The other 10 aerodromes equipped before World War II had transmitters and receivers made in New Zealand. They provided for communication with aircraft and for intercommunication between aerodromes. A fortunate circumstance affecting applications of radio to aviation is the effective liaison with world standards and practice, due mainly to New Zealand's active participation in ICAO and also to the vigilance of the Department of Civil Aviation on matters affecting safety.

Outside government departments there was not much educational assistance available to the technical radio student prior to World War II. The recognised technical examination was that conducted by the Post Office, primarily for regulatory purposes. In the Universities, however, radio had come to receive recognition, mainly due to the influence of their Physics Departments. This was to stand the country in good stead during the war. Earlier there had been some research, notably into broadcasting field strengths and studies of atmospherics using the cathode-ray direction-finder.

The development and flourishing of the radio industry

A most important feature of development in the 1920s and the 1930s was that of the radio industry. From small beginnings with the inception of broadcasting, the industry gradually increased in ability and magnitude. By the middle 1930s there was a dozen sizeable firms making and marketing receivers. At least two were making not only receivers but also specialised transmitting and associated equipment. These were New Zealand concerns, built up entirely by private enterprise and responsible for their own policies and affairs. They were typical of a virile, progressive attitude, and an ability to interpret and meet New Zealand requirements. Six of these firms have disappeared. Perhaps their jobs are done better now with the preponderance of overseas influence in the industry. Even if so it is a matter of regret that their previous qualities, proved in the contribution to the war effort—the direct approach to local problems—may be lost to this country in meeting the challenge of the future.

It is impracticable to refer in any detail to the performance of the New Zealand radio industry in wartime. I have mentioned how Ralph Slade as Controller of Radio Production marshalled the resources of the country at that time. The fact that there were some resources to marshal rested on the individuals who had pioneered and built up the industry. Much of the war work was secret, particularly that concerned with radar, and even now not much is known about it. Within a year of starting, however, New Zealand made radar sets for coast watching were installed round our coasts. Supply ships of the United States fleet took New Zealand-made radar sets on their approach to Guadalcanal in 1942. The New Zealand radio industry was more effective in meeting urgent demands than even the vast resources of the U.S.A. in 1942 and 1943. Aircraft were brought to Whenuapai to await the urgent completion of 1 kW c.w. transmitters in Wellington for transporting to Guadalcanal. New Zealand-made equipment was sent on expeditions to provide communications for parties at Fiji, Cook Islands, Pitcairn, Fanning Island, Raoul Island, Auckland Island, Campbell Island, Beru, Funafuti and 20 other islands in the Gilbert and Ellice Group. After 1942, every ship leaving New Zealand was fitted with a non-radiating receiver designed and made here. I have left out the ZC1 programme as everyone knows about it. In brief, the industry, built up before the war, gave a very good account of itself.

Individual enterprise is nowhere better demonstrated than among the amateur-radio-transmitting fraternity. In addition to the great contribution of self education, a national asset in peace and war, the New Zealand Association of Radio Transmitters has organised notable services, in particular the Radio Emergency Corps, which has given world leadership in its field. This was built up mainly in the 1930s, and has firmly consolidated during the last 20 years.

Present and the future needs

The application of radio in communication services is not science, nor is it engineering, although both these have to be used and given proper respect. It is, however, technical and should

be approached with a proper knowledge of the science and engineering involved. The hazards of having decisions made by people who have to rely completely on others for technical advice are very real. Even these most learned and experienced in other avenues, are in a very weak position in deciding about radio services. The best decisions can be expected to come from people with a basically technical upbringing who have studied other wide issues that may be involved. There is a strange discipline that is not understood by non-technical people in our midst. That is the fact that, if a thing is right on sound technical grounds, nothing can change it. Political or other expediency might sometime call for the alteration or suspension of some regulation or law, but could anyone suspend Ohm's Law? Unfortunately, although truth will out eventually, uninformed people can cause it to be delayed and this can apply to the introduction and improvement of technically-based services. It is up to the technical fraternity to resist these delays.

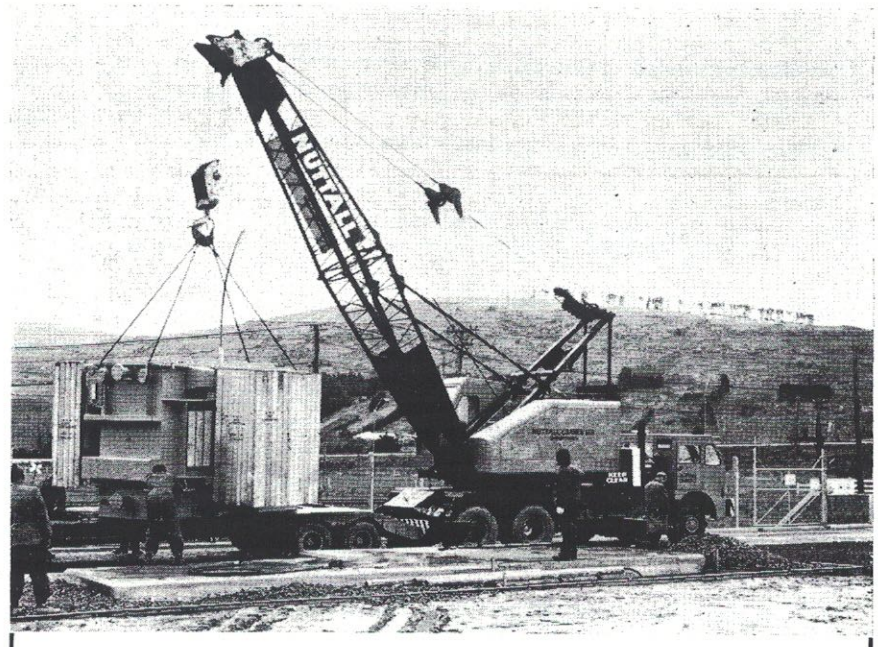
The introduction and improvement of radio services to be used by a non-technical community has no actual advocate from the consumers, as they do not know what they could have, nor what they may be missing. Other factions sometimes have axes to grind and this can lead to delays that may in the broad sense be contrary to the public interest. Remember the Gernsbach newspaper. The late great Hugo Gernsbach considered that every home or office would be fitted with receiving equipment, which was virtually a perpetual newspaper, having on a table or screen the latest news, kept continuously fed from a broadcasting station. It would obviate the need for newspapers and news broadcasts, and combine the advantages of instant news by electrical means, and recorded news as typified by our newspapers. (It may also combine the disadvantages of both these media, no doubt there will be provision for advertising space "next reading matter"). One would expect this kind of device to be opposed by the existing press, by the broadcasting authorities, by the Post Office, by the paper manufacturers, by the printers organisation, and in the recommendations of government department committees. Adherence to the past would acount for most of the opposition, a thing that should not be allowed with applications of electronics.

Another illustration is colour television which is a well established and standardised technique. I have not yet seen an authoritative statement as to when it will be introduced in New Zealand. Perhaps a decision has been made and it would be helpful to the industry and to the purchasers of receivers to know the position. Colour is better than black and white, and is the best too good for New Zealand?

The formative stages of our essential radio communication services are now past but new and improved facilities are still needed. The role of private enterprise and the enthusiastic individual in shaping progress is now finished. The world is different, so is our country and so is radio. Everything is now bigger and more regularised. Individual effort is superseded by the organisations, with decisions coming from councils, boards, or committees. Radio services form a minute item in the problems of the world and the nation. Yet they are vitally important. They constitute one of the sinews of strength of a country in the technical age, with ramifications influencing every aspect of social and national welfare. How are we to have the right things done in the future?

I have suggested that the technical fraternity should wield an influence towards improvement of radio services, and that it does not come exactly in either of the categories of science or engineer.

The general well-regulated set-up that we have in New Zealand does not provide favourable conditions for new and improved radio communication services. Something additional is needed to ensure that the peculiar, unique character of radio — instant communication through space—is applied in the interests of the industry, the community. and the nation.



TRANSFORMERS FOR CHRISTCHURCH M.E.D.

A 20 MVA transformer being lifted on to its pad at Heathcote district substation of Christchurch M. E. D.

This is the first of an order for eight transformers placed with Ferranti Ltd., England. These transformers are 66/11 kV t.c.o.l. 20 MVA with an overload capacity of 40 MVA using oil circulating pump and radiator fans. The radiators are a separate structure. The transformers will be used in pairs at district substations, one transformer being capable of taking the whole load in emergency. The weight of the transformer itself without oil is 30 tons, with oil it will be some 42 tons, without radiator.