

15. The Development of Communication in Victoria.

By J. M. CRAWFORD, M.I.E.AUST.,

Chief Engineer, Postmaster-General's Department.

The art of communication has been—or was until 50 or 60 years ago—a slowly developing one. In prehistoric times the means of conveying messages were few and simple and as late as the beginning of the 19th Century, signals by means of smoke, fire, or reflected sunlight were in use. Amongst the Romans, fire signals were made by filling pots with straw and oil and lighting them in a pre-arranged order. Signalling by means of semaphores was employed in the 18th Century and a regular semaphore service was later established between the various channel signalling stations and London to signal the arrival of ships. This was regarded as a very definite advance on the smoke and heliograph signal arrangement, the latter then only being possible during periods of bright sunshine.

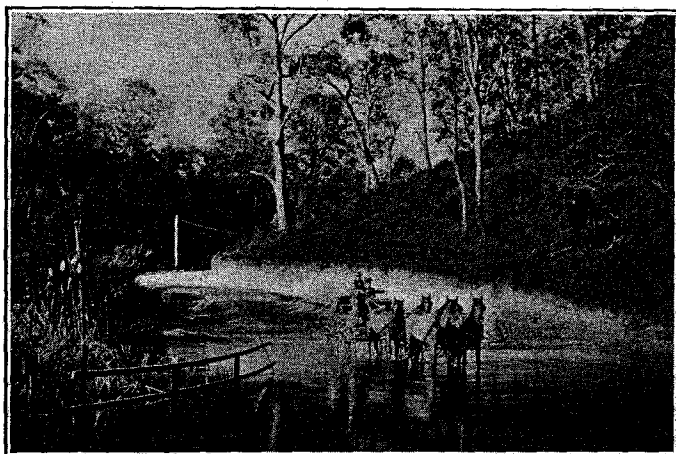
The earliest forms of communication, when Victoria was peopled only by the aborigines, was by means of smoke signals, or quaintly carved and decorated message sticks, which were carried from place to place, conveying information from one aboriginal tribe or group to another. Now, these message sticks are curios kept in Museums duly labelled that we may know what they were used for. To-day the post office is the department of public service, which is entrusted with communication work, and the engineering branch of the post office is that section which has made the application of modern methods of inconceivably rapid—almost instantaneous—communication possible.

The first regular postal service established in Australia was in Sydney on 25th April, 1809, when Lieut.-Governor Paterson fixed the charge to be made for every letter at 1s. and appointed one (Mr. Isaac Nichols) to be responsible for the collection and delivery of all letters to and from ships. On 13th April, 1837, the first Victorian Post Office was opened at Melbourne in charge of a Mr. E. J. Forster, who was also Clerk of Petty Sessions. The only mails then handled were conveyed by sailing vessels between Melbourne and Sydney, and Melbourne and Van Diemen's Land.

Prior to the establishment of the Commonwealth, Post Offices were under State control, and each State had its own Postmaster-General. When the Commonwealth was constituted, all postal services throughout Australia were transferred to it, and the six separate State services were welded into one, with a Federal Postmaster-General in control, whose central administration was set up in Melbourne, where for the present, at any rate, it still remains. This unification was in itself a most notable advance. Without it much of the progress to be recorded would have been difficult, if not impossible.

The first overland mail from Victoria was from Melbourne to Yass by the Melbourne mailman, and thence on to Sydney by the New South Wales mailman, this mail being despatched once per fortnight and taking five weeks in transit. By April, 1839, there was a weekly mail service and the time of transit had been reduced to three weeks. In 1840 post offices were established at Geelong and Portland, and from

that date inland communication services in Victoria may be said to have commenced. The thousand odd letters carried during that first year of service have now grown into almost as many millions of letters and other postal packets—in 1933, 227,000,000 letters alone were handled—and the tedious five weeks journey has been speeded up by aeroplane, mail train, motor car and mail steamer, until the journeys



Mail Coach Crossing a Stream.

are accomplished in about as many hours as it then took days. Additional air services are rapidly being established, and it is quite certain that within the next few decades, air mails will be the regular means of mail carriage.

The next advance was the introduction of the electric telegraph. In 1853 a young man named McGowan, one of the students of Professor Morse, arrived in Melbourne bringing with him a set of Morse recording telegraph instruments, and proposed to establish a company to handle telegraph communication. The Government intervened but, recognizing the advantage of the new invention, entrusted to McGowan the work of constructing a telegraph line between Melbourne and Williamstown, and later appointed him General Superintendent of Government Telegraphs in Victoria. The line was opened in March, 1854, and during the first 9 months no fewer than 1,500 government and 2,300 private messages were transmitted over this line. Later the recording portion of the Morse set was dispensed with and operators read the signals by sound. This form of telegraphy has persisted up till the present time for the smaller country townships where the traffic is small.

The first circuit arrangement was a Simplex one, but about 1857, Duplex working was introduced, and the output was correspondingly increased. Later in the same year that the Melbourne-Williamstown line was opened (1854),

telegraph working was established between Melbourne and Geelong, and in the following year (1855) to Queenscliff. On the latter line "closed circuit" morse working was adopted, the signals being transmitted by interrupted current. In each case the line consisted of galvanized iron wire of No. 6 S.W.G. and the batteries, both main and local, consisted of an early form of Grove cell.

Interstate communication was established in 1858 when both Adelaide (South Australia) and Sydney (New South Wales) were connected, the former in the July, and the latter in the October of that year. A second line to Adelaide was built in 1861, and, while the cost of the first line is not stated, it is interesting to note that the cost of this second line was £19,500.

Meanwhile in 1859 a more ambitious undertaking had been attempted in the laying of a submarine cable across Bass Strait to connect the newly-formed colony of Victoria with the older colony of Tasmania. The cable was laid by the Eastern Extension Cable Company and ran from Cape Otway, via King Island, to Low Head (Tasmania) and was completed toward the end of 1859. In the apparent endeavour to shorten the submarine sections of the line as much as possible, it was laid from King Island to the small group of islands near Stanley, and the strong currents very speedily cut the cable, and shortly after it was laid it parted and was later abandoned. It had cost about £53,000 but the difficulties and dangers attendant upon submarine telegraphy were then imperfectly understood, and the fate of the first Victorian-Tasmanian cable was no whit different from that which overtook the first English-American cable, which lasted even a shorter time. The early failure, however, did not deter another attempt, and ten years later (1869) telegraph communication was again established between Victoria and Tasmania by means of a cable laid from Flinders to Georgetown. This cable maintained traffic until in 1909 when, as the company refused to reduce its rates or sell its cable to the Government at what the Government considered a fair price, the Commonwealth Government laid its own cables over nearly the same route, and these are still carrying all the telegraph traffic between the mainland and Tasmania.

In 1872, Australia was connected by cable with the homeland, the traffic from Melbourne going via Adelaide, thence by the overland route to Darwin and so via the Eastern Extension Company's Darwin-Singapore cable. Communication between Melbourne and Perth was not established until 1877, in which year the transcontinental telegraph line via Adelaide, Fowler's Bay, Eucla and Israelite Bay (Western Australia) was opened. Machine telegraphy was introduced about 1912 when Wheatstone apparatus was fitted on the Melbourne-Sydney and Melbourne-Tasmanian lines. Since that time, rapid developments have taken place and there are many different types of machine telegraphy systems now in use, some working physical, some on superimposed, and some on carrier circuits.

It is interesting to note that bicycles were first used in the delivery of telegrams in Melbourne in 1890, the machines so used being hired for the purpose. This simple innovation speeded up the telegraph service far and away beyond the value of the expenditure incurred. Many thousands of pounds had been spent in improving the transmitting and receiving plant, but the final two legged link in the chain was by far its slowest, and it often took the messenger longer to deliver the message than it had taken to

collect it, transmit it, and book it. The telegraph service as now organized takes the fullest advantage of every modern advance in communication practice. As a result, the use of the telegraph by the public is greater per head of population in Australia than in any other country in the world, with the exception of New Zealand. This is remarkable when it is remembered that the telegraph system of Australia covers three million square miles and serves a population of only about six and a half millions. In speed and reliability the service given compares very favorably indeed with any system in the world, and the three million messages lodged in Victoria are transmitted with an average time lag scarcely to be beaten by any country in the world, and distinctly in advance of most countries.

Valuable as was the telegraph system, it was destined to be eclipsed as a means of rapid and convenient communication by the telephone.

Yet strange as it may appear to-day when the immense value of the telephone in public and private communications is everywhere recognized, there is no clear record of its first introduction in Victoria. It was evidently in 1879 that the telephone was first installed in Melbourne, but although the daily press of that period was, as now, busy recording the petty police court cases, the local cricket and football matches, the entertainments and fights, the squabbles of councillors and the evanescent promises of politicians, the epoch-making event of the first telephone conversation seems quite to have escaped the attention of the busy pressmen of that day, and neither of the two enterprising newspapers then published in Melbourne contains any record of one of the most important developments of that decade. The first reference which can be traced is in *The Argus* of 16th January, 1880, which advised that Messrs. W. H. Masters and Co. were receiving cordial support from the citizens of Melbourne in their efforts to introduce the telephone exchange system into Melbourne, but that difficulty had occurred because the City Council had objected to the erection of posts in the streets. Therefore, Messrs. Masters and Co. were running the lines principally by means of brackets attached to houses, and where posts were absolutely necessary, they undertook to provide them of an ornamental character. We are further informed that a number of the leading firms of the city were signing a requisition to the Council praying that every reasonable facility should be given to the enterprise.

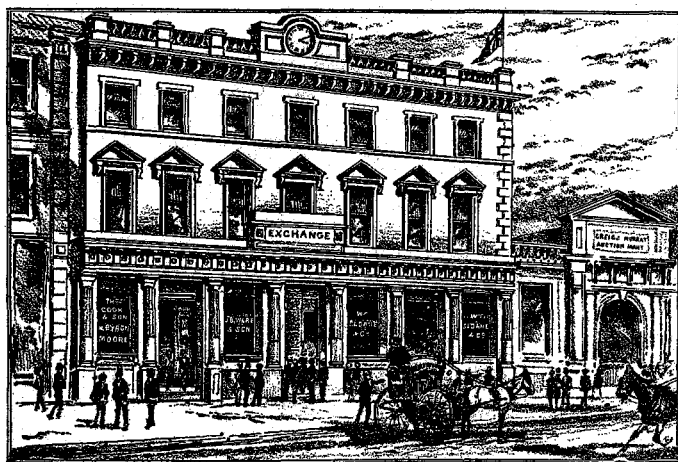
A week later (23rd January, 1880), the same newspaper records that the principal Government Departments were to be placed in telephonic communication, and on 7th May, 1880, a Mr. J. E. Edwards fitted up his own patent telephone to connect the Public Works office and the Post Office. *The Argus* of 8th May, 1880 recorded that "messages were sent yesterday with perfect distinctness from Mr. Le Cren's room in the Public Works Department to Mr. Jackson's room in the Post Office, the speaker's voice being always recognizable."

One of the first—indeed probably the first telephone—brought to Melbourne was of the Edison pattern, and although there is a definite record of its being used on the 17th March, 1880 (almost exactly four years after the patent had been granted as a result of its discovery by Alexander Graham Bell in Boston United States of America), it seems probable that it was first tested out in either June or July, 1879. In either June or July of that year a line was apparently run between the head office of Messrs. Robison Bros., Electrical Contractors, Flinders Street, and their works at Queens

Bridge. Although no contemporary press record can be traced of the opening of this line, early references appear which seem to place beyond all doubt that, after probably a preliminary speaking test by the firm to test out the new invention, the line was constructed and telephone communication established.

The honour of the first practical trial of the telephone in Australia belongs to South Australia, where as early as January, 1878, only 21 months after Bell's famous patent had been granted, a trial of the new invention was made by Sir Charles Todd in Adelaide, using existing telegraph lines for the purpose.

But to Victoria belongs the credit of its first introduction to the public. Apparently on or about the 11th May, 1880, the work of installing a switchboard was completed, and a sort of formal opening of the switchboard took place on that day by Mr. Byron Moore. But so far as public service was concerned, the first public telephone exchange in Australia was opened in Melbourne by Messrs. Masters

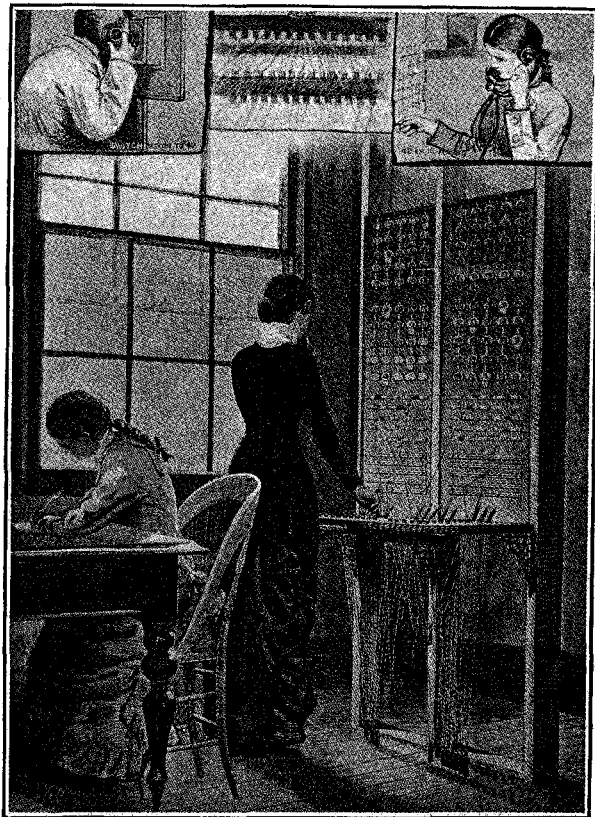


The Exchange (Collins Street Front)

First Telephone Exchange in Melbourne.

and Draper, who obtained the services of Mr. F. R. Welles of the Western Electric Manufacturing Coy. to establish the exchange. The exchange was located behind the old Hall of Commerce, Stock Exchange Building, Collins Street West, and it is a fitting tribute to the foresight of Messrs. Robison Bros. as electrical contractors that, not only were they the helpers in the early enterprise, but the firm retained until recently its original number; No. 1 on Central Exchange Melbourne. Owing to difficulty in obtaining Government permission to run the poles and wires to subscribers' premises, the actual operation of the exchange was delayed, and it was apparently not opened for public business until some time later, as *The Argus* reported in its issue of 3rd August, 1880, that the "Telephone Exchange was expected to be working within a fortnight." The exchange was opened with 43 subscribers. There are now 1,650 exchanges and about 160,000 subscribers in Victoria, and the number of telephone calls last year in the State totalled no fewer than 120,000,000 made over more than 770,000 miles of telephone wire. The annual revenue from telephone traffic now exceeds £1,600,000 in this State.

While Victoria, however, was the first of the states to establish a telephone exchange, it was one of the last to recognize that the new device, being a public service of a monopolistic character, was essentially one for Government control. It was not until the 22nd September, 1887, that



First Telephone Switchboard in Melbourne.

the service was transferred to the Victorian Government. At that time there were three exchanges in operation—Melbourne Central with 887 subscribers, Ballarat with 164, and Sandhurst with 118 subscribers. The earliest circuits were all of the single line earth return type, and the switchboards were of the magneto non-multiple pattern. Geelong was the first metallic line circuit exchange in Victoria.

The next important development was the application of the new invention to long distance communication. This followed rapidly on the completion of the first exchange, as it was then quickly realized how tremendously important the new telephone system was as an annihilator of distance. The first long distance trial of the telephone in Victoria was made over a telegraph line between Melbourne and Ballarat, a distance of about 75 miles. Although the sounds were transmitted, the character of the line was apparently such that speech was unintelligible, and the trials were abandoned. But tests made a little later (on 23rd May, 1880) between Melbourne, Ballarat and Castlemaine proved sufficiently successful and in 1888 the first telephone circuit was built between Melbourne and Geelong, and in the following year it was opened for public business. Thereafter rapid extensions of trunk lines were made, and by 1901 a number of towns was able to communicate with Melbourne and with one another over the telephone. The first interstate circuit was not built until 1907 when the Melbourne-Sydney service was inaugurated and conversations were carried over a pair of copper wires, 600 lb. weight per mile, to the mother city of Sydney, a distance of about 588 miles. During the next few years the principal advances made were in connection with various essential portions of the apparatus—particularly the signalling and transfer circuits

and their associated equipment. The next important advance occurred in September, 1910, when the central battery system of working was introduced into Victoria, and the present Windsor exchange was converted from multiple magneto to common (or central) battery working, whereby both speaking and signalling currents were drawn from the exchange, and the placing of primary batteries and generators in subscribers' premises was obviated. The new system was an immediate success, and Windsor was followed the next year by the conversion of two further exchanges in Victoria—Central (Lonsdale Street) and Hawthorn in the metropolitan area, while the first of the country exchanges to be made common battery was Ballarat in 1913.

From the first the trend of development in telephone working was in the direction of rapidity of connection and disconnection, and as for the most part this was best accomplished when operations were automatically performed, the main advances were in an automatic direction. Very early in the art, the increase in the number of subscribers necessitated some cross-connection arrangement from switchboard unit to switchboard unit. At first long cords were used, but the limit to the length of cord was quickly reached. Cross connecting (or transfer) circuits were then used to pass the calls from one operator to another. While this was satisfactory, it imposed additional handling of calls and slowed up the work of connection. Therefore, one of the early and very successful devices was to "multiple" the lines, so that each operator could have access to every line.

Even after the multiple was introduced, no effective means existed of testing a subscriber's line to see whether it was engaged or not. The solution first attempted abroad was to build a large indicator board whereon every subscriber's number was painted in figures sufficiently large to be visible from the switchboard. When an operator then made a connection between two lines she called out their numbers and an attendant at the indicator board placed a shield in front of the numbers. The confusing effect as the exchange grew in size, especially at the busy period of the day, can be better imagined than described.

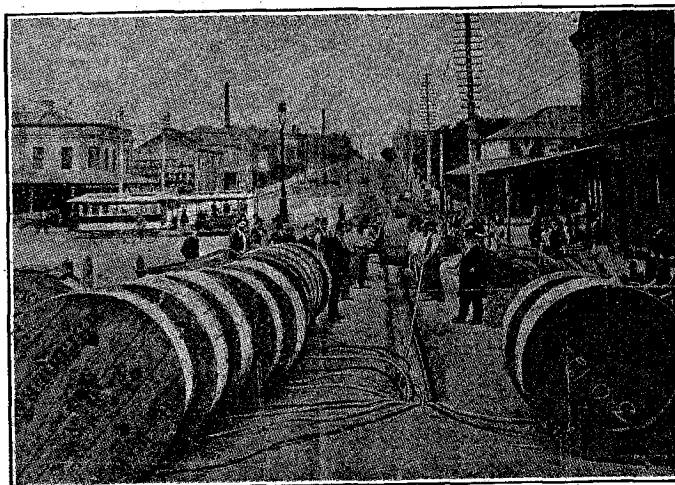
AUTOMATIC TELEPHONY.

Meanwhile the continuous effort to make the telephone more and more automatic in its operation was bearing fruit, and full automatic exchange working was introduced and successfully tried out in both America and England. It was accordingly imported into Australia, and the first automatic exchange was installed in Victoria at Geelong, and opened for working on 6th July, 1912. A self-contained area was chosen in order to be free from junction line complications. It was not introduced without a good deal of misgiving on the part of some of the non-technical administrators, who greatly feared that the public would not take kindly to the new system and be difficult to educate into ready acceptance of a method which deprived them of the services of a telephonist and required them to make their own calls. Such fears were groundless as from the first the subscribers took to the new calling arrangement, and indeed welcomed it. The extension of the automatic system throughout the metropolitan area has steadily proceeded since that time—the first exchange to be converted in Melbourne itself being Brighton, which was cut over to automatic working on the 11th June, 1914—being the second of the metropolitan automatic exchanges in the Commonwealth, the first (Newtown) being opened a week previously in Sydney. The percentage of telephones connected to automatic ex-

changes in Melbourne is at present rather less than in any of the other capital cities, the reason being that by far the largest exchange in Melbourne (Central Exchange) being already common battery and, therefore, reasonably modern, has been left until circumstances of growth and accommodation have necessitated steps to be taken towards its conversion to automatic.

UNDERGROUND CABLE.

At first all subscribers' lines were open and were terminated on a standard on the roof of the exchange building. As the number of subscribers increased, these structures became larger and heavier. The open wire lines also in the main city streets grew in size with the growth of the service, and needless to say did not grow in beauty as they grew in size. The time, therefore, came when aerial pole routes to the telephone exchange carrying a hundred or more wires began to disfigure all the main avenues leading to the exchange, and Collins Street, for example, had as one of its most prominent features tall poles heavily laden with iron or copper wires—structures which to say the least were rarely blessed by people of aesthetic taste! The arrangement was cumbersome and costly, and as it grew became less and less efficient. The spread of electric light systems of distribution also added to the congestion and it soon became clear that better facilities were needed to cope with the increasing number of lines entering the exchange. The introduction of telephone cables was the result. In 1880 the first lead-covered cable was laid in London, but this carried telegraph lines. The first purely telephone cable was laid in 1881 between Boston and Providence. These were gutta percha or rubber-insulated conductors laid up into a lead-covered cable, but in 1887 the remarkable insulating properties of paper were utilized and the first paper-insulated cable was manufactured. Victoria was not long in discovering the value of underground cable, and in 1884 the first telephone cable was laid in Queen Street, Melbourne, by the Telephone Company. It was rather a crude affair, and it was not until 1898 that the Government of Victoria purchased drums of paper insulated 54 pr./cable (108 wires) and laid down a proper duct (albeit of the open type) to accommodate this newer and far more effective means of telephone distribution. A picture showing the laying of these cables in Queen Street is given.



Laying First Underground Cable in Melbourne.

TRUNK LINE CHARGES.

In April, 1924, an important development occurred in connection with the charging for trunk line conversations. Up till that time all trunk line mileage charges had been based on route distance. That is to say, that if the most direct circuit existing between two places happened to be (as it sometimes was) two, five or even ten times the straight line distance, the cost varied as the "route" distance. In 1924, however, the "crow fly" distance was substituted for the route distance, and although in a very large number of cases the adoption of this method resulted in heavy loss of revenue, the increase in the calling rate between adjacent townships which, on account of exceptional geographical position could not be directly connected largely offset the loss. The system to-day is not only proving of very considerable advantage to telephone users, but has simplified to a remarkable extent the compilation of trunk line charges throughout Australia.

CARRIER.

Concurrently with the efforts towards making telephone operation more and more automatic, was the effort towards increasing the carrying capacity of a telephone loop. The earliest methods were of circuit superimposition, and about 1889 or 1890 what was termed (after the name of its Belgian inventor,) the Van Rysselberghe system, was introduced. By this system one circuit (called a phantom circuit) was superimposed on two others, or as was the case in its earliest form, two telegraph circuits were superimposed on one telephone loop. But although it is possible with a superimposed system to obtain 7 circuits from 8 wires, i.e., 4 physicals, 2 phantoms on the 2 pairs of loops, and 1 further phantom by utilizing 4 wires for the *A* line and 4 for the *B* line, this was the limit. The invention and development of the thermionic valve or repeater, however, made it possible to obtain additional telephone circuits (or channels) from one pair of physical lines. Shortly after the invention of the system, it was introduced into Melbourne and in September, 1925, was installed on the Melbourne-Sydney circuit, utilizing the 600 lb. per mile copper loop for the purpose. The immediate effect was to obtain 4 separate telephone channels from this one pair of wires each using a different frequency. The 3 additional circuits were thus obtained at approximately one half the cost incurred in 1907 to build the copper loop upon which they were obtained. The details of the frequency arrangement adopted need not be described in this paper, but the instant success of the scheme was such that new carrier systems were rapidly purchased and applied first to the interstate routes and subsequently to lines on practically all the main routes in Victoria, as well as in the other States.

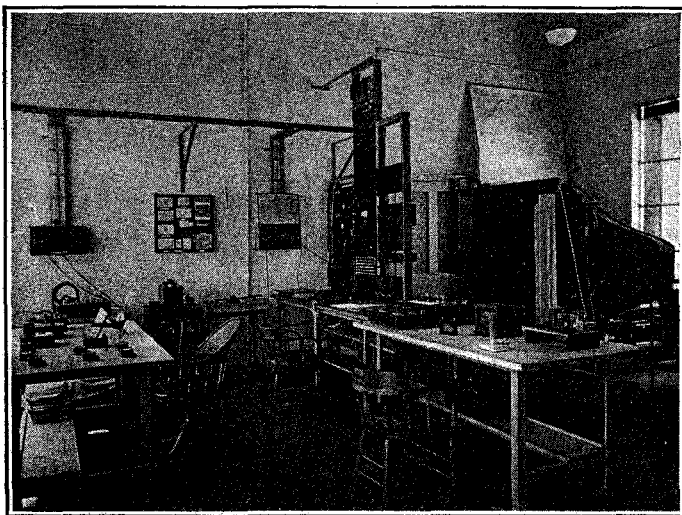
RADIO AND BROADCASTING.

The last and probably the most important advance in the art of telecommunications was the introduction of radio. Not only was it a notable advance in itself, but its effects particularly on the broadcasting side have been revolutionary, and it is destined to exercise a profoundly modifying influence upon every other form of electrical communication. As in the case of the telephone, so also in the case of radio transmission, no definite record exists of the first use of the system. It is known that during 1896 various experimenters were interesting themselves in wireless, and the tests had so far advanced that in 1901 when His Royal Highness the Duke

of York (the present King) reached the entrance to Port Phillip Bay, *en route* for Melbourne, a wireless greeting of loyal devotion was sent him. From that time until in 1905 when the first legislative act in the history of wireless in Australia was passed on 18th October by the Commonwealth Parliament (then sitting in Melbourne) a multitude of experimenters, many of whose residences were, in effect, amateur wireless stations were bending their energies towards developing and testing this latest and by far the most wonderful arm of communication service. The Act constituted the Commonwealth Government the sole controlling and licensing authority in respect of all forms of wireless communication in Australia.

The first license under this Act was granted in 1907 but in 1905 it is recorded that engineers of the Marconi Company, London, erected a station at Point Lonsdale, Victoria, and conducted experiments therefrom. The Government was, however, slow in moving, and although in 1909 a resolution was approved by Parliament that "this House is of opinion that wireless telegraphic stations should be immediately established as found desirable, around the coasts of Australia, and that our merchant marine should be equipped with wireless installations as an up-to-date means of (a) gaining intelligence of the appearance in Australian waters of a hostile force; (b) of saving life and property imperilled by accident upon the sea," nothing was done until August, 1911, when the first wireless officer (Mr. J. G. Balsillie) was placed in charge of the Commonwealth wireless services. On 8th February of the following year (1912), a wireless station was opened in Melbourne. It was situated on the southern side of Government House and the Botanical Gardens, and the tall masts supporting the aerial were removed only a few years ago. The possibilities of the new development were rapidly sensed by commercial people, and determined efforts were made to obtain this section of communication for private exploitation. In 1915 the administration of the *Wireless Act* was transferred to the Navy Department, and for some years that department continued as the sole wireless authority. The application of wireless to telephone purposes, however, brought about a change in the conditions as radio telephony began to be utilized in various parts of the Commonwealth for communication to isolated localities, and the use of the new arm for defence and shipping purposes became relatively less important—at any rate so far as volume of business was concerned. Parliament accordingly in 1920 placed the control of the commercial and ship-to-shore radio services with the Postmaster-General's Department, which department took over the control on 28th October of that year. But the commercial interests were determined not to surrender a service which it was abundantly clear could be turned into an excellent source of profit, and for the next few years the position as to control and licenses was a veritable cockpit of contending parties. During 1921-22 strenuous efforts were made to obtain private control of wireless, which could only be developed by Government incurring fairly heavy expenditure in erecting stations, whereas private enterprise was only too willing to relieve the Government of such expenditure in reward for the monopoly of the commercial wireless services of Australia. The result was that, in consequence of an agreement entered into between the Prime Minister and Amalgamated Wireless (A'asia) Ltd., the coastal radio stations were transferred to the company, as from 8th May, 1922, while the other wireless activities of the Commonwealth were transferred from the Postmaster-General's Department to the Prime Minister's Department as from 1st June, 1922. The change of policy was not left unchal-

lenged for long. During the comparatively short period of control by the Post Office, plans had been prepared to re-organize the stations and develop the service. These plans had been approved ready for adoption when the transfer was made, and the extension of the facilities was necessarily left to the company to inaugurate. The facilities of the Prime Minister's Department to control an essentially technical service were also obviously limited, and consequently after a very brief period the work was re-transferred to the Post Office, which resumed control of the wireless activities and the administration of the *Wireless Act* in December, 1922.



Portion of Research Laboratory, Postmaster-General's Department, Melbourne.

BROADCASTING.

Meanwhile broadcasting had been born! This, though the latest, was the most vigorous child of the radio group of services. Private enterprise was again first in the field, and after a conference held in May, 1923, a scheme was formulated offering under licence of the Postmaster-General full opportunities for establishing broadcasting stations. Two licenses were issued in Melbourne—one to 3LO and the other to 3AR. The former station commenced operations in January, 1924. From the first Victoria led the way. By June, 1926, there were over 64,500 licenses in the State and the first of the Melbourne "B" class stations (3UZ) was operating under license from the Postmaster-General. The number of licenses at the end of June, 1934, was over 200,000 and there are, in addition to the two National stations, 15 "B" class stations in Victoria, of which 5 are in Melbourne. Two further National stations have been approved, one at Sale and the other Nhill, both of which should shortly be in operation. An amending *Broadcasting Act* was passed in July, 1928, under which the Postmaster-General's De-

partment was constituted the authority responsible for the construction, technical control and operation of the National stations, and the provision of programmes was let under contract to the Australian Broadcasting Company Ltd. The final stage was reached in December, 1930, when the Australian Broadcasting Commission was created, and from 1st July, 1932, the arrangement under which programmes had been provided by private enterprise ended, and the new Commission took over the task.

A further Victorian development of radio was the establishment under agreement between the Commonwealth Government and Amalgamated Wireless (A/asia) Ltd., of the two beam stations for communication with the United Kingdom and Canada, which were opened in April, 1927. The transmitting station was built at Ballan and the receiving station at Rockbank, situated approximately 50 miles and 20 miles north-west of Melbourne.

Finally the frontiers of the telephone world were pushed further and further afield until on 30th April, 1930, service was extended by radio to Great Britain, and through it to every European country and to America, and parts of Africa and Asia. New Zealand and the Dutch East Indies were also linked up later in that year. Telephone subscribers in Melbourne are, therefore, now able to speak with over nine-tenths of the subscribers of the world.

Perth was the last of the mainland capital cities to be connected, but on the 18th December, 1930, it was linked up with Melbourne, and the only State which is now telephonically isolated from Victoria is Tasmania. Proposals, however, are now completed to lay a submarine cable from Apollo Bay via King Island to Stanley, which will connect Tasmania and complete the Australian-wide telephone service.

Hand in hand with the rapid extension of the field of service has gone an intensive study of Australian communication problems on their scientific and experimental side. In 1924 a Post Office Research Section was established in Melbourne. It was first housed in rooms in rented premises in Post Office Place, but is now functioning in a separate building in Little Collins Street. As part of the engineering branch of the Post Office it enables Australian problems to be studied from a distinctively Australian angle and under Australian conditions. This is only one more of the many directions in which modern scientific advances are called in to assist the art of communication.

The history of the Post Office in Victoria during the past century is one of which the public may justly be proud. Continuous improvement has been made and at every point in the long story of its development, an earnest endeavour is apparent to keep abreast of the most modern practice, and at the same time preserve that element of courteous attention and that principle of whole-hearted service which have made the Post Office pre-eminently the handmaid of the people.

END OF PART I.