

RADIO

IN AUSTRALIA
& NEW ZEALAND

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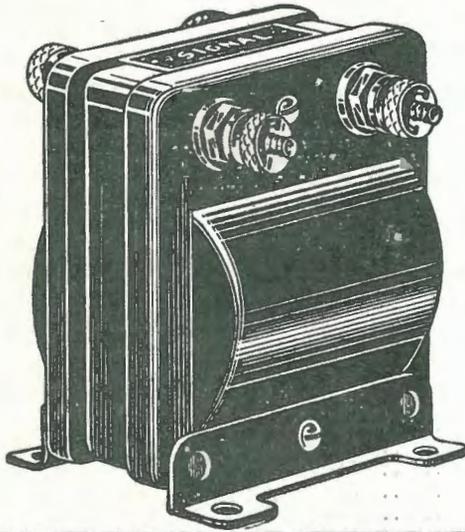
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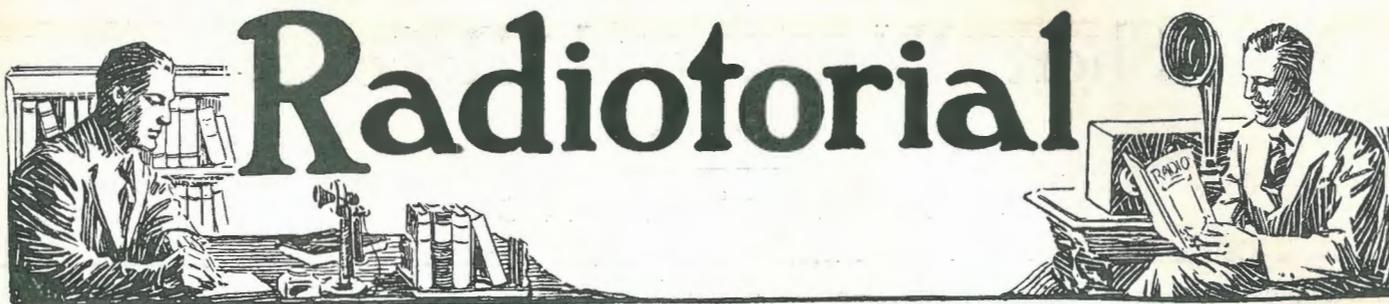
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Radiotorial

Summer Radio



EVER has the Wireless outlook in Australia been so promising as it is to-day.

In another portion of this issue of *Radio* our readers will find a consensus of opinion of the leading Sydney Wireless dealers, amateurs and others, as to what the hot months are to bring forth and throughout their remarks there runs a note of supreme optimism.

AND rightly so.

AS we go to press comes the news that Australia is to have nine new broadcasting stations—three in Sydney, two in Newcastle, two in Adelaide, one at Wangarratta and one at Mildura. No more enlightening instance than this could be given which would show what this country may expect in Radio matters before long. After all, broadcasting and the service it gives is what determines the popularity of Wireless. It seems safe to say that the number of broadcast listeners will always heavily outnumber the experimenters pure and simple.

IN the days to come it is not at all unlikely that in the portable set Australia will lead the world, for with our long Summer and our natural love of outdoors we must have Radio apparatus that we can take with us wheresoe'er we list.

IN the hot Summer nights no sane human being wants to listen to concerts in the heat of the house when he can take his set and do the same in some cool mountain fastness or between "dips" on the golden sands of some quiet beach.

PERSONALLY speaking, we don't!

NOR, when we go on our annual holidays, are we prepared to leave our set behind us—not when it is only a matter of slinging a wire over a convenient tree branch and dropping another weighted with a stone into a stream to listen-in to the best programmes that are on the air.

TRY and let your imagination picture it for you.

ORDER YOUR COPY NOW!

We have pleasure in announcing that the next issue of "*Radio*" will contain, among other things, full details for the construction and operation of a 2-Valve Receiver, using one-stage of Radio Frequency Amplification and Detector.

HITHERTO it was generally agreed that the demon Static was too strong to permit of any real and satisfactory listening during the summer months, but every day now there seems to be growing a feeling of increasing contempt for it. Improvements in apparatus follow thick and fast, one upon the other, and so it should not now be long before the Static bogey will become a thing of the past and be relegated to that limbo of forgotten things in which the coherer and the magnetic detector have their resting place.

GONE now, or at least going, is the "junk pile" type of apparatus which to the uninitiated eye looked like a combination of a roll of barbed wire and the inside of a calculating machine. Very rarely now does one come across this straggling conglomeration of home-made parts and wire, wire, and still more wire. In the great majority of cases the home-made set is a joy to the eye and a pleasure to operate, and as it becomes more compact with its fewer controls it follows as a logical conclusion that the portable Wireless set will be evolved.

YOU have had a long day in the surf and sun. You are experiencing a delightful feeling of lassitude, and as you lie stretched out on the hammock, the roar and sigh, sigh and roar of the breakers come to you faintly through the ti-tree. What could be more in sympathy with the moment than a little music; music that is, as distinct from the eternal ukelele?

YOU lean over to your set; press a switch and twiddle two dials. From ten or a thousand miles away someone is playing for you—and for you only, it would seem, for the notes appear as though they came but from a few feet away. Or, if you desire it, the violin or piano solo can be made so faint and yet so clear that it seems to merge into the very *sound* of the silence about you—to mingle with the "creek" of the crickets or the chirruping of the sleepy birds.

AND all this is heard for a mere turn of the wrist! With wireless entertainment there is no reserving of seats. There is room for all who come!

Short Waves and Reflectors

(Continued.)

By SENATORE G. MARCONI

BELOW we publish the second and concluding portion of the Paper read recently to the members of the Royal Society of Arts, London, by Senatore Marconi, in which he relates the story of his experiments and the results that have been achieved by him with the Beam system—short wave directional wireless telegraphy.

THE last portion of the Paper, our readers will find, is, if possible, even more interesting than the first, for, among other things, it tells of the astonishing results secured aboard the great experimenter's mystery yacht, "Elettra," when situated thousands of miles from Poldhu.

(Special to "Radio.")

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HE results of our measurements and observations are that for short waves of the order of 100 metres this constant must be replaced by a variable, which is approximately a linear function of the mean altitude of the sun calculated on the great circle track between the two stations. In other words, the coefficient of

in signal intensity observed with the long waves over great distances, is not true in the case of short waves.

It also appears that there is probably no sharp limit between short and long waves, and that the change in the behaviour of short waves, of, say, 100 metres, to that of long waves of, say, 10,000 metres, may follow a slow process of transformation.

time, less severe than those experienced when working with the longer waves up to now employed for practical radio telegraphy.

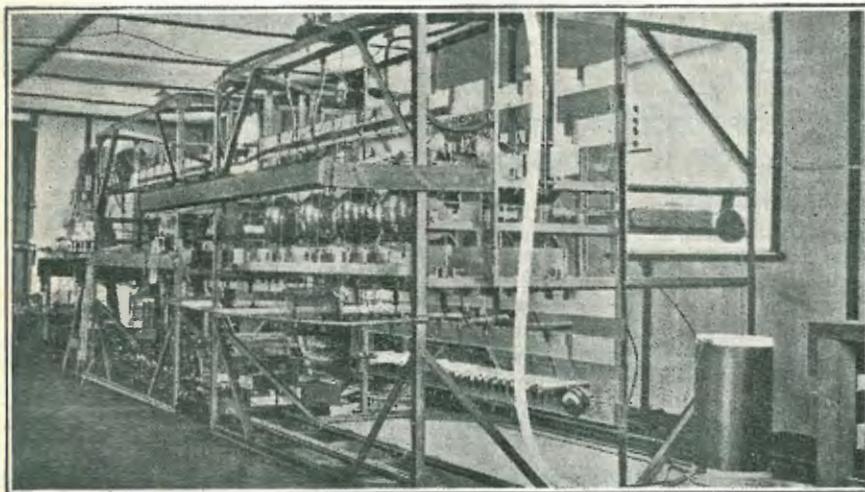
During night time, even when receiving at St. Vincent, which is situated at 2,230 nautical miles from Poldhu, and well within the tropics, the strength of received signals was so great that absolutely none of the x's or atmospherics which we there experienced ever approached being able to interfere in any way with the reception of signals or messages from Poldhu.

During the tests to the *Elettra* on 97 metres wave the Poldhu transmitter consisted of eight glass valves (standard M.T.2) worked in parallel, the input to the valves being 12 kwts. The radiation from the aerial was approximately 9 kwts. The parabolic reflector concentrated the energy towards Cape Verde, and gave a strength of field in that direction which would have required a radiation of approximately 120 kwts. from the aerial without a reflector to produce.

For the purpose of the experiment a special receiver with independent aerial was installed and added to the wireless gear of the *Elettra*.

The receiving aerial was a vertical wire, the top of which was at a height of 20 metres above sea-level.

The receiver consisted of an aerial circuit, a closed condenser intermediate circuit, a frequency changer circuit, two high frequency tuned amplifications and an auto-heterodyne detecting valve, to which could be added two stages of low frequency amplification.



High Power Short Wave Transmitter at Poldhu.

absorption is a function of the time, the seasons and the relative geographical situation of the stations, and can now easily be ascertained for wave lengths of the order of 100 metres.

Our tests obviously show that short waves behave quite differently in their propagation from long waves, and that the weak period at sunset and sunrise, followed by a recovery

Very likely over very long distances, as the wave length increases, there may be a tendency for the signals to recover progressively during the period of no signal, for short waves, and this may form the object of further very interesting investigation.

In regard to the x's and atmospheric disturbances generally, these usually appeared to be, during day

After carrying out a few preliminary tests in Falmouth Harbour on April 11, the *Elettra* sailed for Cape Finisterre (Spain).

A first series of tests was carried out without the transmitting reflector.

After rounding Cape Finisterre it was anticipated that the intervening land would have cut off signals during day-time, and also would have considerably weakened them during the night.

These expectations were not verified.

Signals during the day weakened according to the distance and the altitude of the sun, but were received right up to Seville (780 miles from Poldhu), although practically the whole of Spain, consisting of over 300 miles of high and mountainous land, intervened between the sending and receiving stations.

The night signals were always so strong as to appear almost as powerful as those received when the yacht was at her anchorage in Falmouth Harbour at only 12 miles from Poldhu.

It should be stated that the yacht, when at Seville, was moored in the Guadalquivir River, in a situation particularly unfavourable for the reception of signals, as the adjacent banks of the river were high and surrounded by trees and buildings.

At Gibraltar (820 miles), notwithstanding the greater distance, a better strength of signals was noticed during the hours of daylight, probably in consequence of the fact that the yacht was anchored in a more open space, and therefore in a more favourable position.

Similar results were also obtained at Tangiers (840 miles), and at Casablanca (970 miles).

I find it almost unnecessary to refer to the night signals, as these were always, and in all places throughout the whole of the cruise, extraordinarily strong and capable of being received at all times without using an amplifier, with the aerial out of tune, or disconnected, or without using the heterodyne.

At Casablanca I telegraphed instructions to hoist the reflector aeriels at Poldhu.

The *Elettra* then proceeded to Madeira, but at Funchal was obliged to anchor in a very unfavourable position for the reception of wireless signals from England, being at the far

end of the island, and immediately under the mountains of Madeira, some of which rise to heights of over 6,000 feet.

On May 17 tests were recommenced between Poldhu and the *Elettra*, but although the night signals were, as always, extremely strong, I considered it desirable to carry out day-light tests in positions not so completely screened by the immediate vicinity of mountains.

Thus it was ascertained that signals could be received from Poldhu by day up to 1,250 nautical miles when that station was using 12 kwts. of energy.

On May 21, we sailed for St. Vincent, Cape Verde Islands, and al-



Fig. 6.—Experimental Transmitting Hut, Poldhu, 1924.

though at St. Vincent our anchorage was at a position partly screened by mountains, day-light reception was still possible for a few hours after sunrise and for some time before sunset.

The night signals continued to arrive from Poldhu at all times with apparently unabated strength, notwithstanding that our distance had increased to about double what it was at Madeira; that is, to 2,230 nautical miles.

At St. Vincent, as at Madeira, the Poldhu signals could always be received with the heterodyne of low frequency amplifier switched off.

Mr. Mathieu estimated the strength of the night signals at St. Vincent from 400 to 500 microvolts per metre in the aerial, and with such a strength on the wave length we were using no trouble was ever experienced in consequence of atmospherics or x's. In fact, for greater convenience, all messages from Poldhu were read with the aerial out of tune or disconnected from the receiver,

At St. Vincent the signals received from the post office at Leafield were weak and often unreadable. I, therefore, gave instructions that all wireless messages addressed to me should be transmitted by our short wave experimental station at Poldhu. No difficulty was ever experienced in the accurate reception of these messages.

As, in consequence of my having to return to England, it was decided not to carry on these tests to still greater distances. I instructed Poldhu to gradually reduce the transmitting power from 12 kwts. down to 1 kw., but even with this small amount of energy the signals received at St. Vincent were still stronger than would have been necessary for the carrying out of commercial work over that distance.

Mr. Mathieu calculated that the signals would still have been readable at St. Vincent, even should the power at Poldhu have been reduced to 1-10th of a kilowatt.

I might add that the night signals received at St. Vincent, even when Poldhu was using only 1 kilowatt, were much stronger than those received from Carnarvon, or than those which could be received at either St. Vincent or Madeira from any of the other European or American high-power stations.

The signals by night or by day did not appear to be subjected to lengthy fluctuations in strength, nor inclined to give what have been termed freak results. The results obtained could always be repeated over the same distances under similar conditions in respect to the sun's altitude.

Short periodical fluctuations of strength, lasting less than a minute, were constantly observed, but I believe that these variations were mainly caused by slight changes in respect to the sun's altitude.

Short periodical fluctuations of strength, lasting less than a minute, were constantly observed, but I believe that these variations were mainly caused by slight changes of the wave length determined by imperfections of the arrangements in use at Poldhu, and also by the movements and rolling of the ship at the receiving end.

Although sunrise at St. Vincent occurred about three hours later than at Poldhu, during the period of the tests nothing was observed which would indicate the existence of the

weak period so noticeable under similar circumstances in radio reception between Europe and North America.

The results of these tests were sufficient to convince me that it would be possible to carry out reliable commercial services for a large portion of hours out of the 24 over distances of at least 2,300 nautical miles by utilising only about 1 kilowatt of energy at the transmitting stations, and that the practical range of the system, when using 12 kilowatts had not even been approached.

These results were obviously so encouraging that I decided to give the new system very careful study and consideration.

The station at Poldhu was somewhat improved, and the energy employed was increased to about 20 kilowatts.

Since February of this year further series of tests have been carried out over ranges which included the greatest possible distances separating any two places on earth.

A special short wave receiver was installed on the s.s. *Cedric*, and reception tests were carried out with Poldhu by Mr. Mathieu during a journey of this vessel to New York and back. No reflectors of any kind were employed at either end.

For the tests to the *Cedric* the wave length was 92 metres, and the transmitter comprised two oil-cooled valves of special design, controlled by an independent drive circuit to ensure steadiness of wave length. The power supplied to the main valves was 21 kwts., giving a radiation of approximately 17 kwts.

These experiments were conducted with the object of supplementing our information on the general behaviour of short waves over long distances.

The results showed that on the *Cedric* signals could be received during day-time up to a distance of 1,400 nautical miles, and it was confirmed that the signals' intensity is symmetrical to the mean altitude of the sun at all times. As a consequence of this, the day limit of the signals on the *Cedric* was greater than what was observed during the cruise of the *Elettra*, because the average height of the sun was much less at that time of the year on the particular track of the *Cedric* compared to what it was on the far more southerly

track followed by the *Elettra* during the months of May and June.

Signals of great intensity were received at Long Island, New York, during the hours when darkness extended over the whole distance separating the stations, and of less intensity when the sun was above the horizon at either end, the intensity of the signals varying inversely in proportion to the mean altitude of the sun when above the horizon.

According to the measurements carried out by Mr. H. H. Beverage, Research Engineer of the Radio Cor-

COMPARATIVE POLAR CURVES OF FIELD STRENGTH

NON DIRECTIONAL AERIAL
2 WAVE APERTURE REFLECTOR
8 WAVE APERTURE REFLECTOR

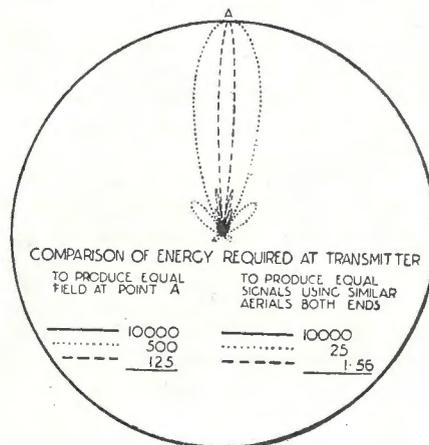


Fig. 7.

poration of America, the average strength of the signals at New York was 90 microvolts per metre.

I might mention that a few days prior to the commencement of these tests between Poldhu and the *Cedric*, the Chief Engineers of Amalgamated Wireless (Australasia), Ltd., of the Marconi Wireless Telegraph Company of Canada, Limited, and of the Radio Corporation of America, had been requested by telegraph to attempt to receive the transmissions radiated from Poldhu in their respective countries.

Rather to my surprise, I must admit, Mr. E. T. Fisk, the Managing Director of Amalgamated Wireless (Australasia), Ltd., reported to me by cable that he could receive the Poldhu transmissions at his house in Sydney every day perfectly well from 5 to 9 p.m. (Greenwich), and also that he had received them between 6.30 and 8.30 a.m., informing me also that for most of the time the signals were clear, steady and strong

on an improvised receiver, consisting of a 2-stage high frequency tuned plate and grid with one rectification. He also added that he had read every word that was sent, and that the signals were better than those he had yet received from the high power station at Carnarvon.

These experiments with Australia were continued during the month of May, consistently good results being obtained at two receiving stations situated in the vicinity of Sydney.

It seems obvious, if we consider the position and altitude of the sun, that during the morning period the waves travelled from England to Australia, starting in a westerly direction, across the Atlantic and Pacific Oceans, along the longest route, which is approximately 12,219 nautical miles, whilst during the evening period they travelled in an easterly direction over Europe and Asia, along the shortest route, which is about 9,381 nautical miles.

In Canada, at Montreal, reception was found to be possible for 16 hours out of the 24.

These results were so encouraging that I was tempted to try a wireless telephony test to Australia.

With rather experimental arrangements at Poldhu, intelligible speech was transmitted for the first time in history from England to Sydney on Friday, the 30th day of May, of this year.

For the telephone test to Australia oil-cooled valves were employed for the main valve, and for modulating valves. The wave length was 92 metres, and an independent drive was employed for controlling the main valves. The total power supplied to the valves was approximately 28 kwts., divided up as follows: 18 to the main valves, 8 to the modulating valves, and 2 to the drive valves. No reflector was employed.

A continuous development of the short wave transmitter has been taking place at Poldhu. To utilise considerable power, required the study and development of circuits for paralleling valves satisfactorily, and also the design of special valves. To maintain the wave length steady has necessitated the application and development of an independent drive. These problems have been solved satisfactorily, and the production of commercial transmitters dealing with

powers up to the order of 50 kwts. now presents no difficulties. Figures 5 and 6 show the interior and exterior of the small experimental station at Poldhu.

It was gratifying to all concerned that the experiment succeeded the very first time it was tried, Mr. C. S. Franklin being in charge of the transmitting apparatus at Poldhu, and Mr. E. T. Fisk of the receivers at Sydney.

It is also interesting to observe that these extreme distances were obtained without the use of any reflector at either end.

The results obtained between England and Australia easily constitute a record for ratio of distance to wave length, for Sydney, by the shortest route, is approximately 189,000 wave-lengths from Poldhu.

In my opinion, it appears to have been proved conclusively that adequately designed reflectors, even if of comparatively moderate size, will enormously increase the effective strength of the signals.

This cannot but augment the efficiency of communication, besides increasing the number of hours during which it will be possible to work with very distant countries.

Moreover, the use of receiving reflectors will be of the greatest advantage to practical working, because, whilst magnifying the strength of the received waves, they reduce all interference, whether caused by atmospheric electricity or other stations, unless, of course, the direction from which the interference may be coming happens to coincide exactly with that of the corresponding station.

The energy magnification, due to the concentration of the energy by the directional effect, has been carefully calculated by Mr. Franklin, and tests carried out at Poldhu have fully confirmed his figures.

Figure 7 shows comparative polar diagrams of the field in all directions from three different transmitters. The circle is a polar curve of a plain, non-directional aerial. The short dot curve shows the polar curve of a two-wave length aperture reflector. The long dot curve shows the polar curve of an 8-wave aperture reflector, such as we propose to use for practical purposes.

The case which was tried experimentally at Poldhu was an aerial and reflector $\frac{1}{4}$ wave high, 3 waves wide, the aerial being fed at four points

with a cable feeder system. The horizontal polar magnification figure of about 30 was found.

Mr. Franklin has formulated some general laws regarding these aerials, which may be stated as follows:

- (1) The ratio of the loss by radiation to the loss by ohmic resistance, and therefore the efficiency remains constant for all sizes of the aerial at the same frequency. This efficiency figure is very high, and can easily be of the order of 80 per cent.
- (2) The natural decrement of the aerial is very high, and remains constant whatever the extension, as the ratio of

and receiver, these would each be 10 square wave lengths for 100 metre wave, and would give a combined magnification of 10,000. For half this wave length (50 metres), each aerial would be 40 square wave lengths and would give a combined magnification of 160,000.

Up to what ranges this fourth power law can be effective in compensating for the greater attenuation of the shorter wave has yet to be ascertained.

The energy capacity of these aerials is enormous, and they could never conceivably be worked to their limit. It would be quite possible practically

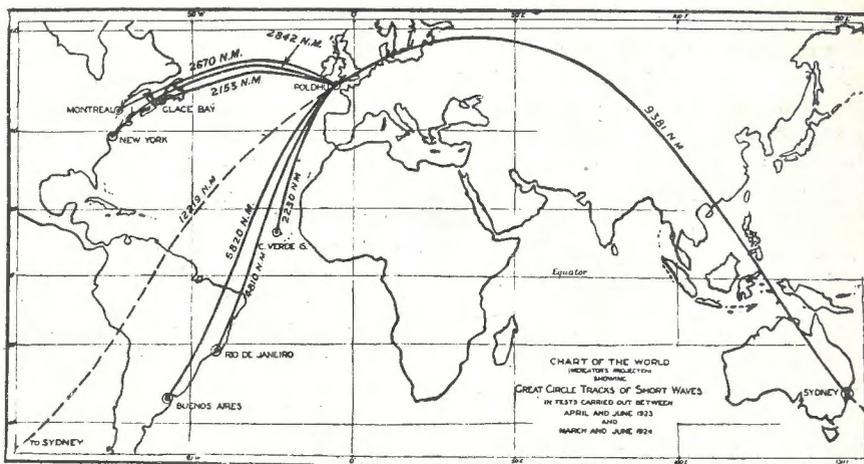


Fig. 8.

the inductance to the resistance of the aerial remains the same.

- (3) The greatest magnification for a given area, and therefore for a given cost, is obtained by having equal areas at the transmitter and receiver. Thus an aerial of 20 square wave lengths at transmitter and receiver gives a magnification of 200, but if divided into two aerials at transmitter and receiver, each of 10 square wave lengths, gives a magnification of 10,000.

- (4) For a given area of aerial at the transmitter and receiver, the magnification goes up as the fourth power of the wave frequency used. Thus, assuming aerials 1 kilometre wide and 100 metres high at transmitter

to superimpose several waves, and thus several services on the same aerial.

It should not be lost sight of that very high speeds of working appear to be possible only if short waves are employed, whilst speeds of the same order are unattainable with the long waves now in general use for long distance radio communication.

I might, in other words, state that there exists no theoretical reason why with a frequency of 3,000,000, such as is the frequency of oscillation of a 100 metre wave, the speed should not be one hundred times as great as the speed attainable with a frequency of 30,000, which represents the frequency of a wave length of the order of those which it is proposed to use for the Imperial stations.

Between June 12 and 14 (both inclusive) of this year, some further important tests were carried out between Poldhu and a small receiving

station at Buenos Aires in the Argentine, the distance between the two points being 5,820 nautical miles (10,780 kilometres).

For this radio-telegraphic test the wave length was 92 metres, and the power to main valves was 21 kwts. This gave a radiation of 17 kwts. The parabolic reflector was employed to concentrate the energy towards South America, and gave a strength of field in that direction which would otherwise have required a radiation of approximately 300 kwts. from the aerial without reflector to produce the same effect.

Although many of the arrangements employed were far from perfect, very strong signals were received for over ten hours each day at Buenos Aires.

Messages were sent by the Argentine Minister of Agriculture (Dr. Le Breton), who happened to be in London, to the Minister of War (General Justo), in the Argentine, and every message transmitted was correctly received in one transmission.

At the conclusion of the tests we received a communication from the Argentine Committee, representing the wireless interests in the Argentine, who are conducting the wireless telegraph services through their super power station with Europe and the United States of America, to the effect that the signals from Poldhu transmitted by this new system were received at Buenos Aires with such regularity and extraordinary strength as to permit a service being conducted at any speed, and expressing the opinion that the Argentine station should be immediately equipped with the new system, which, they are confident, will handle more than double the traffic in six hours than they are now able to handle in twenty hours with their present super-power station. Excellent results were also obtained at Rio in Brazil (Figure 8).

All these results, many of which have greatly exceeded my expectations, convince me that by means of this system economical and efficient low-power stations can be established which will maintain direct high-speed services with the most distant parts of the globe during a considerable number of fixed hours per day.

I am further of the opinion that by means of these comparatively small stations a far greater number of words per 24 hours could be trans-

mitted between England, India and her distant dominions than would be possible by means of the previously-planned, powerful and expensive stations.

Another particular advantage of this system should not be overlooked. As distant stations situated only within a certain angle or sector of the beam are enabled to receive, this condition brings about a comparative privacy or secrecy of communication unobtainable with any other system of radio communication, and this may prove to be of the greatest value in war time, besides considerably increasing the number of stations it will be possible to work, by reducing the possibilities of mutual interference between them.

The comparative economy in capital cost of these stations, the small amount of electrical power which need be employed, together with the capability of working at very high speeds, should make it possible to bring about a substantial reduction in telegraphic rates. The importance of this to the Empire must be obvious.

I wish to take this opportunity of expressing my high appreciation to Mr. C. S. Franklin for all the valuable work he has carried out in order to make this system a practical success, and also to Mr. G. A. Mathieu for his practical and theoretical assistance.

I also wish to thank Mr. E. T. Fisk, the Managing Director of Amalgamated Wireless (Australasia), Ltd.; Mr. H. H. Beverage, Research Engineer of the Radio Corporation of America; Mr. J. H. Thompson, Chief Engineer of the Marconi Wireless Telegraph Company of Canada, Ltd.; Commander J. Lloyd Hirst, Marconi's Wireless Telegraph Company Ltd.'s representative on the Commercial International Committee in the Argentine; and Mr. P. Eisler, Manager of the Cric Construction Co., Ltd., contractors for the high-power stations of the Commercial Radio International Committee in Brazil, for their most valuable co-operation in arranging at very short notice to successfully receive in their respective countries the signals transmitted from Poldhu.

YOU can pick up quite a few pointers by mingling with experienced amateurs.

BRAYBROOK.

THE new Melbourne broadcaster, 3LO, is regarded in the light of a great acquisition to Tasmania. Being a few hundred miles closer to Tasmania reception from the new station is exceptionally strong and distinct. Modulation is excellent. One thing that has been noticed about 3LO's transmissions is that daytime results are almost as good as night. It is considered possible over here that 3LO drops down on power at night, which would account for the strength of signals in daylight. Another explanation is that the mountainous nature of Tasmania affects night-time signals from Victoria, whereas a direct line to Sydney does not pass through this area.

DX WITH A CRYSTAL.

NOW and then a letter is included in our mail bag which makes us sit up and take notice. The latest one to galvanate us into such a state of mind and body is that from Mr. E. S. Earngey, of Milton, South Coast. He naively asks—"Will you please advise me if the reception of Farmer's broadcasting station on a simple crystal set is usual at this distance from Sydney, approximately 140 miles?" The reception is always exceptionally clear at both day and night sessions. Theatre programmes also come in beautifully. On the occasion of the final performance of Grand Opera recently broadcasted, every word of the speeches at the conclusion of the performance was clearly received. Melbourne comes in with time signals, very strongly and VIS VIA on 600 metres at night are also easily readable. The set itself is of the simplest, being of the single coil type with tappings to two switches and galena as a detector. The 'phones are of 1,200 ohms resistance. The aerial, a single wire, which occupies an elevated position 70 ft. high and 100 ft. in length, has a lead-in of about 85 ft. The direction of the aerial is north and south, and the lead-in is taken from the northern side. "Earth" is secured by a soldered connection to lead piping which is buried about three feet under the ground. Due in no little degree to the success which has attended this simple apparatus. Crystal sets are selling in this district, but have not proved so successful until tried out on Mr. Earngey's aerial.

IF you use a simple crystal detector set, buy more than one crystal.

IF you connect the ground connection to the grid side of your set, nearby stations may be copied without an aerial during bad radio weather.

Items of Interest

FIRST WIRELESS TRANSMISSION FROM AUSTRALIA TO ENGLAND.

MR. E. T. FISK, Managing Director of Amalgamated Wireless (A/sia.) Ltd., announces that experimental wireless signals transmitted on low power from the Company's experimental station at Sydney have been received in England. These tests were commenced on Monday, November 10, and the Marconi Company, London, has cabled that the signals of part of the test were received at medium strength.

This is the first direct transmission of wireless signals from Australia to England.

6AHP DE 2CM.

AT the moment of going to press we learn from Mr. C. D. Maclurcan that he has exchanged messages with stations in the United States. From 8 p.m. to 10 p.m. he was in communication with Mr. W. Williams, of Pomona, California, whose station is 6AHP. Mr. Williams was working on a wave-length of 78 metres, while Mr. Maclurcan was using a wave-length of 90 metres.

During the evening Mr. Maclurcan was also in communication with 9EKY, the station of Mr. R. K. Rohan, of St. Louis. The communication continued for 10 minutes.

Mr. Maclurcan has been experimenting for a considerable time on low wave-lengths, and he states that his latest achievements go to prove their utility.

A power of 150 watts (by calculation) was used.

AMALGAMATED WIRELESS PATENT.

"WE think that patentees the world over and financial circles generally will be astounded by the N.Z. Government's action," said Mr. G. Mason Allard, the Chairman, in moving the adoption of the Directors' Report and Balance Sheet at the Annual General Meeting of Amalgamated Wireless (Australasia) Limited. He referred to the N.Z. Government's legislation in regard to the company's patents. "We now await full information from the other side," he continued, "upon receipt of which all

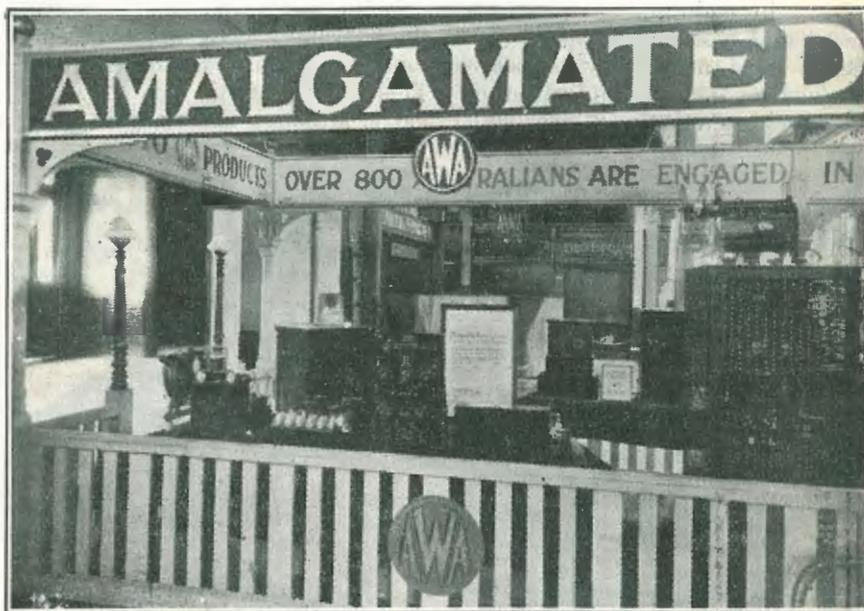
necessary steps will be taken to assert the Company's claims."

Mr. F. D. BELL'S ACHIEVEMENTS.

CONGRATULATIONS from all parts continue to flow in upon Mr. F. D. Bell on his achievement in maintaining two-way conversation with England. Writing to a friend in Auckland, Mr. Bell states:—"We

it. As a matter of fact, they were readable by the second operator (Miss Bell) without 'phones right across the table from the official receiver. There are some local stations harder to read. We find that from 5.50 to 6.50 p.m. English signals come in quite well, but after that they fade rapidly.

"Their wave is around 100 metres, with an input from 100 to 200 watts.



One of the most interesting displays which attracted the attention of the public at the All-Australian Manufacturers' Exhibition held this month at Melbourne was that of Amalgamated Wireless (Australasia) Ltd. The apparatus on view included a $\frac{1}{2}$ Kw. Oscillator Panel Broadcasting Transmitter. This, in conjunction with one of equal size comprised a 5,000 watt transmitter and is used in broadcasting stations as a "drive" for the six Kw. broadcasting panels. Other apparatus shown included a type F marine set as installed and operated on the principal ships of the Australian Mercantile Marine.

have been in communication every night since our first success on Saturday, October 18, under varying conditions, our signals being reported sometimes QRZ (weak) and sometimes QSA (strong). Our usual correspondent is 2SZ, Mill Hill School. It was a great pleasure to work with Mr. J. Orbell, of 3AA fame, who was at 2SZ on Tuesday. He is certainly a good operator and while he was at the key we were able to work considerably faster than usual, since he recognised that if we said 2SZ's signals were QSA we probably meant

We work on 90 metres, using an input of 150 watts, with a 50-watt Radiotron valve, a 96 feet lattice mast, vertical cage and small counterpoise. The receiver is of the low-loss type with one-step audio amplification, and we have worked English 2KF, 2SZ, 2OD, 2SH, and we have heard, but not worked, 2NM, 5LF and 2WJ. On Monday evening we also raised U5DW, Greenville, Texas, who cabled for confirmation. 4AG and 4AK, Dunedin, have been reported several times now by English amateurs."

Another Famous Circuit

(From the same source as the well-known P1.)

Type 103 Triple Magnifying Valve Receiver

(By G. Apperley.)



THE imposition of a number of functions on one valve is usually responsible for the difficulties experienced in maintaining stable adjustment and moreover simplicity in operation must necessarily be sacrificed. The commercial application of wireless, and particularly broadcast

The chief difficulty was to keep the circuit constants in a state of almost continuous variation in order to compensate for alterations in capacity brought about by the movement of the operator's body or by other persons or objects in the neighbourhood. This characteristic of the "soft" valve, although necessary in order to

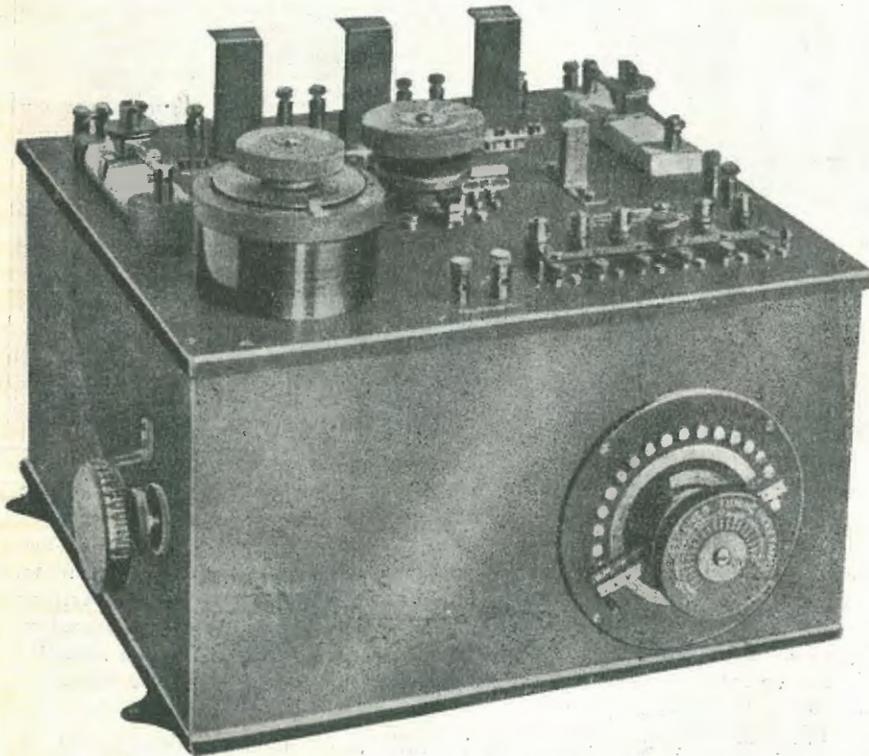
hands of a single wireless operator, their gravity could best be imagined.

The "hard" valve is probably one of the greatest gifts science has bestowed upon civilisation. It has made possible progress which a few years ago was undreamt of. Who could have visualised ten years ago a single broadcasting station serving thousands of receivers located in various states and countries?

In its early commercial form it arrived in this country during 1917-1918 and its value was at once fully appreciated by technicians and experts.

Not one moment was lost by the engineers of Amalgamated Wireless (Australasia) Limited to turn its use to eliminate the trouble experienced with its predecessor. The first receiver employing the new type of valve was placed in commercial service in this country a few months later. Indeed, it was one of the first in the world and the Australian designers were well rewarded by the knowledge that it created very considerable interest abroad. The original instrument was known as "The Triple Magnifying Valve Receiver, Type 103" and, although this particular type is now no longer manufactured, its fundamental principles are embodied in practically all commercial instruments in use to-day. The receiver soon made history for itself. Record distances for reception were soon chronicled by the twenty or thirty Mercantile Marine stations which were equipped with the apparatus and later the receiver provided means for accomplishing a feat which was hitherto thought insuperable—the girdling of the earth by wireless.

It was on September 22, 1918, that Mr. E. T. Fisk received at Wahroonga the first direct wireless message from England.



The completed receiver, as used for commercial purposes.

reception, demands receiving apparatus which is simple to operate, stable in adjustment, capable of giving continuous service on any given adjustment and sensitive. Up till the year 1918, valve receivers used in this country for commercial work and by experimenters, employed, without exception, valves of the "soft" type. Many readers will have vivid memories of the task of maintaining the adjustment of these earlier receivers.

obtain sensitiveness, was most troublesome, so much so, in fact, that the advantage of sensitivity was almost invariably destroyed by instability of adjustment.

These troubles, although perhaps very annoying to the experimenter, were not always serious, but in commercial work, when impending disaster at sea might virtually place hundreds of lives and thousands of pounds' worth of property in the

Keeping well in mind the shortcomings of known valves and valve receivers the designers at once commenced their task, and simplicity, efficiency, and stability were, to a very large extent obtained by employing three valves and imposing one function only on each. Like its

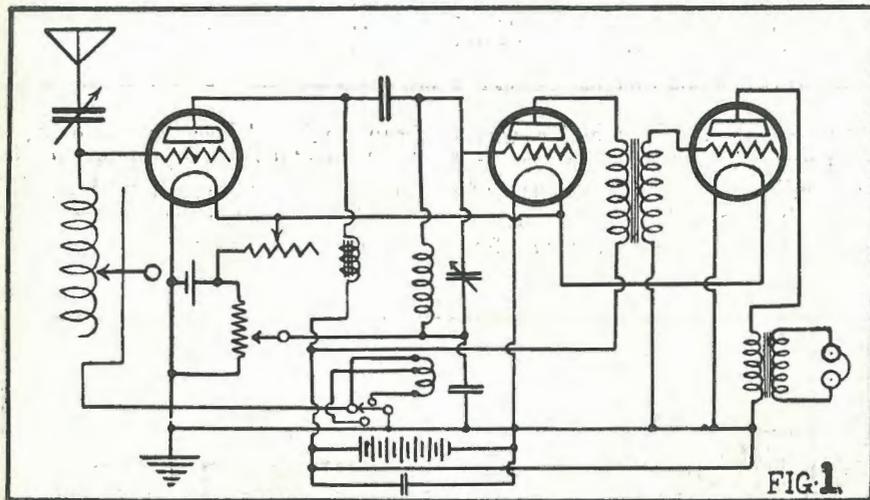
The circuit arrangement is shown in Fig. 1. The first valve functions purely as a radio frequency amplifier, the second as a rectifier or detector, and the third as a low frequency amplifier. The similarity of that section of the circuit associated with the first valve to the P1 circuit

ing characteristics of the "Q" valve by placing a suitable potential on the grid of the detector. This fact makes the circuit between the first and second valve uncommon in view of present day practice.

Fig. 2 shows the Type 103 circuit slightly modified for experimental purposes utilising modern valves. The connections to the first valve are very similar to the P1 circuit, although the valve acts only as an amplifier of radio frequency, rectification being performed by the grid condenser and leak method on the second valve.

Reaction, which for self-heterodyne purposes may be carried so far as to make the first valve oscillate, is provided between the aerial and secondary circuits, the coil being wound in two sections, one for short waves and the other for long waves.

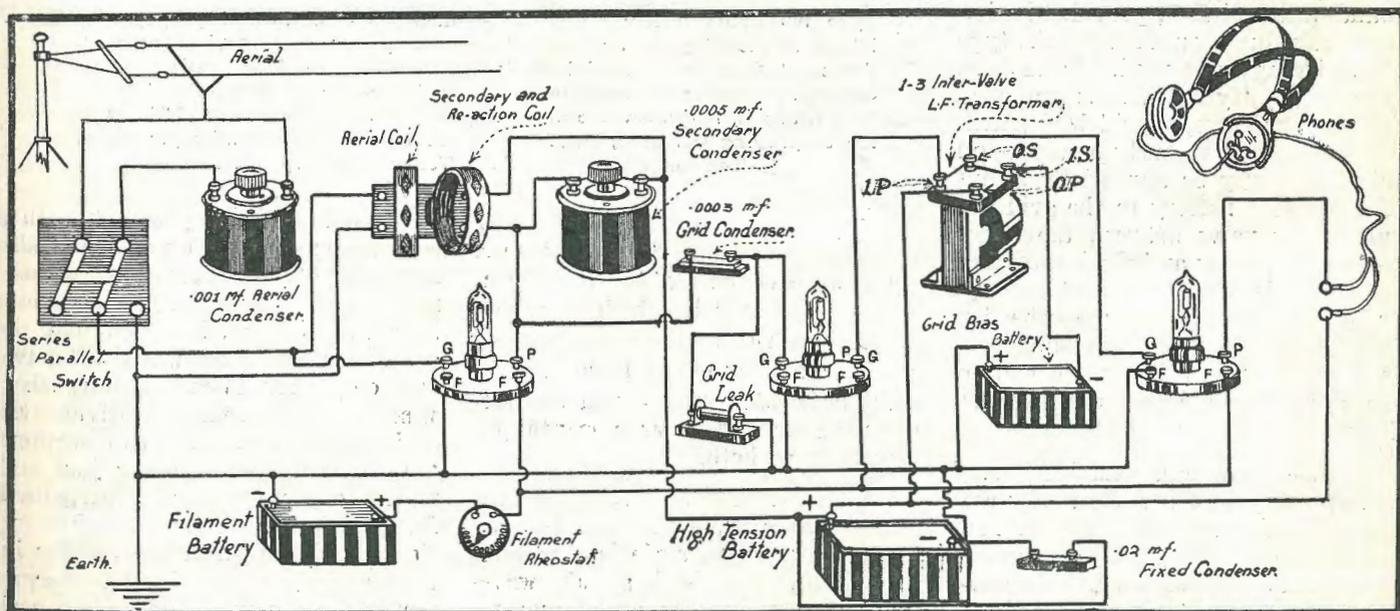
To return to Fig. 1: In order to utilise potential from the common lighting battery for impressing on the grid of the rectifying valve, the secondary circuit must necessarily have to be isolated from the plate potential battery by stopping condenser C3. The plate battery is fed to valve 1 through an impedance of suitable value which in practice should be equal to that of the plate-filament impedance of the valve employed. Its purpose is to introduce across the secondary circuit the greatest possible



Type 103 Receiver Circuit, as employed for commercial purposes.

successor, the famous P1 Receiver, the Type 103 circuit arrangements are founded on Round's invention of 1913 and Von Arco and Meissner's of the following year, each of which are protected by Commonwealth Letters Patent Nos. 16100/20 and 12194/14, respectively.

published in *Radio* on September 3 last will be readily recognised. Type "Q" Valve (the only type then available) was used throughout, but with a few minor alterations the circuit is suitable for use with any other type or types. It will be noticed that advantage was taken of the rectify-



Pictorial diagram of receiver herein described, showing wiring connections.

TABLE GIVING TUNING RANGES OBTAINABLE WITH EXPANSE HONEYCOMB COILS ON AVERAGE EXPERIMENTAL AERIAL HAVING A DISTRIBUTED CAPACITY OF .0003 M.F. AND A DISTRIBUTED INDUCTANCE OF 20 MICROHENRIES. AERIAL CONDENSER, .0001 M/F. SECONDARY CONDENSER, .0005 M/F.

Wave range.	Aerial coil.	Aerial condenser: Series or parallel.	Secondary Coil.
90- 140 metres. ..	19 turns. ..	Series ..	25 turns
140- 300 " ..	19 " ..	Parallel ..	35 turns
300- 500 " ..	75 " ..	Series ..	75 turns
425- 680 " ..	100 " ..	Series ..	100 turns
550-1000 " ..	150 " ..	Series ..	150 turns
760-1600 " ..	100 " ..	Parallel ..	200 turns
1100-2400 " ..	150 " ..	Parallel ..	250 turns

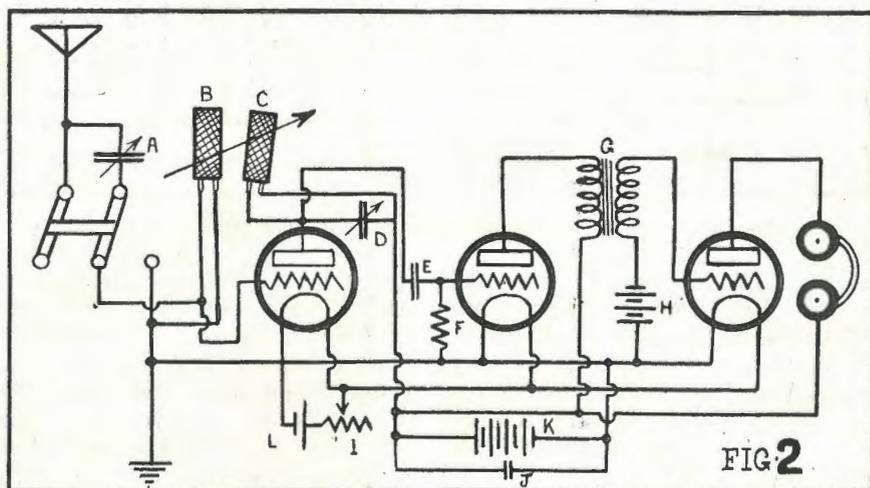
potential variations set up by the radio frequency impressed on the grid of valve 1. Without the impedance the potential variations across the secondary circuit would be of negligible value. Condenser C2 provides a low impedance path for the oscillations passing between grid and filament of the rectifying valve, which otherwise would have to pass through the resistance of the potentiometer. A third condenser, C1, is connected across the high tension battery and also acts as a bi-pass for the high frequency component of the plate current variations. The intervalve transformer between V1 and V2 was originally of equal ratio, each section being wound to an ohmic resistance of 11,000 ohms, which value gave an impedance equal to that of the plate-filament circuit of the type "Q" valve.

Any good make of intervalve step-up transformer will, however, be found quite suitable, provided its impedance value is suitable for the type of rectifying valve used. If a modern type of amplifying valve is employed for the last stage, a grid bias potential may advantageously be used, and this may easily be applied by means of a separate battery in the grid circuit of the valve between the transformer secondary and the negative or positive side of the filament battery, or by a potentiometer across the filament battery having its sliding contact connected to the lower end of the secondary winding of the transformer.

In cases where a combination of different types of valves call for different plate potentials, the common high tension battery may be tapped or separate batteries used. The same applies to filament current supply or voltage.

The original receiver had a wave-length range 250-6000 metres and was supplied with additional units to extend the range to 20,000 metres. The secondary former carried four

been combined because two coils, one in the aerial circuit and the other in the secondary circuit, will be quite suitable for these wave-lengths. For convenience in operation the commer-



Type 103 Valve Receiver Circuit modified for experimental purposes. The letters in the diagram represent the following parts:—A, Aerial Tuning Condenser, .001 mfd.; B, Aerial Coil; C, Secondary and Re-action Coil; D, Secondary Condenser, .0005 mfd.; E, Grid Condenser, .0003 mfd. (fixed); F, Grid Leak; G, 1-3 Intervalve Low Frequency Transformer; H, Grid Bias Battery for amplifying valve; I, Filament Rheostat; J, Fixed Condenser; K, High Tension Battery; L, Low Tension Battery, .02 mfd.

sections of windings, each carefully insulated and spaced from the others. They were connected to a special wave-change switch, which completely isolated the sections not in use. Another switch enabled the instrument to be used purely as a low frequency amplifier or as a crystal receiver, or as both.

The table above gives standard honeycomb coils, which can be used respectively in the aerial and secondary circuits for the band of wave-lengths quoted. The aerial and reaction coil inductance values have

cial instrument was provided with a separate reaction coil which was also necessary for fine reaction adjustment on the longer waves. It should be borne in mind, however, that the coupling adjustment when using two coils only, should be fairly fine, otherwise it is desirable to divide the aerial inductance into two sections, the reaction section being just sufficient to promote oscillations with a fairly tight coupling. The other section containing the balance of the inductance should be placed well away from the secondary winding in a position not in inductive relation to it.

Summer Broadcasting

Will be Popular in Australia



CIRCUMSTANCES augur extremely well for a record Radio summer this season in Australia. With several broadcasting stations in full activity and with the great possibility of others commencing in due course; the trade doing quiet but consistent and steady business and splendid performances in all branches of wireless being put up by amateurs almost every day, the outlook is exceedingly bright.

Below we give the opinions of some of the leading amateurs, dealers and others as to what the coming hot weather will bring forth. The note of their remarks is extremely optimistic and their anticipations make very interesting reading, coming, as they do, from the men who know.

MR. C. D. MACLURCAN.

I think we will use still lower waves to enable the amateurs to further communicate with other parts of the world. As far as broadcasting is concerned, I think that Australia is now passing through a period more or less slack, but which has, without exception, been experienced by all other countries in the world in which services of this nature have been established. Wireless is bound to come into its own, and must play a more and more important part in our daily home life. I think that probably by next winter wireless will be in full swing again.

Chas. MacLurcan

MR. R. C. MARSDEN.

Low waves will become so popular with amateurs this summer that they will eventually be pushed off them. I think that the eastern suburbs of Sydney, in which are situated stations of 2YI, 2YG, 2DS and 2BK, will be the point from which the next long-distance records will be put up. It must be remembered that to put up the records of the nature of those which have recently filled so many columns of the daily press, it is necessary to have the money and the material, not to mention many other important factors, and, as these experimenters have these requisites I feel confident that it will not be long before we hear something of a startling nature from them. With regard to broadcasting, more attention

WE ARE PLEASED TO ANNOUNCE THAT after many months of careful designing and proper application of scientific principles we are now completing a new range of popular priced Wireless Receivers. In order to distinguish this popular grade from our extremely high grade of "Burginphone" they will be known by the name

"BECOLIAN"

The prices will be within the reach of the average person, who will be assured of the efficiency of our Becolian machines by the fact that our reputation and guarantee is behind them. In considering

Your Christmas Wireless Set

don't decide till you have examined our "Becolian" machines.

Years of experience, combined with efficiency methods of quantity production, have enabled us to produce such an instrument.

Full particulars on application.

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Wireless Engineers, Suppliers, and Manufacturers of the famous "BURGINPHONE."

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should be paid to the requirements of the man outback, to whom broadcasting is of twice the value it is to the city inhabitant. In the case of the town dweller amusement is more or less at his very door, and he has not the incentive to listen-in to musical items that the farmer has. The information, however, concerning stock, market and weather reports is of the utmost value to the man many, many miles from the city centres and even more attention and a wider service should be carried on for his benefit. I think that steady wireless business will continue indefinitely.



**MR. COLVILLE, OF COLVILLE-MOORE
WIRELESS SUPPLIES.**

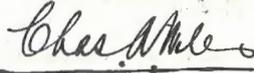
To a certain extent, I am of the same opinion as Mr. Marsden and anticipate steady business up to Christmas but a sudden drop in January and February. Trade will then pick up later at Easter and increase to a big boom. Speaking of Broadcasters (Sydney), Limited, of which I am a Director, it may be of interest to your readers to learn that it is this station's intention to train artists especially for broadcasting purposes in order that their clients may receive the very best in services. 2BL is shortly going on to a power of five kilowatts.



**MR. C. A. WILES, OF "WILES
WONDERFUL WIRELESS."**

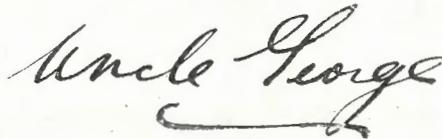
Providing broadcasting companies continue to transmit satisfactorily, there is no reason to doubt that conditions would remain excellent. One thing I would like to see is more Sunday and holiday transmissions. With the summer coming and the Australian being essentially an outdoor soul, he wants to take his Radio with him on his week-end jaunts in the country and at the seaside, and, if tuning in, he hears only race results and market reports when he has every right to expect musical items, this will not be conducive to the popularity of Radio as a summer holiday

recreation and entertainment. I think that portable sets will become very popular here this summer and have no fear that steady wireless business will continue until Easter, and then there will be another big and more lasting boom.



UNCLE GEORGE OF 2BL.

With the summer coming I anticipate that the future of wireless will become greater and greater. In my capacity as Uncle George I notice that my "family" is growing every day and I now have thousands of kiddies with their little sets who never miss a night listening-in. Radio has just commenced in Australia and it is my idea that there are wonderful possibilities in it.



**MR. H. J. HAPGOOD, OF UNITED
DISTRIBUTORS LIMITED.**

The future of wireless in Australia will be very similar and equal to that in all the other countries of the world, where wireless has increased in popularity and volume of sale from year to year. A great many people speak of wireless as they did of the telephone, automobile and many of to-day's necessities when they first appeared as a fad and a passing moment's fancy, whereas



**MR. R. B. HUNGERFORD, OF THE
WESTERN ELECTRIC CO.**

WE will most likely experience a little slackness during the hot months for two reasons: in Summer, the Australian who loves the outdoors, is more inclined for other activities, and, although I have no doubt that when the portable set comes into

an example of the permanency of the popularity of wireless in the United States is shown in a recent letter which we have received from a prominent radio engineer. He states that the volume of sales in Radio in the season 1924-25 will far surpass any previous years and amount to at least 100 million pounds. The usual statistics that are published are not always reliable, but in the United States there is a firm named Babson, which has an unquestioned reputation for reliability, and has published some statistics for last year which include the fact that in the United States one home in every five has a Radio set, in England that one home in every ten has a set, and in Cuba and other Latin-speaking countries there is a larger percentage of sets than in England. Proportionately speaking, this means that before long there will be two hundred thousand sets in Australia. A similar statement comes to me from England, although not in the same form of statistical figures. I maintain that there are many reasons why wireless should develop faster and be more lasting in Australia than it has been in the United States. Three of them are:— The distance of many of the inhabitants in large homes from the cities with their amusements, theatres, musical entertainments, etc., the fact that there are less static in the summer months in Australia than the greater part of the United States; and also that the summer days are shorter, giving more evening time to be devoted to Radio, and also the great demand and necessity of getting quick market and news reports where there is not prompt delivery of daily papers.

its own it will change all this, that time has not yet come. The public must be educated up to it first. The second reason is that static will more or less have a depressing effect on wireless. Nevertheless, at Christmas time I expect a small peak in the sales of sets as presents and also accessories.

I expect, however, that the following Autumn and Winter will show what can really be done with Wireless—providing, of course, that the trade are ready. My personal opinion of the best way in which to make broadcasting popular in this country is to educate the public and show them what is best. With broadcasting, I think that quality of reproduction should come first, whereas, at present, it would appear that more importance is given to volume. There are a fair percentage of musically inclined people among listeners who will be the first to realise that volume is not the only thing.

It should be remembered that the wireless industry will only last, to any extent, so long as the stations furnish good programmes—and I think they fully realise this, although it is a difficult job to always gauge the public's taste. Considering the relatively small experience the members of the broadcasting stations have had, they have done very well. As to its future possibilities, they are, of course, wonderful. Particularly so when considered in conjunction with

the man on the land and the frequent transmissions of stock and market reports. Anything that may serve to lighten his burden is bound to be for the ultimate benefit of Australia as a whole.

R. O. Humphreys

NIUE ISLAND RADIO STATION.

REFERRING to Niue Island progress the Secretary of the Cook Islands Department, Mr. J. D. Gray, said that with the establishment of a wireless station and a steamer service in lieu of a sailing vessel connection, the island's long isolation had in a way been ended. The wireless apparatus was a radio telephone and he understood it was the first official station of its kind in that part of the world. It had, therefore, interesting possibilities from a broadcasting aspect. Already the suggestion had been made that a band of picked Niuean singers and dancers should practise for the purpose of broad-

casting some typical Pacific Island dance music as a change to the usual items now broadcasted.

WIRELESS FOR THE SICK.

WIRELESS continues to make its advances and a recent installation beside the bed of a patient in the Auckland hospital is regarded as something new. The patient is Mr. J. Edwards, of the Grand Theatre, Auckland. He is a wireless enthusiast and his friends decided that if he could not come to his hobby they would take his hobby to him. The superintendent granted permission and the patient's son installed the set. Mr. Edwards, to say nothing of the nurses and an occasional doctor now "listen in," and, speaking wirelessly, hears all there is to hear.

AERIAL insulation for receiving is not as important as for transmitting, but good insulation will improve your range in damp weather.

A PHONOGRAPH makes a good load speaker when connected to your radio set.

THE NAME TO KNOW IN RADIO—

WILES Wonderful Wireless
CRYSTAL or VALVE SETS for Home Construction

Parts for Single Slide
 Crystal Set 14/8

Parts for Loose Coupler
 Crystal Set £1/3/2

Parts for 1-Valve Set £5/17/9

Parts for 2-Valve Set £7/15/9

Parts for 3-Valve Set £9/15/-

Parts for 4-Valve Set £14/3/3

The only accessories you require to complete the above Sets are:—For Single Slide or Loose Coupler Crystal Sets are Headphones. For Valve Sets: Batteries, Headphones and Valves.

The parts for these Home-constructed Sets have been carefully tested, both individually and together, in the particular part for which they are intended. We employ a staff of experts to test out and find the right parts for whatever set you wish to build. Not the most expensive parts, nor the cheapest, but the right parts that will perform faithfully whatever is demanded of it by the particular set being built.

MAIL US YOUR ENQUIRIES.

SEND FOR PRICE LIST R5.

W. HARRY WILES

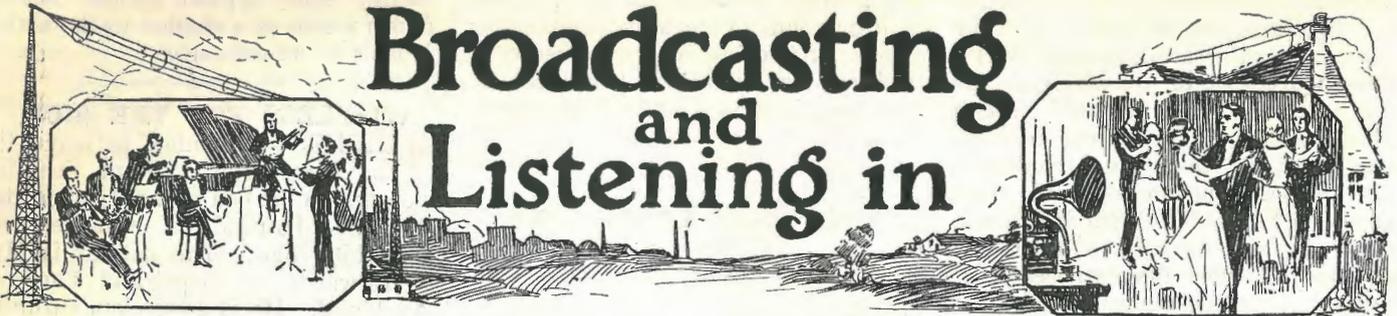
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Please address all communications to Head Office, 56-58 Goulburn Street, Sydney.



QUITE an industry in radio is being established on the Coast, says the *Hobart Mercury*. A large number of sets have been erected

Coast, as their range will be too limited. One hopes also that a broadcasting station will be set up in Hobart. The revenue ought to be sufficient to give a satisfactory return for the money spent in its erection. Such a station would be of service to Tasmania.

HIS Excellency the Governor of Queensland, Sir Matthew Nathan, recently received an audience at Government House consisting of Mr. E. Christensen

2FC

BROADCASTING TIMES.

Sydney Mean Time.
Wave Length: 1100 metres.

Midday Session:
12.55 Tune in to the Studio Chimes.
12.58 Time Signals from Farmer's Master Clock (Sydney Observatory Time), Stock Exchange Intelligence, Weather News, "Sydney Morning Herald" news and cable service, "Evening News" midday news bulletin.
1.15 Close down.

Afternoon Session:
3.30 Studio Chimes.
3.33 Musical programme by Farmer's Orchestra broadcast direct from Farmer's Oak Luncheon Hall. Numbers will be played at intervals to 4.45.
4.45 Stock Exchange, weather, afternoon news.
5.0 Close down.

Early Evening Session:
6.30 Studio Chimes.
6.33 Children's Hour.
7.0 Dalgety's Market Reports, Fruit and Vegetable Markets, Stock Exchange, Shipping News, Sussex Street Markets, Late News.
7.15 Close down.

Night Session:
8.0 } Entertainment.
to }
10.0 } See list hereunder.

EVENING ENTERTAINMENT.

As far as possible the following schedule is adhered to:—
Monday: Theatre Night.
Tuesday: Popular Concert
Wednesday: Studio Concert.
Thursday: Studio Concert.
Friday: Classical Night.
Saturday: Jazz Night.
Sunday: Semi-Sacred Concert (7.30 to 9.30 p.m.).

and many are on order. Of course, we are handicapped in Tasmania, the paper continues. In Melbourne and Sydney, a small crystal set, which costs only a few pounds, will get practically all that its owner wants. Such sets will be of no use on the

A DEPUTATION from the Church Missionary Society recently waited on the Postmaster-General (Mr. Gibson) with a request for assistance in installing wireless on Groote Island, near the Gulf of Carpentaria. In introducing the deputation, Mr. Latham, M.H.R., stated that the Society was asking the Minister to make Groote Island an official station, as the mission ketch took three weeks to cross the Gulf of Carpentaria and missionaries had to wait five months for letters. Mr. Gibson said in reply that he realised the difficulties under which the missionaries worked and promised to obtain an estimate of the cost.

THE Radio Society of Britain has passed a resolution congratulating members who have successfully established two-way wireless communication with New Zealand, and also congratulating the Radio Society of New Zealand and the New Zealanders who co-operated.

ONE evening recently, a Tasmanian amateur was listening on a loud-speaker to broadcast music from an American station. With him at the time there happened to be a person musically inclined, who actually took down the tune in ordinary notation and subsequently orchestrated it for his own benefit. Since then the title of the piece has been ascertained and it is to be published in Australia. Another victory for wireless!

6WF

BROADCASTING TIMES.

Perth Mean Time.
Wave Length: 1250 metres.

Midday Session:
12.30 Tune in to Sonora.
12.35 Market Reports of The Westralian Farmers, Limited.
12.42 News Service.
12.55 Weather Report.
1.0 Time Signal.
1.1 }
to } Sonora and Pianola.
1.30 }
1.31 Close down.

Afternoon Session:
3.0 Tune in to Piano Player (Duo-Art).
3.5 }
to } Special programme, com-
4.0 } prising talks, Sonora
and Pianola.
4.1 Close down.

Early Evening Session:
7.0 Tune in to Sonora.
7.5 Bedtime Stories.
7.45 Market Reports.
7.55 Weather Reports.
8.0 Time Signal.
8.2 News Cables.

Night Sessions:

NIGHT SESSIONS.

Monday: 8.10, A Lecture; 8.45, Music, Pianola and Sonora.
Tuesday: 8.10, Professional Concert.
Wednesday: 8.10, Concert Evening.
Thursday: 8.10, Professional Concert.
Friday: 8.10, Talk on Wireless to Amateurs by a Representative of the Affiliated Radio Society; 8.45, Concert Evening.
Saturday: No Saturday afternoon, only from 12 to 1, and again at 7.0. 8.10, The Wesfarmers Studio Cabaret Jazz Orchestra, under the direction of Irwin Lawrence.
Sunday: 7.30, Mr. C. H. Coff's Choir. Close down at 9 p.m.

With the exception of Saturday, when the station closes down at 10.30 p.m., all other evening sessions conclude at 10 p.m.

(managing director), and Mr. Sydney Wyllie, of Home Radio Service, Limited, a new company that is being formed in Queensland to sell receiving sets and accessories. His Excellency showed great interest in the venture.

IN a letter to the Adelaide *Observer*, Mr. E. J. Hume eloquently pleads for the installation of listening-in sets at lighthouse stations, which would enable the occupants to keep in touch with large centres of population and share in the delights of music and the recording of stories and so on, such as are now so freely available to the general community. The imagination can readily conceive the inestimable benefit, socially and educationally, which would result from the provision of radio instruments at the lighthouses in South Australia. Those least accessible, stating them in order, are Sape de Couedie, the Neptunes, Cape Jaffa, Point Lowly, and Althorpes and Cape Borda. It would be a gracious act on the part of the public if the fund opened by *The Register* proved sufficient to install radio sets at these six out-of-the-way lighthouses, whose occupants so seldom come into touch with outside civilization.

well equipped with wireless apparatus. Now the following communication has been received by radio

Eastland. Broadcast received perfectly over 2,000 miles."

"I HEAR that a new phrase has been coined to describe the unfortunate wives of enthusiastic listeners-in," states a writer in a Melbourne paper. "The trouble about wireless with its crystals, its valves, and its coils," he continues, "is that it possesses a fatal fascination for the male who is once really bitten by the craze. Hence in our suburbs there are numerous 'wireless widows' to be found already. 'My husband comes home in the evening,' said one of them to me the other day, 'has his tea—and that's the last I hear of him for the rest of the day. He goes straight to his wireless, commands strict silence in the house—and never a word more will he utter. I am a wireless widow.'"

2 B L

BROADCASTING TIMES.

Sydney Mean Time.
Wave Length: 350 metres.

Midday Session.	12	}	Musical Programme, with News to Reports supplied by "The Guardian."
2 p.m.	3	}	Afternoon Session.
	5	}	Musical Programme, with News to Reports supplied by "The Guardian."
	7	}	Early Evening Session.
	7.45	}	Nursery Rhymes and Bedtime Stories. Pitt, Son & Badgery Stock Exchange Reports.
	8	}	Night Session.
		}	8 Nightly Concert.

EVENING ENTERTAINMENT.

Monday:	"Jazz" night, with vocal items from the Studio.
Tuesday:	Classical Studio Concert.
Wednesday:	Dance Night.
Thursday:	Broadcasters' Popular Concert.
Friday:	"Jazz" night, with popular items from the Studio.
Saturday:	Popular Concert.
Sunday:	Classical and Operatic Concert.

IN June last, the Oxford University Expedition set forth to explore North Eastland, and was, of course,

from the commander of the Expedition:—"Oxford Expedition sends heartiest congratulations from North

HOW machinery can be set in motion by wireless was demonstrated recently at the now closed Wembley Exhibition. A rotary converter of some 600 h.p. was started and stopped by wireless signals transmitted from the Manchester works of the Vickers Metropolitan Company.

Have You Seen The new Gramophone Attachment for utilising your Gramophone as a Loud Speaker. It is simply fitted to the Tone Arm in place of the ordinary speaker. It has a beautiful tonal quality on account of its adjustable Mica Diaphragm. Price, with Long Flexible Cord, £2/2/6.

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MANHATTAN VARIOMETER

in Brown Bakelite. Beautiful appearance. Fits in any position, on panel or base.

PRICE 39/-

We make a Special Carton for sending Valves to the country. It is almost impossible for the postal people to break a valve packed in this carton.

The New Prices of Valves.

PHILLIPS, D1, D2 and E	18/6
MARCONI, R	19/-
MULLARD	19/-
DE FOREST	30/-
RADIOTRON	30/-

Headphones of High Quality that we Stock

PEERLESS, 2000 ohm	30/-
TRIMM, 2000 ohm	32/6
TRIMM, 3000 ohm	45/-
RED SEAL—the Aristocrat of all Headphones 45/-	



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THE QUALITY RADIO STORE.

6WF's Programmes

November 26—December 10, Inclusive

These programmes are subject to any alterations which may be necessary owing to unforeseen circumstances.



WEDNESDAY, November 26, 1924:—P.M.: 12.30, Tune in to Gramophone; 12.35, Market Reports of the Westralian Farmers, Limited.; 12.38, News Service; 12.42, Weather Report; 12.44, Gramophone Items; 1.0, Time Signal; 1.1 to 1.30, Gramophone and Pianola. 3.30, Tune in to Piano Player 3.35 to 4.30, Special programme, comprising Talks, Gramophone, and Pianola. Items by The Wesfarmers' Orchestra. 7.5, Tune in to Gramophone; 7.10, Bedtime Stories; 7.45, Market Reports; 7.57, Weather Reports; 8.0, Time Signal; 8.1, News Cables; 8.10, Lecture; 8.30, Wesfarmers Studio Orchestra.

Thursday, November 27, 1924:—P.M.: 12.30, Tune in to Gramophone; 12.35, Market Reports of The Westralian Farmers, Limited; 12.38, News Service; 12.42, Weather Report; 12.44, Gramophone Items; 1.0, Time Signal; 1.1 to 1.30, Gramophone and Pianola. 3.30, Tune in to Piano Player; 3.35 to 4.30, Special programme, comprising Talks, Gramophone and Pianola. Items by The Wesfarmers' Orchestra. 7.5, Tune in to Gramophone; 7.10, Bedtime Stories; 7.45, Market Reports; 7.57, Weather Reports; 8.0, Time Signal; 8.1, News Cables; 8.10, Professional Concert.

Friday, November 28, 1924:—P.M.: 12.30, Tune in to Gramophone; 12.35, Market Reports of The Westralian Farmers, Limited; 12.38, News Service; 12.42, Weather Report; 12.44, Gramophone Items; 1.0, Time Signal; 1.1 to 1.30, Gramophone and Pianola. 3.30, Tune in to Piano Player; 3.35 to 4.30, Special programme, comprising Talks, Gramophone and Pianola. Items by The Westfarmer's Orchestra. 7.5, Tune in to Gramophone; 7.10, Bedtime Stories; 7.45, Market Reports; 7.57, Weather Reports; 8.0, Time Signal; 8.1, News Cables; 8.10, A Talk on Wireless to Amateurs by a representative of the Affiliated Radio Society; 8.45, Concert Evening.

Saturday, November 29, 1924:—P.M.: 12.0, Tune in to Gramophone; 12.5, Market Reports of The Westralian Farmers, Limited; 12.10, News Service; 12.15, Weather Report; 12.16, Gramophone and Pianola; 1.0, Time Signal. 7.5, Tune in to Gramophone; 7.10, Bedtime Stories; 7.45, Market Reports; 7.57, Weather Reports; 8.0, Time Signal; 8.2, News Cables; 8.10, Wesfarmers Studio Orchestra.

Sunday, November 30, 1924:—P.M.: 7.30, Church Service.

Monday, December 1, 1924:—P.M.: 12.30, Tune in to Gramophone; 12.35, Market Reports of The Westralian Farmers, Limited; 12.38, News Service; 12.42, Weather Report; 12.44, Gramophone Items; 1.0,

Time Signal; 1.1 to 1.30, Gramophone and Pianola. 3.30, Tune in to Piano Player; 3.35 to 4.30, Special programme, comprising Talks, Gramophone, and Pianola. Items by The Wesfarmers' Orchestra. 7.5, Tune in to Gramophone; 7.10, Bedtime Stories; 7.45, Market Reports; 7.57, Weather Reports; 8.0, Time Signal; 8.1, News Cables; 8.10, A Lecture by the Department of Agriculture of W.A.; 8.30, Wesfarmers Studio Orchestra.

Tuesday, December 2, 1924:—P.M.: 12.30, Tune in to Gramophone; 12.35, Market Reports of The Westralian Farmers, Limited; 12.38, News Service; 12.42, Weather Report; 12.44, Gramophone Items; 1.0, Time Signal; 1.1 to 1.30, Gramophone and Pianola. 3.30, Tune in to Piano Player; 3.35 to 4.30, Special programme, comprising Talks, Gramophone, and Pianola. Items by The Wesfarmers' Orchestra. 7.5, Tune in to Gramophone; 7.10, Bedtime Stories; 7.45, Market Reports; 7.57, Weather Reports; 8.0, Time Signal; 8.1, News Cables; 8.10, Professional Concert.

Wednesday, December 3, 1924:—P.M.: 12.30, Tune in to Gramophone; 12.35, Market Reports of The Westralian Farmers, Limited; 12.38, News Service; 12.42, Weather Report; 12.44, Gramophone Items; 1.0, Time Signal; 1.1 to 1.30, Gramophone and Pianola; 3.30, Tune in to Piano Player; 3.35 to 4.30, Special programme, comprising Talks, Gramophone and Pianola. Items by The Wesfarmers' Orchestra. 7.5, Tune in to Gramophone; 7.10, Bedtime Stories; 7.45, Market Reports; 7.57, Weather Reports; 8.0, Time Signal; 8.1, News Cables; 8.10, Concert Evening.

Thursday, December 4, 1924:—P.M.: 12.30, Tune in to Gramophone; 12.35, Market Reports of The Westralian Farmers, Limited; 12.38, News Service; 12.42, Weather Report; 12.44, Gramophone Items; 1.0, Time Signal; 1.1 to 1.30, Gramophone and Pianola. 3.30, Tune in to Piano Player; 3.35 to 4.30, Special programme, comprising Talks, Gramophone and Pianola. Items by The Wesfarmers' Orchestra. 7.5, Tune in to Gramophone; 7.10, Bedtime Stories; 7.45, Market Reports; 7.57, Weather Reports; 8.0, Time Signal; 8.1, News Cables; 8.10, Professional Concert.

Friday, December 5, 1924:—P.M.: 12.30, Tune into Gramophone; 12.35, Market Reports of The Westralian Farmers, Limited; 12.38, News Service; 12.42, Weather Report; 12.44, Gramophone Items; 1.0, Time Signal; 1.1 to 1.30, Gramophone and Pianola. 3.30, Tune in to Piano Player; 3.35 to 4.30, Special programme, comprising Talks, Gramophone, and Pianola. Items by The Wesfarmers'

Orchestra. 7.5, Tune in to Gramophone; 7.10, Bedtime Stories; 7.45, Market Reports; 7.57, Weather Reports; 8.0, Time Signal; 8.1, News Cables; 8.10, A Talk on Wireless to Amateurs by a representative of the Affiliated Radio Society; 8.30, Concert Evening.

Saturday, December 6, 1924:—P.M.: 12.0, Tune in to Gramophone; 12.5, Market Reports of The Westralian Farmers, Limited; 12.10, News Service; 12.15, Weather Report; 12.16, Gramophone and Pianola; 1.0, Time Signal. 7.5, Tune in to Gramophone; 7.10, Bedtime Stories; 7.45, Market Reports; 7.57, Weather Reports; 8.0, Time Signal; 8.2, News Cables; 8.10, Wesfarmers Studio Orchestra.

Sunday, December 7, 1924:—P.M.: 7.30, Church Service.

Monday, December 8, 1924:—P.M.: 12.30, Tune in to Gramophone; 12.35, Market Reports of The Westralian Farmers, Limited; 12.38, News Service; 12.42, Weather Report; 12.44, Gramophone Items; 1.0, Time Signal; 1.1 to 1.30, Gramophone and Pianola. 3.30, Tune in to Piano Player; 3.35 to 4.30, Special programme, comprising Talks, Gramophone and Pianola. Items by The Wesfarmers' Orchestra. 7.5, Tune in to Gramophone; 7.10, Bedtime Stories; 7.45, Market Reports; 7.57, Weather Reports; 8.0, Time Signal; 8.1, News Cables; 8.10, A Lecture by Dr. Roberta Jull on "The Health of School Children"; 8.30, Wesfarmers Studio Orchestra.

Tuesday, December 9, 1924:—P.M.: 12.30, Tune in to Gramophone; 12.35, Market Reports of The Westralian Farmers, Limited; 12.38, News Service; 12.42, Weather Report; 12.44, Gramophone Items; 1.0, Time Signal; 1.1 to 1.30, Gramophone and Pianola. 3.30, Tune in to Piano Player; 3.35 to 4.30, Special programme, comprising Talks, Gramophone Orchestra. 7.5, Tune in to Gramophone; 7.10, Bedtime Stories; 7.45, Market Reports; 7.57, Weather Reports; 8.0, Time Signal; 8.1, News Cables; 8.10, Professional Concert.

Wednesday, December 10, 1924:—P.M.: 12.30, Tune in to Gramophone; 12.35, Market Reports of The Westralian Farmers, Limited; 12.38, News Service; 12.42, Weather Report; 12.44, Gramophone Items; 1.0, Time Signal; 1.1 to 1.30, Gramophone and Pianola. 3.30, Tune in to Piano Player; 3.35 to 4.30, Special programme, comprising Talks, Gramophone, and Pianola. Items by The Wesfarmers' Orchestra. 7.5, Tune in to Gramophone; 7.10, Bedtime Stories; 7.45, Market Reports; 7.57, Weather Reports; 8.0, Time Signal; 8.1, News Cables; 8.10, Concert Evening.

WIRELESS SOCIETY OF NEWCASTLE.

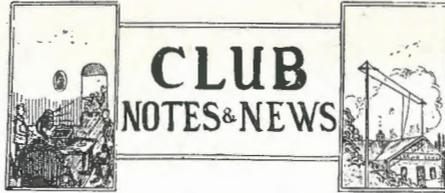
THE Wireless Society of Newcastle, which represents the genuinely interested experimenters in this district, held its second annual meeting at the Society's Rooms, Y.M.C.A. Buildings, King Street, Newcastle, on Wednesday, 5th instant, at 8 p.m. The President, Mr. Seward, occupied the chair.

Mr. L. T. Swain, the secretary, submitted the following annual report:—It is with pleasure that your committee presents its second annual report. The year has been most prosperous for the Society, many long-standing difficulties having been overcome, and the establishment placed on a secure footing. Early in the year an internal loan was arranged, whereby nine members each lent the Society the sum of £1 to enable the early establishment of the experimental radio-telephone. This was got under way on the night of January 10, 1924, and reports on the first transmission were received from Hay, Toowoomba and Brisbane. Regular test transmissions of telephony were made right up to June, and reports were received from Victoria, Queensland and New Zealand, placing the Society in the unique position of being the only club whose transmitter has been heard outside Australia.

February saw the Society in a position to again pay rent for its club room, and the committee again takes this opportunity of thanking Mr. Denny for his kindness in allowing the Society six months' free tenancy of its quarters.

OTAGO'S RECORDS.

DURING the past month there has been considerable rivalry amongst Otago's leading amateur wireless enthusiasts, in the matter of establishing fresh records, and each week has brought a fresh Richmond into the field. Undoubtedly a great performance was put up by Mr. F. D. Bell, 4AA, of Waihemo, Shag Valley, and Mr. R. Slade, 4AG, Dunedin, when they established two-way communication between New Zealand and England, but now Mr. Slade comes to light and smashes all existing records in setting up communication with England, Chili, Los Angeles, Australia and New Zealand, in the one night. Mr. Slade only required communication with South Africa and he would have been in touch with all part of the world. In his latest performance, the stations communicated with on the same evening were G2NM, 5LF and 5MN, England; FAL (Santiago), Chili; U6CGO and U6AHP Los Angeles; A2IY and A2BK, Australia; Z4AK, New Zealand. The Dunedin operator maintains that the total mileage connected was 57,700.



In August a public demonstration of wireless telephony was given in the Y.M.C.A. Building in King Street. This affair was highly successful—the Society having the co-operation and assistance of the Newcastle Y.M.C.A. The proceeds were equally divided, the Society profiting to the extent of over £7.

The Y.M.C.A. kindly placed a club room at the disposal of the Society recently entirely free of rent with only a small charge of 10/- per month for electric power. This gives the Society its long-wished-for quarters in the city, and with the enthusiastic co-operation of members the committee hopes to make the third year a most prosperous one.

In conclusion, it might be mentioned that, with the formation of the Delegates' Council in Sydney, this Society was one of the first to affiliate, and it has been represented at Council meetings by Mr. Olsen to whom the Society is under a debt of gratitude for his enthusiastic representation of its interests. A new unit receiver covering two valves at present is in course of construction and should be in operation shortly.

Mr. J. Shaw, treasurer, submitted the balance sheet which was considered very favourable.

New rules were submitted and considered, and after several alterations had been made, were accepted by the club for the ensuing 12 months.

The next business was the election of officers for the ensuing year, which resulted as follows:—President, Mr. L. T. Swain; Secretary, Mr. S. Childs; Assistant Secretary, Mr. G. Seward; Treasurer, Mr. J. Shaw; Publicity Officer, Mr. N. P. Olsen; Technical Committee, Messrs. Swain, Filmer, Seward, Childs and Stewart; Delegate for Delegates' Council of Wireless Institute, Mr. N. P. Olsen.

A vote of thanks was passed by acclamation to Mr. Swain as a token of the appreciation of the club for the valuable services rendered during the past 12 months. It was decided that in future the meetings be held at the club rooms on the first and third Wednesdays of each month at 8 p.m. The Technical Committee has been asked to prepare a syllabus of interesting lectures.

AUCKLAND RADIO ASSOCIATION.

CONSIDERABLE interest is being taken in regard to activities of the Auckland Radio Association and applications for affiliations from as far south as Palmerston North have been received locally. It is the object of the Association, however, to secure a Dominion federation of societies, each of which will remain an autonomous unit.

The following morning Mr. Slade made an attempt to reach South Africa, but, unfortunately, he was unable to do so. He gave it as his opinion that lack of arrangements was at present the chief stumbling block, but he was confident that before long one of Otago's enthusiasts would get Africa. The method of communication used by Mr. Slade was a continuous wave Morse.

NEW BOOKS.**THERMIONIC TUBES IN RADIO TELEGRAPHY AND TELEPHONY.**

(By J. Scott-Taggart, F. Inst. P., A.M.I.E.E.)

THIS is a revised and enlarged edition of Mr. Scott-Taggart's book published in 1921. A considerable

amount of additional matter has been added to bring the book thoroughly up to date and in order that the reader may be conversant with the latest developments. The book contains the following chapters, covering 470 pages, and including over 380 figures:—1, Two-Electrode Valves and the Theory of Thermionic Currents; 2, The Three-Electrode Vacuum Tube; 3, The Vacuum Tube as a Detector; 4, The Vacuum Tube as an Amplifier; 5, Regenerative Amplification; 6, Multi-stage High Frequency Amplifiers; 7, Multi-stage Low Frequency Amplifiers; 8, Combined High and Low Frequency Amplifiers; 9, Multi-stage Retroactive Receiving Circuits; 10, Reception on Continuous Waves; 11, Transmission of Continuous Waves with Vacuum Tubes; 12, Vacuum Tube Oscillators, Wavemeters, Capacity Meters, and other measuring instruments; 13, The Vacuum Tube in Wireless Telephony; 14, The Dynatron; 15, Miscellaneous Vacuum Tube Devices; 16, Recent Developments; 17, New Invention for Selective Reception. The Wireless Press. Price, 20/-.

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DX Notes—and Other Things

By C. D. Maclurcan (2CM).

STAND from under folks! 2CM is as sore as a Zoo tiger with in-growing toenails.

I leave it to you, "as the cabman says." Wouldn't it make anyone mad enough to throw suspension bridges at the wife when, right in the middle of all this record breaking, some perfectly efficient QRM from power lines, or transformers, or something puts your receiver out of action on 70-90 metres?

Such is the horrible truth, however. About two weeks ago a noise was born in Strathfield district that was so bad in the receivers as to make it difficult to read even the New Zealanders—let alone Yanks. Since then, 2CM has been practically out of action on, what is at present, the most important band of wavelengths. This noise has a distinct 50 cycle note to it and is going almost continuously.

Last Wednesday night, with the aid of 2AY, Jack Cureton, an attempt was made to track this noise to its lair. The low loss set and a loop were loaded aboard the Super-three (it's a four, but one cylinder was missing), and off we started. Oh, yes! We found it alright. About a mile from 2CM was a little 10,000-volt transformer weighing about 500 tons, perched up in the air on large poles. For those who don't know, a transformer is a piece of iron of not less than so many tons entirely surrounded by wires.

When we got near this thing (I could call it something else—but at least I'm respectable—it sounded like—like, now what did it sound like? Ah! yes, it sounded for all the world like a transformer transforming.

So that is how matters stand at present. The matter has been reported to the City Council and it is hoped that they will be able to fix things up. If not—well, I reduce my last offer to sell 2CM down to two bob.

Congratulations to 3BQ for being the first Aussie to work U.S.A. 2CM had hopes but it was not to be. 6AHP was the Yank he worked, and, believe me, 6AHP must be some Morse reader, 'cause 'ole Max got so "het up" that he nearly strained his ex-hist. Still who wouldn't be? Later when I worked him (3BQ), Max was

still doing 4,000 revs. per, and I had to beg him "For the love of Mike to QRS and untangle his gear-box."

Well, we've had one try for England with no success. Z4AA arranged for Aussies to call GB, 4—5 a.m. This was last week. Four "goats" took part, 3BQ, 3BD, 2CM and 2DS. Getting up at 4 a.m. is a mug's game, anyway. Once is bad enough, but anyone who does it seven days in concussion, needs a vet. The



Mr. C. D. Maclurcan.

results were—nil. Although it is darkness all the way, I think there is too much desert country for the signals to cross. Who was it said that early morning was the best time for wireless signals? It may be, I don't know. I did notice, however, that signals from Z4AK (another a.m. "goat") at 3.15 a.m. 'tother morn were only half the audibility that they are at, say, 8.10 p.m. Note also 3BD's and 3BQ's strength at that time.

Whilst on the subject of tests with England, 2CM had a try at 5.30 p.m. Sydney time last Tuesday. I arranged with Z4AA the previous night, that when he got QSO England again to ask them to QRX for 2CM. The

next afternoon I heard Z4AA working G2WJ, who was requested to QRX. Z4AA then called me and told me to go ahead. I called G3WJ for about ten minutes, but was not heard. So evidently the extra 1,200 miles of daylight must have put the "ki-bosh" on the signals.

There is great joy in the 2DS household—at least, in the wireless section of same. Father 2DS generously came across with the necessary and, as a result, Jack 2DS is the proud possessor of a very business-like Phillip's 250-watter. A 3,000-volt transformer was then unearthed from 2CM's junk heap, so it won't be long now before there is another "he" station on the air. Question: If 2DS can work 4,700 miles with two 5-watters—go on you can fill in the rest.

Phil Nolan, 2YL, also has ambitious schemes afoot. A coupled Hartly circuit (2CM's favourite) is going to get a nasty jolt from two 50-watt 'trons. Two 600-volt generators in series will be accessories before the fact.

2XA is on the air quite a lot lately. Unfortunately, he has taken a sudden fancy for half-hour stretches of slow Morse practice, per buzzer, and during our best DX time, too. Here's hoping that he grows out of it or has a relapse.

2BB reports working 3XX. Ses he has a very nice liquid note and is very steady. If you want to see 2BB do two quick back hand-springs—make a noise like an ST 100. He is our local expert with this circuit.

Last week most of us had the pleasure of meeting Kingsley Love (3BM) and Ross Hull (3JU). They spent a week in Sydney, and during that time visited most of our transmitting stations. Unfortunately, they missed seeing 2AY, one of our best. A visit such as this can do an immense amount of good in cementing the good feeling between States. Kingsley and Ross left many friends behind them, which is only to be expected of two "jolly good fellows."

2JM had his first taste of the short waves last week. Well, when I say "taste" I don't mean that he actu-

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Dear Sir,—

I enclose herewith 10/- (ten shillings) for twelve months' subscription (twenty-six issues) to "RADIO," commencing from the next number.

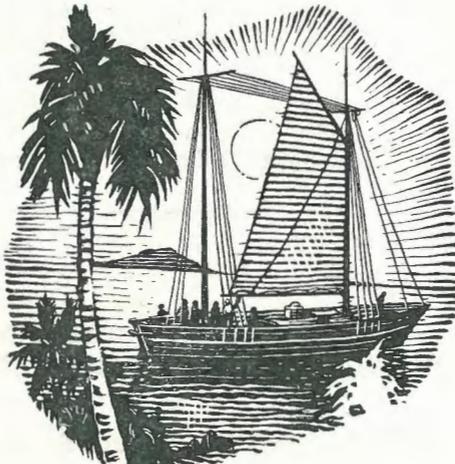
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Keeping in touch with the world

"Radion" Panels in the South Seas
Help "Big Bill" Get the News



On July 4, 1924, the auxiliary ketch rigged ship, "Bill Jones" sailed from the Great Lakes, Illinois, U. S. A., bound for the South Sea Islands.

An important part of her equipment was a Zenith Radio set equipped with Radion Panels and Parts. An experienced radio operator was taken along to carry on constant communication with amateurs in the United States, Canada, Australasia and the Orient. It is planned to make the "Big Bill" the first intermediate relay point between the United States and Australian amateurs.

Long, careful consideration was given to the construction of this apparatus. As proved in the set used by Dr. MacMillan in his recent Polar Expedition, also equipped with Radion, panels and parts must be of the highest quality to withstand extreme atmospheric conditions. That Radion Panels and Parts were chosen for the "Big Bill" is another definite proof of their superiority.

Whether for amateur or professional, Radion has proved to be supreme for wireless insulation. Radion is made expressly for Radio work and excels any other material in the four Radio essentials necessary to any set:

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- 2. Low Dielectric Constant
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C-46

ally swallowed the rectifier, though to look at him you might suspect it, the skinny hound. Got such encouraging reports that he intends to carry on with them. Remember chaps, "short skirts are better than long—and cost less."

2CX (Harry Stowe) is building him a new transmitter, favours the 4-coil Meissner Circuit and 2, 20-watt

check up their instruments with accuracy.

2AY is using two 50-watters (Radiotrons) and is trying to raise U.S.A.

2CM and 2AY usually arrange to call together, for it's no use either listening whilst the other is sending: there's less than a mile between.

3BD is about the same as usual,

down a full meter or so—I wonder if it's that Meissner circuit—don't like it meself. I can't name any station that uses it that can be called entirely stable—on the other hand, I know many using the coupled Hartley that are absolutely steady. 2CM is supposed to be stable—is it so, fellows?

The audibility list this month is a poor one. This is because 2CM has

Date.	Time.	Call.	W/L.	Aud.	Notes.
Oct. 25	7.0 p.m.	4AA	90	200	Worked. Good note but unstable.
" 26	4.30 a.m.	3BD	—	36	
" 26	4.30 a.m.	3BQ	—	56	
" 26	8.0 p.m.	4AK	—	150	Worked. Steady A.C. note.
" 27	4.15 a.m.	3BD	—	250	Worked.
" 27	4.15 a.m.	3BQ	—	1000	Note about same as 3BD but not as steady.
" 28	4.35 a.m.	ZTFT	90	—	Anyone know who this might be at this time? Signal weak.
Nov. 2	7.0 p.m.	4AA	—	—	Worked.
" 2	7.45 p.m.	4AK	—	120	Calling CQ U.S.A.
" 2	8.30 p.m.	3BQ	—	1000	QRH changing in sudden jumps, though note steady otherwise.
" 3	5.15 p.m.	4AA	—	14	Worked.
" 3	5.35 p.m.	4AA	—	65	
" 3	6.0 p.m.	4AA	—	180	
" 3	7.5 p.m.	2AG	—	400	Note this.
" 4	3.30 a.m.	4AK	—	12	
" 4	3.30 p.m.	4AK	—	145	Both stations seemed very weak, hardly audible on one valve.
" 7	6.8 p.m.	4AK	—	—	
" 7		2AG	—	—	

Phillips toobs. His fone has been heard (with one 5-watter) in S.A., 540 miles. 2CX is the official custodian of the Wireless Institute's Precision Wavemeter and other instruments and he intends shortly to transmit Standard Frequency Waves at, say, 150, 200 and 250 metres. This will be a great boon to country experimenters to know that they can

though not so loud as 3BQ, he is much more stable.

Talking of instability, 2CM always has quite a job working Z4AA. Plenty of strength, mark you, but it is necessary to keep one hand on the condenser dial all the time. Does anyone else have this trouble with him?

One night he suddenly plomped

been put out of action on the lower waves by that power line QRM previously mentioned. I should mention that most of the listen-in is now done below 100 metres, and so those transmitters on the higher waves are not heard. I'll make a special effort next month to try and log these stations and tell them how their strength is.

Contributions to "Radio"

THIS MAGAZINE WILL WELCOME ARTICLES AND PARAGRAPHS ON ALL SUBJECTS PERTAINING TO WIRELESS BE THEY TECHNICAL OR OTHERWISE. THEIR PRINCIPAL REQUIREMENT IS THAT THEY BE INTERESTING.

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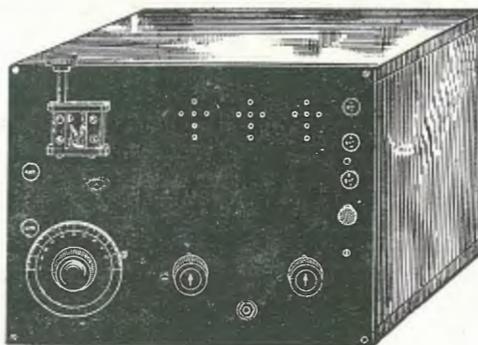
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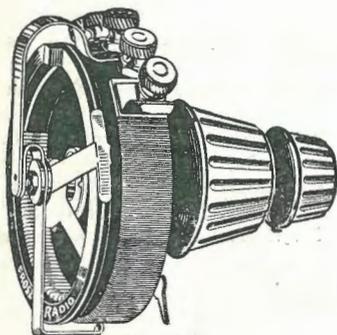
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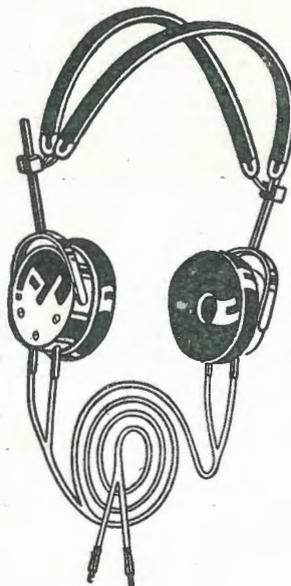
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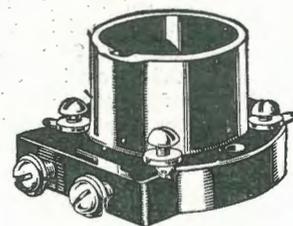
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3LO

Melbourne's New Broadcasting Station

A Tour of Inspection



WITH the advent of the opening of 3LO broadcasting has begun in earnest in Melbourne, and already public enthusiasm is steadily rising, so there should be soon as great a boom in the Southern Capital as there has been in Sydney.

As reports will, no doubt, soon be coming in from all parts of Australia and farther, of reception of this station's concerts, it may prove of in-

terest to the eye, but are concealed by tasteful decorations in tone with the royal-blue carpets.

The station itself is situated at Lyons Street, Braybrook, which is some six miles distant from the General Post Office, while the nearest suburb is Kensington.

3LO occupies an area of four acres, and the site is practically flat. The two steel masts which support the aerial system are each 200 feet high

and are of the lattice type, weighing seven tons. The distance between the towers is 575 feet, and across this space the aerial system is extended.

Directly beneath the aerial and equidistant from both masts is the operating house and quarters for the use of the staff. The transmitting equipment consists of a 6 K.W. broadcasting set, comprising a rectifying panel, magnifying panel, a $\frac{1}{2}$ K.W. oscillator panel and modulator panel, one power con-

denser panel, and two large tuning inductances.

A special steel tower, set in concrete, is erected near the side of the operating room, and to this the lead-in of the aerial is brought, while a connection is also made to it from the earth-screen. The tower stands upright against the operating house, and from it the various wires are carried by heavy insulators to the actual instruments within.



Broadcasting station 3LO, at Braybrook, Melbourne. On the right may be seen a portion of the aerial lead-in and counterpoise systems.

terest to our readers to learn just which is which and what is what at 3LO.

The studio is on the second floor of Cambridge Buildings in Collins Street, and comprises a suite of elaborately furnished rooms. In one of these the transmitting apparatus has been installed.

All walls, ceilings and windows have been heavily padded with mattresses in order to deaden any vibration. These, of course, are not visible

and are of the lattice type, weighing seven tons. The distance between the towers is 575 feet, and across this space the aerial system is extended.

Directly beneath the aerial and equidistant from both masts is the operating house and quarters for the use of the staff.

The transmitting equipment consists of a 6 K.W. broadcasting set, comprising a rectifying panel, magnifying panel, a $\frac{1}{2}$ K.W. oscillator panel and modulator panel, one power con-

Transmissions at present are made on a wave-length of 1,720 metres, and power is obtained from high tension mains from Morwell, which supplies power equivalent to 5,000 watts.

No fewer than seventeen indicators ensure perfect control over the transmitting apparatus.

Another aerial has also been erected at Braybrook for the use of another transmitter, to be installed at the station at some future date, when, with this, two separate transmissions on

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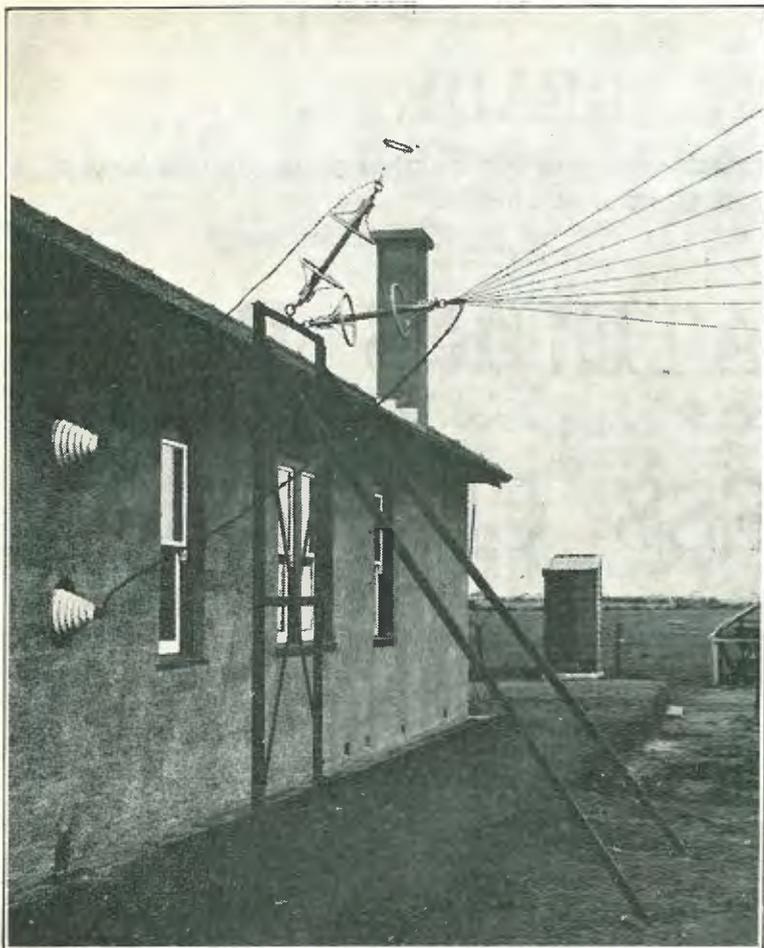
Copious notes on crystal receivers, single-valve sets, high frequency, low frequency, and dual amplifiers, transmitting circuits. Several pages of most useful data have been added, including the method of pile winding, tables giving tuning range of commercial types of inductances, wave-lengths produced by various tuning condensers, types of receiving valves and their characteristics, etc., etc.

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A close view of the aerial lead-in and counterpoise systems. Note the large insulators.

different wave-lengths and concerning distinct subjects can be made. No earth connection is used with either aerial, but an effective ground screen, or counterpoise, consisting of eight wires carried directly under the aerial on twenty-four poles, each about fifteen feet high, has been provided for each aerial. It is thought that the use of the counterpoise in preference to a "ground" will greatly improve results, and, what is very important for long-distance results, will help in preventing changes in the radiating wave of the station.

The main radiating unit in the operating house is made up of six high-power transmitting valves, supplied with a current of between 8,000 and 10,000 volts. For additional assurance that the wave-length will remain stable, a master-oscillator controls this transmitter, and produces alternating currents of the desired frequency. What the main transmitter really does is to amplify the alternating currents from the big oscillator, and impress them on the aerial system. As a result of this, a continuous stream of waves disseminated from the aerial is varied in amplitude, thus producing audible responses in any receiver tuned to the wave-length—1,720 metres—of the transmitter.

Every care has been taken by Amalgamated Wireless (Australasia), Limited,—the constructors—to insure



A corner of the station's operating room. On the right is the $\frac{1}{2}$ Kw. Oscillator Panel, while further back is the Modulator Panel.

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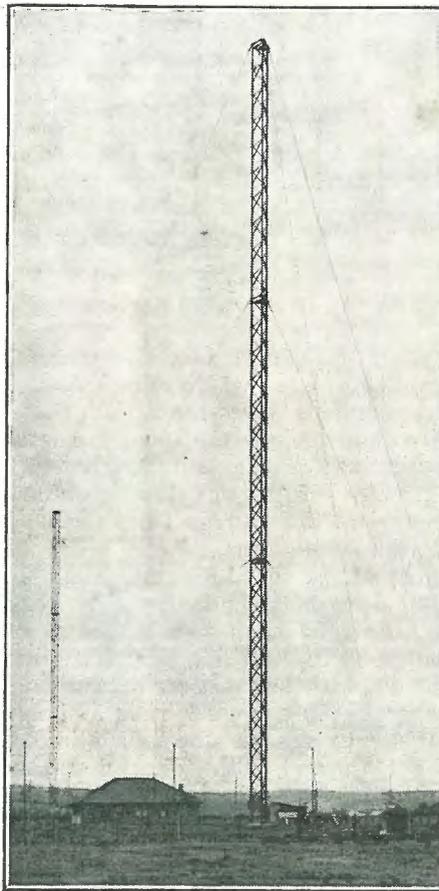
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a non-interruption of the service, and all valves and other delicate apparatus have been so placed that in the event of damage or destruction they can be quickly removed and replaced in the space of a few seconds.

In handling the instruments great care has to be observed, as a shock from the 10,000 volts plate c.m.f. would be disastrous. As a precaution against this, each unit is protected by special steel panels, which are guarded on all sides by perforated metal doors, which give



The Aerial Masts at Braybrook.

access to the high tension circuits. Whenever the doors of the panel are opened, a special switching arrangement turns off the high pressure current, which insures protection from electrocution for the operators.

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(November 26, 1924.)

Variable Coupling in a Single Coil Set

FOR those who have a single coil set and want to retain it, but are not satisfied with its selectivity, the suggestions given below will help them a great deal. It does not matter whether it is a crystal or valve detector, the principle applies to each case. The drawings show a valve.

Figure 1 shows a non-regenerative valve circuit using a single coil of 100 turns and a variable condenser. The coil is tapped at the 20th, 25th, 40th, 50th, 60th, and 80th turns. The

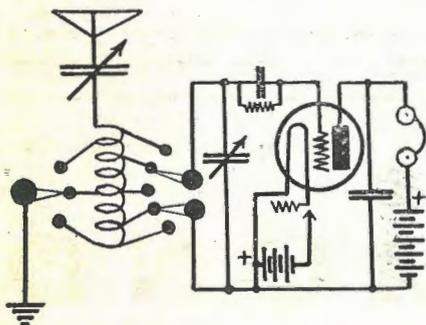


Fig. 1.

start of the coil goes to a switch point as well as to the aerial, and the end of the coil goes to two switch points. This arrangement, with two sets of switches, allows you to use all of the 100 turns in the aerial-ground circuit or in the secondary or detector circuit.

Figure 2 shows how the switches would be placed where a close coupling was desired. That is, where you would want to pick up stations without any trouble. This shows the

aerial ground circuit to include the turns from the beginning of the coil to the 40th turn and the secondary to include the turns from 20 to 60. This gives you part of the aerial-ground circuit in the secondary—from the 20th to the 40th turn.

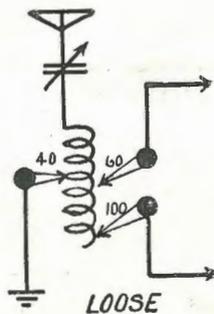


Fig. 2.

Figure 3 shows how the switches would be placed where selectivity was desired. This shows the aerial-ground circuit to include the turns from the beginning of the coil to the 40th turn as before, but the secondary comprises those turns from the 60th to the 100th turn, there being no turns of the aerial-ground circuit included in the secondary.

An arrangement such as the above will be found to bring selectivity into the set with but one set of taps. If yours has but one set, it is a simple matter to remove the insulation at the 20th and 50th turns and take out taps from them, as well as an extra one from the 100th turn, and call that your primary circuit. Your

regular switch taps may be used for the secondary and with this new arrangement you will be able to listen in without the usual amount of interference encountered heretofore.

While the above arrangement is quite satisfactory, it is not as good as a loose coupled set employing separate coils for the primary and secondary. With the latter you can get a better degree and variation of coupling than with the single coil and taps.

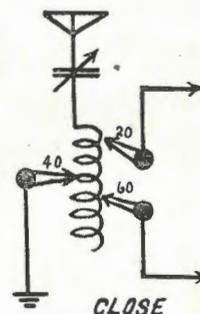


Fig. 3.

With the set outlined, it is best to use a 43 plate (.001) condenser in the aerial and a .0005 microfarad condenser across the coil for the secondary. In adjusting the secondary switches, keep in mind the fact that you should use all the wire you can and the least amount of variable condenser. However, do not use so many turns that the coupling between circuits will be close, as that will defeat your first purpose, which was to have a select receiving set.

Wireless Lecture at Sydney University

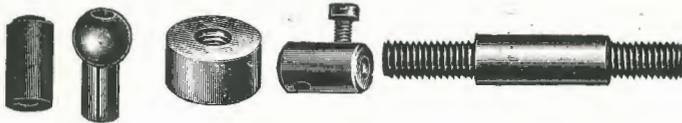
BEFORE a large audience, including the Dean of the Faculty of Science, the Professors of Physics, Electrical Engineering and others, in the Union Hall at the Sydney University recently, Mr. E. T. Fisk, Managing Director of Amalgamated Wireless (Australasia), Ltd., delivered a lantern lecture on the latest develop-

ments in wireless telegraphy, wireless telephony and wireless broadcasting. The lecture was arranged by the University Radio Society, and in the course of an hour's address the lecturer dealt with the fundamental principles of modern radio communication, and described the technical and other applications in its various

branches. Marconi's new inventions in the production of powerful ultra-short wave transmitters and his new "beam" system were described, and the descriptions were received with great interest by the audience, which comprised a considerable number of students in the Department of Physics.

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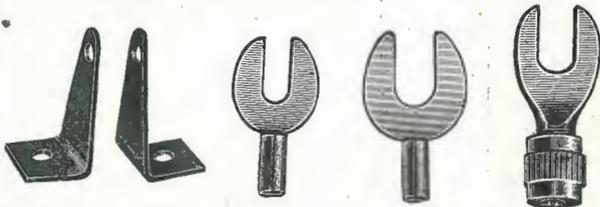


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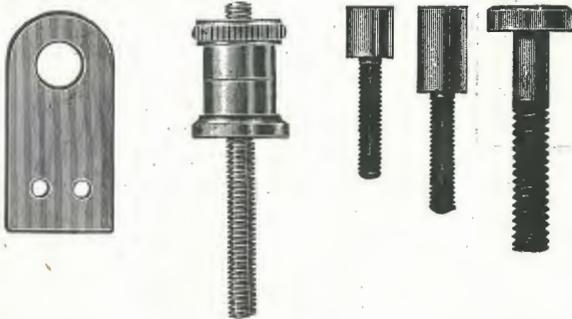
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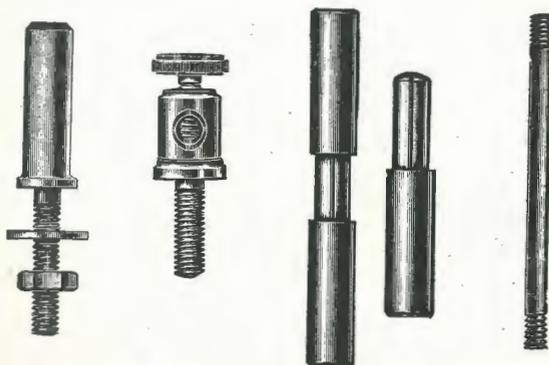
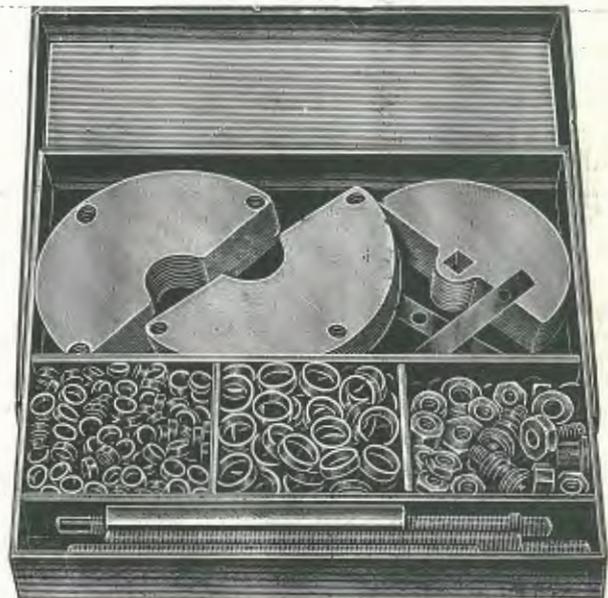


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Barbecue by Wireless



THE barbecue is a popular American institution which, since the earliest settlements has drawn people for the purpose of having a good time. The main idea of a barbecue is a grand picnic, and combined with this there is usually music, speeches, and sometimes, horse-races. In the old days the method of securing the attendance of the settlers at a barbecue was by sending out

the barbecue. Guests began to arrive at La Joya Lodge, on Captain Salisbury's estate, as early as 5.30 a.m. and some were still coming at 6 p.m. By actual count 15,500 motor cars entered the canyon leading up to the lodge by 2 p.m. of the day of the barbecue.

Captain Salisbury's estate consists of 1,100 acres, commanding a magnificent view of San Francisquito Canyon. The great crowds were enter-

Fifteen bolts of cheese cloth had been used in wrapping the 20,000 pounds of beef, and great hooks reached into the pits to draw out the huge smoking roasts. Senor Jose Romero, famous as a conductor of barbecues was the master of chefs. He was assisted by 15 cooks, 20 special chefs and 50 waiters. Among other food consumed at the barbecue was 50,000 buns, 30,000 apples, 800 pounds of coffee, 1,000 pounds of sugar, 2,500 pounds of salad, and 30,000 paper plates. These were only a few of the items.

Grouped about the platform were the bands and entertainers. Radio speech amplifiers broadcasted the music on loud-speaking horns, which echoed in silvery tones throughout the canyons. Radio sets were installed and these picked up Los Angeles during the afternoon. At the back of the table land a platform had been erected, and standing on it Captain Salisbury delivered an address of welcome. He emphasized the fact that radio broadcasting had been the means of bringing together the large assembly, and made possible a day filled with joys to himself and his guests.

This gathering brought home to every one attending it the wonderful practicability of radio as a means of quickly assembling a vast throng for any and all purposes. It would have been impossible in any other way imaginable to so swiftly assemble this vast throng. In all of Captain Salisbury's travels, comprising practically the limits of the known world, he had never, he said in his address to his guests, experienced so unique and pleasurable a meeting with his fellow men.

The surroundings for this picnic, from the standpoint of natural beauty, were unsurpassed, and the enjoyment of the occasion was unmarred by a single accident. The great concourse moved out of the canyon as the stars came out above the hilltops, and every participant in the barbecue returned home with a new and keen appreciation of the possibilities of radio, one of the most wonderful inventions ever emanating from the fertile brain of man.



If the reader knows of a better way than the above for lightening the burden of housework we would like to hear of it.

couriers on horses. Later on they were gathered together by mail, and by the use of the telegraph. But it remained for Captain Edward A. Salisbury, a traveller who has circled the globe in his journeys, and who owns a magnificent estate in Southern California, U.S.A., to introduce a genuine novelty in the way of a barbecue by radio.

Captain Salisbury broadcasted his invitation to all of Southern California, it being expected that all the invitations sent broadcast from KHJ would be responded to by written acceptances. More than 27,000 of these written acceptances were received by the host, and more than 60,000 persons came in automobiles to attend

tained by the 160th Infantry Band, the California National Guard, the Southern California Saxophone Band, the California Girls' Vocal Quartet, Burtman Brothers Hawaiian Quartet, and many others. The Automobile Club of Southern California had placed a number of temporary signs, guiding the visitors to La Joya Lodge, and the Salisbury estate, and the barbecue was in every respect a marvellous success. It established a record of attendance at any barbecue ever held in the United States.

The barbecue pits were a striking sight. There were eight of them, each 16 feet long and each holding 2,500 pounds of meat, which had been set to roast several hours beforehand.

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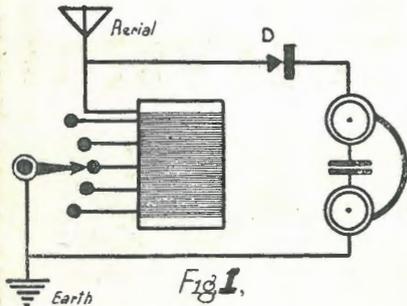
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Various Tuners for Crystal Sets

PROBABLY some of you read with interest and surprise an announcement some time ago, in which it was predicted that the radio set of the future would cost about six shillings, and that you would be able to hear any big event that took place in Australasia.

You, no doubt, wondered what was to become of all the high-priced sets if such a statement were true. The

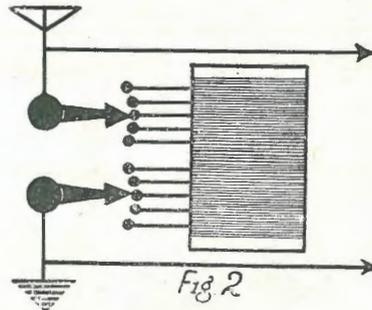


cheap set will, no doubt, come to pass, but it will only be possible when every large city in the country has a powerful broadcasting station, or the power of them is greatly increased, and you happen to live within 15 to 50 miles of them.

Herewith we are giving three types of tuners for a crystal detector set:

Figure 1 shows a simple form of crystal detector set and the one most

used. It consists of 80 turns on a four inch tube, tapped every eight turns. The aerial is connected to the top of the coil and the ground to the switch arm. The condenser and telephones are connected in series, and

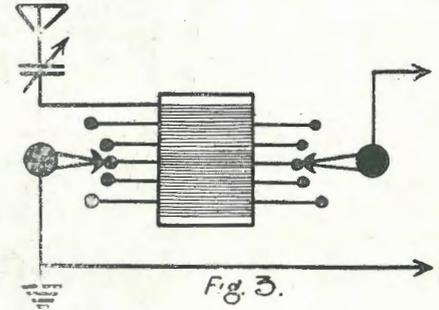


then shunted around the aerial and ground as shown. A large fixed condenser can be used to advantage around the telephones. This may be .006 microfarad.

Figure 2 is a slight improvement over Figure 1 in that you have two switch arms and two sets of taps, the upper taps being unit turns and the lower one ten turns. This gives us a little finer tuning, which is an advantage. The rest of the circuit is identical with Figure 1.

Figure 3 also uses two sets of switch taps, but they are on opposite sides of the coil. Taps are brought

off every five turns, giving us eight taps for each side. The first tap goes to the aerial switch tap and the second tap to the switch arm leading to the detector, and so on. In this way the coupling between the aerial-ground circuit and the detector circuit may be varied. A .0005 microfarad variable condenser is connected in series with the aerial and coil to give sharper tuning.



The signals received over a crystal set are good and clear with none of the distortion so often found in a valve set, but the range is limited, and unless you are within 25 miles of a large station, you will be lucky to hear them. With a crystal detector it is imperative that a long aerial be used. One hundred and fifty feet is a good length, although it may be longer.

An Australian Achievement

MUCH has been said of late about giving preference to Australian-made goods, and certainly the future financial greatness of Australia is largely dependent on the general acceptance of this policy. Yet this acceptance rests on the ability of Australian manufacturers to fulfil the anticipations of purchasers who have long been accustomed to the finished products of overseas manufacturers. Now, however, it may fairly be stated that Australia can in most instances, produce goods equal in every way to the imported varieties.

Take wireless as an instance: Australia is coming to the fore with radio lines which promise to suit local con-

ditions of atmosphere and broadcasting as well as any imported goods for the same purpose could. One outstanding example is the Signal audio frequency amplifying transformer. This is a perfect piece of workmanship, really wonderful in the delicate precision of its adjustment, yet thoroughly strong and reliable. It is magnetically shielded in a shell of original design and beautifully neat finish. Attached to a set, it ensures a loud, clear tone, while guarding against howl or distortion. The fact that this transformer is made by the Electricity Motor Manufacturing Company, Ltd., who make the electrical meters for the Government, is in

itself a guarantee of workmanship by thoroughly experienced craftsmen in this class of work.

Every one is guaranteed by the manufacturers and the distributors. Needless to add, the fact also that this transformer is made in Australia results in a saving of about 60 per cent. in freight and duty. It is now obtainable at all radio dealers, the price being 21s., and is said to be fully equal to imported transformers, which sell as high as 35s. and 40s. Dealers themselves may obtain supplies from the wholesale distributors: United Distributors, Ltd., 72 Clarence Street, Sydney; 592 Bourke Street, Melbourne; and at Adelaide, Perth, Brisbane, Hobart and Wellington.

Learn the Morse Code. Tap the World's Wireless Messages. Be an experimenter and reach out beyond the broadcasting stage. Buy a

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and learn the code thoroughly in your spare time at home in a few weeks.

This wonderful instrument, simple in operation, is designed especially for wireless amateurs. By passing machine-perforated tapes, containing hundreds of different signals, through the Tapograph you can learn the code in a few weeks. Price, complete with valuable charts and instructions, high-toned buzzer and beginner's tape, containing hundreds of signals, is 25/- (postage 9d. extra). Sounder supplied in lieu of buzzer at small extra cost. Write for full particulars.

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A CORRESPONDENT writes that, using a four-valve set at about 7.30 in the evening of October 26, he picked up a strange transmission. An instrumental item to the tune of "I'm Forever Blowing Bubbles" was played, and then the sending station closed down, the announcer stating that it was KGR. The writer would like to know the identity of the transmitter. We ourselves have no information on this point, but on looking up our records we find there is a broadcasting station KJR at Seattle, Washington, which is controlled by the North West Radio Service Company, and broadcasts on a wavelength of 283 metres. However, if this station actually was KGR we would be glad to hear from anyone as to its identity.

DURING the last week or so, working a low loss tuner and single valve, Mr. Thos. R. Anthony, of Auburn (New South Wales), has been doing some remarkable DX work without aerial or earth. The following, under these conditions, have been quite QSA:—N.Z.: 2AC, 4AA, 4AK, 4AG. Victoria: 3BD, 3BQ. New South Wales: 2HM. Using a two-foot frame aerial, U6CGW was just readable.

MR. W. R. LOVELOCK, of Roma Street, Brisbane, receives Farmer's broadcasting service on a crystal set. His aerial is at Sandgate, outside Brisbane on the coast, and he thinks that locality has a lot to do with the phenomenal results he has secured, as there are no electric wires or other power lines to cause interference. To date he has not received 2BL but 2FC is his DX record. The aerial itself is a twin wire, inverted L type, 90ft. long, and the poles (bamboo and well stayed) are 48ft. high. There are two earth connections—one to the water pipes and the other to a 2ft. length of galvanised piping driven into the ground. The set itself consists of a 74-turn honeycomb coil and a No. 711 Bestone variometer. Fine copper wire is used for the catwhisker with a Galena crystal. Telephones are 4,000 ohm Western Electric. No condensers are used, although Mr. Lovelock has found that a .0005 will improve reception when used in parallel.

USING two Weco valves as detector and low frequency. Mr. John A. Elsbury, of Kalgoorlie, Western Australia, writes that he has logged the following stations over the past few months:—2DS, 2LO, 2HM, 3BH, 3BD, 3XF, 3DX, 3BQ, 5AD, 5BQ (phone), 6AB, 6AG, 6AM, Z4AA. Broadcasting stations heard were: 2FC, 2BL, 3AR, 5AB and 6WF. Mr. Elsbury finds that 2FC comes in weaker now than it used to, while 2BL is also less strong than two months ago. Occasionally he logs 3AR. 5AB is generally very QSA.

If you use a crystal detector and want to hear signals and speech louder and clearer than you ever have before you should buy **Sacrystal.**

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is not an ordinary detector mineral; it needs care and intelligent handling, but the results from such attention will repay you a hundredfold.

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gives the very best results with any metallic springy contact when the point is flat or blunt, and, once secured, adjustment is permanent.

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'Phone: R'wick 530.

Atmospherics v. Long Range

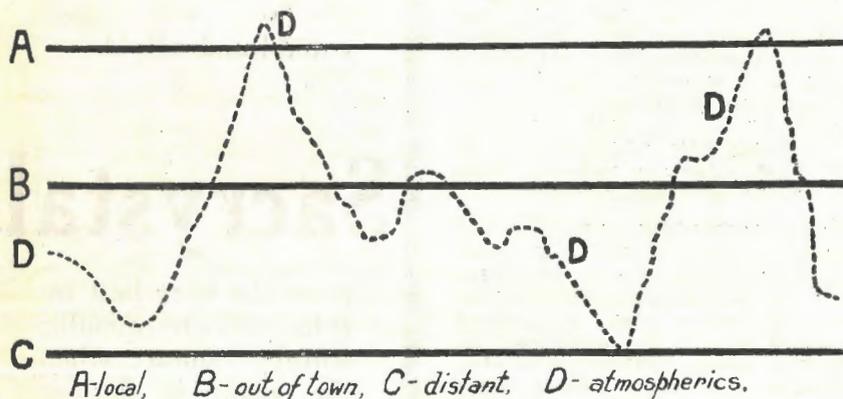
THE opinion seems to still prevail that if you procure a very sensitive receiving set that you will be able to copy stations on the West coast of Australia from the East coast, and those in foreign countries too. At first thought, this does sound reasonable, because if you have a simple crystal set its receiving range is limited, but if you make it into a regenerative set, the range is greatly increased. Calculating along those lines, all that you have to do is to further increase the sensitiveness of your set and the range is automatically increased. It is, up to a certain distance, which depends on conditions of the atmosphere.

Those who have had a receiving set during the hot and cold months know that the range of their sets is very

programmes to any extent, for most of you are aware now that you can copy a local station with no aerial at all, only using the ground connection, and in some cases without aerial or ground connection.

Line B, representing the broadcasting stations that you do not hear during the day, shows the atmospheric level to interfere with them a great deal and that is why, in the warmer months especially, the programmes are continually interrupted with crashes and invariably you have to listen to a station closer to home. In the cooler months these crashes are not so pronounced, but occasionally you will get a night that is as bad as any summer night.

Line C represents the stations "you have never heard," but hear your



good in winter, but considerably less during the hot months. The main reason being that during the hot months we hear noises in our sets that we seldom hear in the winter. These noises are termed *atmospherics* and consist of strays and grinders, and the ratio of that to signal strength is what determines the distance you will hear from any night.

In the drawing, D represents what we will call the atmospheric level; C the broadcasting stations that are never heard except under ideal conditions when the atmospheric noise level is negligible; B the broadcasting stations from 500 to 1,000 miles away, and A your local stations.

Taking the local stations as line A, we find that nothing short of exceptionally strong *atmospherics*, such as local storms, will interfere with their

night owl radio friends talk about. As will be seen, the atmospheric level almost completely swamps it at all times, and it is only when conditions of the atmosphere are exceptionally clear that you can hope to cover remarkably long distances on your set.

You must bear in mind that no matter what type of set you use, when you amplify the signal strength you also amplify the atmospheric strength, and if the ratio of the latter is greater than the former, you cannot hope to copy through the latter. At times you may get snatches of their programmes: might hear their call letters or the name of the city, but on the other hand, the speaker might be talking about the climate of New Zealand or Hawaii, and you will mistake those names for the country the station is located in.

MURDOCK SOLID HEADPHONES.

RADIO enthusiasts will be glad to hear that a large shipment of Murdock Solid Headphones has just arrived. The enormous demand for these famous headphones can now be met in full by all radio dealers.

6WF HEARD IN AUCKLAND.

AMONG the very few Auckland radio enthusiasts to hear 6WF is Mr. T. K. Thompson, of Ponsonby, who reports clear reception on a three coil circuit using only detector and one stage of audio frequency amplification. Mr. Thompson is one of Auckland's quiet experimenters who has made a thorough study of radio from the letter "A." He is also possessed of a very fine library dealing with all wireless matters, and has a number of the original works on the art. We are sure that more will be heard of this ardent enthusiast in the near future.

AID FOR THE UN-GRAMMATIC.

NEWS comes that a radio hospital for broken down vocabularies and defective parts of speech has opened its doors. Any listener may write to KGO and describe his struggles with grammar and words. Wilda Wilson Church (director of audio players in drama) will be the good-language doctor in charge. It is intended that the school be kept free from as much of the purely academic as possible. "Listeners are invited to write me, giving their troubles," says Wilda Wilson Church, "and I will develop my course of instruction from the requests that come in the mail." So there you are. If you are having any trouble with idioms, synonyms, antonyms, nouns, pronouns, or derivations, or should your case have been diagnosed as "Split Infinitive," just write W. W. Church a letter. She will prescribe. That the course will also aid parents who are unconsciously, in many instances, teaching their children the English language, is apparent. "When a child learns to say 'ain't' at home," says Mrs. Church, "it is very difficult to get him to change even after several years in school."

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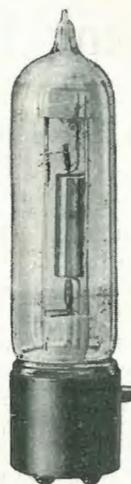
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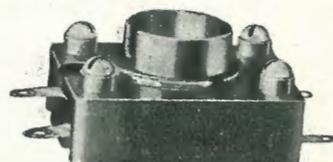
One of these little valves has given wonderful results to a Radio experimenter in Brisbane. He calls it "the little marvel, she stands on her dignity and I received 2 B.L. and 2 F.C."

K.G.O., Oakland, California, U.S.A., has been distinctly heard on TWO WECOVALVES, also 4 Y.A., Dunedin, N.Z., and 5 A.B., South Australia. Any Radio Dealer supplies Wecoalves.

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Highlights of Radio Broadcasting

Chopping Out a Slice of Frequency

By Dr. ALFRED N. GOLDSMITH, B.S., Phd., Fellow I.R.E.,
Chief Broadcast Engineer, Radio Corporation of America

(Special to "Radio.")

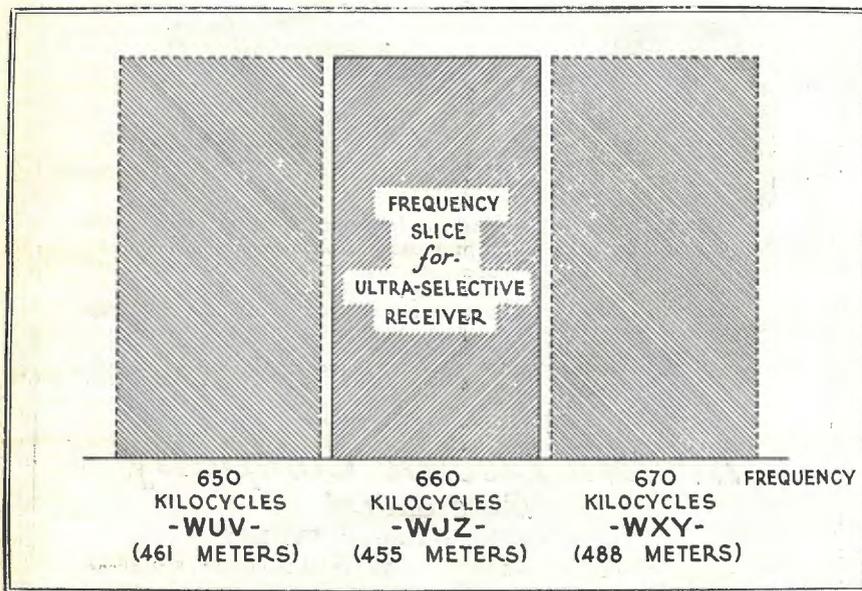


RADIO designers have always wanted to reach the ultimate in freedom from interference with broadcast reception. A receiver was desired which should be the very limit of selectivity—which would permit only one signal to be heard, while perfectly excluding all others. But, partly owing to an imperfect knowledge of just what the limit of selec-

(1) The speech or music of each of them can be heard at the same time in the loud speaker, with resulting confusion. Sometimes one of them is so much fainter than the other that the speech from it is not heard even if it is nearly on the same frequency.

(2) More serious, however, is the continual whistling note (called a "beat note" by the engineers) which

the recommendation of the Second National Radio Conference. For example, WJZ at New York has a frequency of 660 kilocycles, and therefore no other broadcasting stations can be in operation in the region from 650 to 670 kilocycles at the same time without causing interference and the whistling note mentioned above. (As a matter of information, 660 kilocycles corresponds to 455 metres wavelength, and 650 and 670 kilocycles correspond respectively to 461 and 448 metres.)



Ideal tuning for receivers of ultimate selectivity.

tivity really was, and partly because the production of an ultra-selective receiver is a very complicated matter, the desired result has only recently become commercially available to broadcast listeners.

It is well known that every station nowadays has its own frequency (in kilocycles, or thousands of vibrations, per second) of wave length (expressed in metres). It is also known that two stations, if their frequencies approach too closely, interfere with each other in two ways:

always results when two stations operate on frequencies less than about ten kilocycles (10,000 cycles) apart. This objectionable note will be quite audible even when one of the interfering stations is so faint that it is not possible to understand speech, or even to hear music from it.

It follows, then, that stations must not be nearer to each other in frequency than ten kilocycles, and the U.S. Department of Commerce, in its frequency assignments to the various stations has carried out this idea on

It is clear, then, that the ideal receiver, having ultimate selectivity, should chop out a slice of frequency certainly less than twenty kilocycles wide, and should permit receiving all stations within that band or slice while totally excluding all remaining stations having frequencies outside of that band. But it is not clear, off-hand, how narrow the slice of frequency, which the receiver will admit, may be made with safety. For example, it might be asked: Would it not be a good idea to reduce the width of the slice of frequency actually receivable to two kilocycles? The answer is emphatically negative. Theory and practice agree entirely in the conclusion that the receiver must permit a band of frequency approximately ten kilocycles wide to be passed through, since, if this is not done, the quality of the music will be ruined because of either the high notes or the low notes being suppressed and lost, and the effect becoming unpleasant. The ideal receiver will then act as shown in the accompanying drawing. It is seen that it admits a slice of frequency ten kilocycles wide and nothing else. Therefore, it will enable perfect reception of the music from WJZ at 660 kilocycles, while totally excluding the stations WUV and WXY (imaginary call letters) on 650 and 670 kilocycles respectively.

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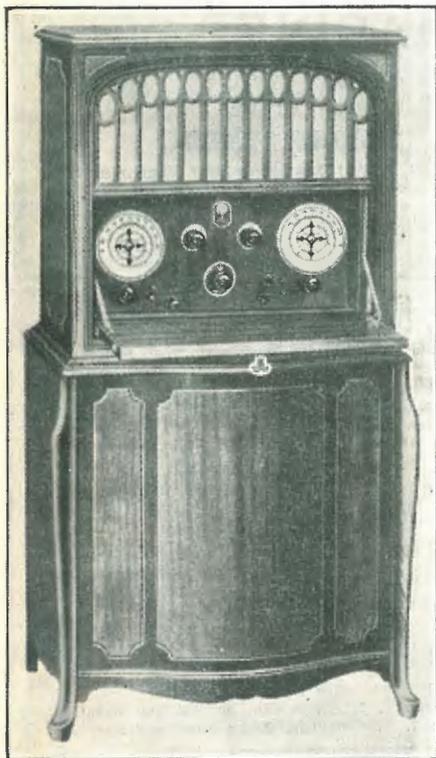
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RADIO DEALERS! THIS MAGAZINE IS THE ONLY ONE OF ITS KIND IN THE COMMONWEALTH AND NEW ZEALAND. EACH ISSUE IS EAGERLY AWAITED AND READ BY "LISTENERS-IN," BROADCASTING COMPANIES, AMATEURS, EXPERTS, AND ALL CONNECTED WITH WIRELESS ACTIVITIES. THEY ARE ALL PROSPECTIVE PURCHASERS. GET IN TOUCH WITH THEM BY ADVERTISING IN "RADIO."

WRITE FOR RATES AND ALL PARTICULARS TO THE MANAGER, THE WIRELESS PRESS, 97 CLARENCE STREET, SYDNEY.

It will do this even if WJZ were being received from a great distance, whereas the other two stations were nearby and powerful stations, which feature is, of course, a great advantage to the critical radio listener who desires to listen to concerts from distant stations right through transmission from powerful local stations on nearby frequencies or wave lengths.



Radiola Super-VIII and—

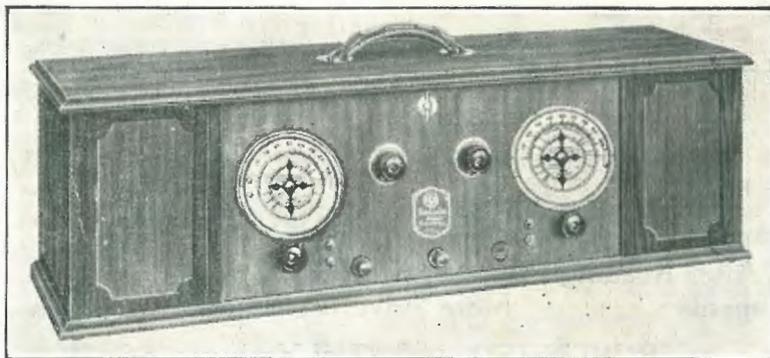
It may seem somewhat startling at first to learn that a receiver simply must not chop out less than a ten kilocycle slice of frequency for broadcast reception. However, up to the present, receivers have been very far from meeting any such requirement as this, and it has required the use of every resource of modern radio engineering finally to create such receivers. The accompanying photograph shows the Radiola Super-VIII and Radiola Super-Heterodyne receivers, which fully meet the necessary requirements for ultimate selectivity. This receiver has a number of very distinctive characteristics which are shared by no other type of receiver. For one thing, its selectivity is entirely independent of the adjustment of the receiver. That is, it always chops out just the same width for its

received slice of frequency. Regenerative receivers, and even non-regenerative receivers, have a selectivity which depends very largely on the adjustment of the set, and, therefore, on the skill of the user. The new receiver is stable, and the selectivity is once and for all fixed by the designer and the factory at the highest selectivity which will permit perfect broadcast reception. Furthermore, this selectivity, and freedom from local interference from other broadcasting stations, is found to be astonishingly high, being, in fact, of an entire different order of magnitude from that of the usual receiver.

The general method whereby this selectivity is obtained is by getting away from the ordinary methods of tuning altogether. That is, instead of tuning the antenna circuit alone, or any other circuit having the same high frequency, the frequency of the incoming signals is first shifted by a single, simple adjustment to a new fixed frequency, where the actual picking out of the desired station and the exclusion of all other stations is then accomplished. In other words, the set tunes not only to the frequency of the incoming signal, but also to a new and more favourable frequency into which the incoming frequency has been directly trans-

listeners have found the effects of this "transformed frequency operation" and consequent selectivity to be a distinct and pleasurable novelty. The handling of a circuit which "cuts sharp" in the most definite possible fashion, no matter how the receiver is adjusted, is a real aid to the user, and one which is particularly of importance in neighbourhoods where there are many stations to be heard, and where the listener does not desire to adjust delicately a critical circuit.

The possibility of producing "birdies" or twittering notes by having the receiver in an oscillating condition has been entirely avoided in this receiver, which does not effect its neighbours at all, and is, therefore, another example of the "Golden Rule" type of receivers. It is also of great practical interest to note that this type of receiver, in the form shown, is so sensitive that no antenna or ground at all are used (including "short grounds" and "balancing wires," and a multitude of other electrical curiosities). Only a small, invisible, and self-contained pick-up system actually forming a part of the receiver is employed, and with this it is still possible to get louder signals from distant stations than an ordinary regenerative three-valve set using large outdoor antenna! It is,



Radiola Super Heterodyne with ultimate selectivity circuit.

formed. This is what is called by engineers the super-heterodyne system of reception.

Furthermore, the amplification of the incoming signal largely takes place on the new or transformed frequency, and is therefore accomplished not only with complete stability, but with the utmost efficiency. Thus remarkable sensitiveness of the receiver and full utilisation of the tube capabilities are obtained. Seasoned radio

therefore, proper to designate such circuits and the receiver containing them not only as ultimate in selectivity, but also as ultimate in practically usable sensitiveness.

CONNECTING the primary and secondary coils together and grounding them will sometimes improve reception.

FOR receiving, one wire is as good as several.

*Marconi Valves
Mean Greater Efficiency.*

The Popular "DE3" Reduced to 32/6

Popular because of its wonderful economy and great efficiency, the Marconi DE3 Valve has been accorded the unqualified approval of Australian radio enthusiasts. It gives equally as good results as an accumulator-heated filament valve and with an expenditure of only one-tenth of the filament current.

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The anode voltage is from 20-80 volts.

Obtainable from all Radio Dealers.



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The Storage Battery

SEVERAL letters have been received from readers claiming their storage battery which is a 60, 80 or 100 ampere hour capacity battery does not hold up half as long as that. "What is the matter," etc.?

Unless your dealer tells you your battery has a certain ampere hour capacity at a *fixed* discharge rate, the ampere hour capacity does not mean anything. For example: A storage battery that will deliver 10 amperes for 8 hours will not deliver 20 amperes for 4 hours but will deliver 5 amperes for more than 16 hours. What is really meant by the ampere hour capacity is the number of hours a storage battery will deliver a fixed quantity of electricity without harm to the battery.

If you put a heavy load on your battery the voltage will drop to a low point, depending on the condition of your battery. Now when this load is taken off, the battery will recuperate to a certain extent and when next used the voltage will be higher than when the heavy load was taken off. This is one reason why the rheostats should be turned off after the set has been used instead of using a battery switch.

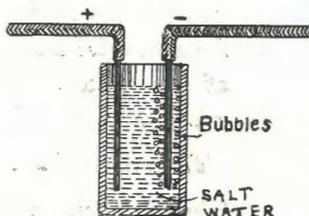
One of the best indicators as to how your battery is holding up is your filament rheostats. When a battery is fully charged the rheostats are set at a certain point for best results. Now when this point has to be exceeded, it means that the voltage is dropping

off from your storage battery and that means it should soon be recharged. The voltage of your storage battery will not fall off quickly due to the

used, over 4 amperes more is taken from your battery and where you have a battery charger that will only allow your battery to be charged at a 3 to 5 ampere rate, it means that you are going to be charging your battery about as much as you use it, probably more.

If you have been "shopping" around, as most fans do, you no doubt have noticed that few of the storage batteries have the manufacturer's name on them and those that do do not give any data as to the capacity, normal charge or discharge rate. It is left to the purchaser to use his own judgment, which is not always the best.

A good plan is to give your radio battery more attention than you do your automobile battery. You have water put in your auto battery at regular intervals, so do the same with your radio battery. In some cities the main water supply may be used for storage batteries but it is safest to buy a quart of pure distilled water and use that. The top of the battery should be kept clean at all times as any moisture allows energy to leak from the battery and it will run down without you having used the radio set at all. A little vaseline will counteract the tendency of "sweating" and when dust collects on it, it may be very easily wiped off. How to use a hydrometer syringe and a simple polarity indicator is shown in the illustrations.



light load that the average set draws (anywhere from $\frac{3}{4}$ to $1\frac{1}{2}$ amperes for a 3 to 5 valve set). Where a Western Electric 3 valve power amplifier is

Broadcasting "Effects"

THERE is much testimony that radio has entered forcefully into the affairs of men, women and children, and now letters reaching KGO indicates that the animal kingdom is also being considerably upset. Reporting a recent broadcast from KGO, Mrs. F. D. Elwell, Fruitvale, California, has this to say: "In the low

laughter part of the song from 'Faust,' our quiet English bull terrier got up and barked back at our radio set. He has accustomed himself to radio music, but laughter is too much for him." Down on the farm a different kind of trouble in the animal kingdom is apparent. A letter from

Mrs. J. L. George, Hebro, Oregon, reports the following:—"Here we are in Tillamook County, five miles from the ocean beach in the land of cheese. We run our milking machine with the same battery that we use on our radio. So every night it is a mad race to get through with the milking in time to listen-in on KGO."

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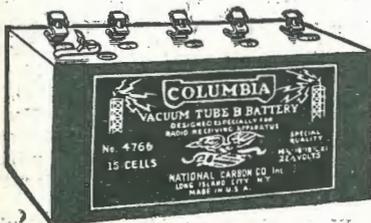
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Queries Answered



J. E. R. G. (Manly). Q.: Using the P1 circuit, how can a continuous hum in the receivers be eliminated? A.: You have evidently omitted to connect the negative lead of the A or B battery to earth. Q.: Is 6 volts too high a potential to apply to UV201A valves? A.: No, this is the correct filament voltage. Q.: Would you recommend using the above circuit with two stages of audio frequency as described in *Radio*, No. 40, or one stage radio and one stage audio? A.: For DX work use one stage radio and audio and for short distance work, two stages of audio. Q.: Could honeycomb coils be used in Fig. 1, article on "Untuned R.F. in a Regenerative Set" described in *Radio*, No. 37? A.: Yes. Q.: What are the advantages of a three-coil circuit compared with a two coil? A.: The three-coil gives greater selectivity.

K. J. D. (Longueville). Q.: Why it it 2BL cannot be tuned in, although 2FC can be received quite satisfactorily (diagram of receiver submitted)? A.: You will have to use honeycomb coils. Your variocoupler will not cover a range from 350 to 1100 metres. Q.: How can I eliminate howling? A.: Possibly your grid leak is too high or you are using too large a reaction coil. See "A Howl-less Regenerative Set," *Radio*, No. 40.

"Fitzie" (Petersham). Q.: Is it possible to receive clear Morse signals and perfect broadcast music or speech simultaneously on the same adjustment? A.: Yes, but as the majority of "Spark" stations transmit on 600 metres, providing your receiver is selective, you should experience no interference from these when receiving broadcasting.

C. D. (Thornbury, Vic.). Q.: Would a .0005 variable condenser, instead of a .001 in the aerial circuit be O.K.? A.: Yes. You will probably need a larger primary coil. Q.: Are dull emitter valves as efficient as the other type? A.: Yes. UV199 will give satisfactory results. Q.: Is one stage radio, detector and one audio better than detector and two audio? If so, can you give me circuit of same? A.: Yes, for DX work see circuit in *Radio*, No. 5. Q.: Is twin wire L aerial better than single wire L? A.: This depends upon the length. For good, all-round work a single wire 100 feet long should be satisfactory.

A. J. P. (Yass). Q.: Can you explain cause of difficulty in obtaining signals using the three-valve receiver described in *Radio*, No. 40? A.: Unfortunately, no

connection in Fig. 2 is shown between the A and B batteries. The negative of the former should be connected to the positive of the latter, as shown in Fig. 2, pp. 381, *Radio*, No. 41.

L. K. (Seven Hills). Q.: Can you supply me with a lay-out of the panel for the three-valve receiver published in *Radio*, No. 40, and which parts should be assembled on the outside of the panel? A.: The size of the panel is a matter for you to decide. We would suggest, how-

I be able to pick up Australian and N.Z. stations? A.: Yes.

S. G. (Willoughby). Q.: Would the three-valve receiver described in *Radio*, No. 40, give loud-speaker results at Moss Vale? A.: You will probably need a stage of radio frequency amplification in conjunction. Q.: Would an aerial 150 feet long and 50 feet high be satisfactory? A.: Yes.

H. F. S. (Waverley). Q.: Is it possible to use electric lighting current instead of both A and B batteries? A.: Yes, a valve is now available known as the A.P. double filament which can be used in conjunction with a Bell transformer to step down to six volts for filament heating. An article on high tension from lamp socket appeared in *Radio*, No. 24. Provision has been made for eliminating A.C. hum.

L. S. (Adelaide). Q.: What type of valve would you recommend using the P1 circuit? A.: Any standard type. Q.: What should be the values of the grid condenser and leak? A.: .0003 m.f. and two megohms respectively.

L. B. (Strathfield). Q.: Using circuit as per Figure 1, *Radio*, No. 39, should howling be experienced? A.: Not if you wire up your receiver as per diagram, and use a reliable transformer. Q.: What filament and plate voltages should be used with a Phillips valve? A.: See the carton which contains these valves. Q.: Should a "hard" or "soft" valve be used? A.: Either. Q.: What crystal would you recommend? A.: Galena "Q.S.A." or "Sacrystal."

H. B. L. (Willoughby). How can the P1 be converted into a three-coil circuit? A.: This circuit is designed for two coils only. Q.: What are the connections of a series-parallel switch? A.: See *Radio*, No. 41.

A. H. B. (Five Dock). Q.: Can you give me call signs, wave-lengths and size of coils required for the principal Australian and New Zealand broadcasting stations? A.: For Farmer's, Sydney (2FC), use Primary 150 and Secondary 200; for Broadcaster's, Sydney (2BL), 50 and 75, and for the new Melbourne station, 3LO, 150 and 250 turns respectively. For Westralian Farmers, Perth (6WF), use the same as for 2FC. For N.Z. amateur transmitters, particulars appeared in previous issues.

R. W. D. (Honeysuckle). Q.: Would I be able to tune in 2FC and the new Mel-

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ever, you make this large enough to accommodate another valve, so that, at any time, should you desire, an extension can be made without going to the expense of another panel. The usual parts assembled on the outside or front of the panel are the condensers, rheostats and honeycomb coils (if used).

J. F. W. (Gladesville). Q.: Kindly furnish me with the P1 circuit for a two-valve set. A.: Add the stage of audio frequency amplification published in *Radio*, No. 37. Q.: Would spiderweb coils be as effective as honeycomb coils? A.: Spiderweb coils are only used for short wave reception. Q.: Using the P1 circuit, should

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bourne station on 1750 metres? If not, what additional apparatus would be required? A.: You omitted to state type of tuning coils used. Q.: Could I add two or more valves to this circuit? A.: Yes.

J. H. (Hurlstone Park). A.: The circuit you submit should work a loud-speaker satisfactorily at your distance. Use the three-valve circuit in *Radio*, No. 40.

A. F. O. (Dulwich Hill). Q.: Why are there three 'phone terminals shown on diagram of panel lay-out, when only two are shown in wiring diagram? A.: Probably for inserting an intermediate battery in connection with the carborundum crystal. Q.: What would be the best transformer to use? A.: Any standard type of audio transformer. This, however, should not be more than $3\frac{1}{2}$ or 4 to 1. Q.: How much more wire would have to be used on the spiderweb coils to receive 2FC? A.: Spiderweb coils are only suitable for short wave-lengths; suggest you use honeycomb coils for receiving this station. Q.: Could a series-parallel switch be used with this circuit? A.: Yes, see diagram of connections in *Radio*, No. 41. Q.: What make of rheostat and batteries should be used? A.: Depends upon the type of valve used. Q.: What is size of coil shown connected with Y switch and why is it necessary? A.: The coil referred to is the primary of the transformer.

"Touta" (City). Q.: What connections would you suggest to obtain maximum results from loose coupler set (circuit submitted)? A.: Use condensers in both the aerial and secondary circuits. This will give finer tuning and greater selectivity from interference. Q.: Should loose ends of coils be connected? A.: No. The switch controls the number of turns in use. The end of the coils should be connected to the last studs of the respective switches.

J. B. (North Sydney). Q.: What qualifications are necessary to obtain a transmitting license? A.: Communicate with Radio Inspector, Macdonnell House, Sydney. Q.: What books would you recommend for this purpose? A.: "The Elementary Principles of Wireless Telegraphy," Parts 1 and 2, by Bangay, obtainable from most leading booksellers.

S. K. (Waverley). Q.: Would two audio frequency transformers, $3\frac{1}{2}$ to 1, be suitable for three valve circuit published in *Radio*, No. 40? A.: Yes, but obtain a reliable type. Q.: What type of valves would you advise? A.: Any standard English or American. For "Radiotron" valves use "Radiotron" type holders. Q.: Do the connections to the B battery mean that there are taps? A.: As different voltages should be used for each valve you should use a battery with external connections on each cell.

"Vario" (Newcastle). Q.: Using the three valve receiver published in *Radio*, No. 40, would a .0005 m.f. condenser be satisfactory instead of the .0003? A.: Yes. Q.: Would two transformers, 5 to 1, be

O.K.? A.: These are rather too high; use preferably, $3\frac{1}{2}$ or 4 to 1. Q.: Using UV201A and Mullard "Ora" valves, what should be the resistance of the rheostats? A.: Six ohms and 30 ohms, respectively. Q.: Could 'phones be used with the circuit referred to or would the volume be too loud? A.: Yes. For DX work you will need a stage of Radio.

R. H. C. (Collarenebri). Q.: Can you supply wiring diagram for a valve and loose coupler crystal set? A.: See *Radio*, No. 39.

F. R. (City). Q.: Using a loose coupler crystal set, what is cause of difficulty in picking up 2FC, while 2BL is clear and distinct (dimensions of aerial submitted)? A.: Aerial is too small to enable you to tune to 1100 metres. Either make this bigger or use honeycomb coils.

C. H. (Sydney). Q.: Would a .001 variable condenser in the primary circuit be satisfactory using circuit as per Fig. 4, *Radio*, No. 39? A.: Yes. Q.: Will .00025 m.f. condensers do in place of the .0002? A.: Yes. Q.: Would dry-cell valves be suitable? A.: Yes. Q.: As audio frequency transformers are liable to distort, could resistance coupling be used? A.: Resistance coupling is not suitable for the circuit referred to, as it is not a case of coupling valves but of transferring the L.F. component from the crystal detector circuit back to the valve for re-amplification. Using an audio transformer of reputable manufacture no distortion should be experienced. The coupling and capacity adjustments of the tuned anode coil and condenser respectively have to be carefully effected in order to avoid distortion.

G. A. (Box Hill). Q.: How can interference from VIM be overcome when receiving from 3AR (10 miles away) using circuit published page 221, *Radio*, No. 36? A.: As you are approximately the same distance from both stations, it will be necessary for you to use coupled aerial circuit such as Fig. 1, page 247, *Radio*, No. 37. Q.: What increase in signal strength should be obtained using the one stage audio amplifier described in *Radio*, No. 39? A.: 3 to 4 times.

W. M. K. (Como, W.A.). Q.: How can 6WF be received without interference from VIP? What circuit would be most selective? A.: See answer to G.A. above. Q.: Would adding a stage of audio work a loud-speaker? A.: Yes.

H. M. (Sydney). Q.: What valve circuit would you recommend in conjunction with a loose-coupler set? A.: See the one-valve amplifier published in *Radio*, No. 37. Would not advise using the two electrode valve, this would be little or no improvement on your crystal.

"Shellac" (Roseville). Q.: Although 2FC can be received satisfactorily, only faint signals can be heard from 2BL (dimensions of aerial submitted). Why? A.: Your aerial is apparently too large. Use a .001 variable condenser in the primary circuit in conjunction with a series-parallel

switch. Q.: How can a one-valve amplifier be added without using accumulators? A.: Use dry cell valves such as WD12, UV199 or 199. Q.: What is the best method of fixing the crystal in the cup? A.: Use "Wood's" metal. This has a very low melting point.

W. A. W. (Parkes). Q.: Would a UV200 valve as detector work satisfactorily with Marconi "R" valves as amplifiers? A.: Yes.

R. B. M. (Liverpool). Q.: Using a loose-coupler crystal set, why is it only faint signals have been heard? A.: Information supplied too vague. Construct your loose-coupler according to instructions in *Radio*, No. 37.

E. M. S. (Canterbury). Q.: Would a Marconi "R" valve be satisfactory both as detector or high frequency amplifier? A.: Yes. Q.: What should be the resistance of the rheostat and voltage of "B" battery? A.: Between five and six ohms, and from 70 to 90 volts respectively.

J. H. (Sydney). Q.: Using simple crystal receiver described in *Radio*, No. 36, and a 150 turn Giblin Remler coil, 2FC cannot be received using the variable tuning condenser in the aerial circuit without reducing the signal strength. Why? A.: The coil used is too large in conjunction with the aerial. Use the next smaller size.

E. G. B. (Cremorne). Q.: Can you suggest improvement to loose-coupler crystal set (circuit submitted)? A.: Shunt the variable condenser across the secondary, and have the detector and 'phones in series.

T. McC. (Strathfield). Q.: Would a vario-coupler work satisfactorily instead of the honeycomb coils in the two-valve receiver described in *Radio*, No. 41 (aerial, 100 feet long and 40 feet high)? A.: Yes, for short wave-lengths. Q.: Using vario-coupler, would this circuit work a loud-speaker? Yes, for local broadcasting stations, although this circuit is not recommended for this purpose as already pointed out. Q.: Would a Jefferson Star transformer do in place of the transformer suggested? A.: Yes. Q.: Would a 26-plate variable condenser be satisfactory? A.: Yes. Q.: Would better results be obtained with this circuit than the one submitted? A.: Yes.

A. P. (Griffith). Q.: Can you make suggestions for improving reception (diagram submitted)? A.: As the diagram only shows portion of the wiring we cannot, except that you communicate with the manufacturers.

C. H. R. (Dulwich Hill). Q.: Can you recommend any improvements for picking up other than local amateurs (diagram of receiver and particulars of aerial submitted)? A.: The coils you are using in conjunction with your aerial are too large to enable you to get down to the amateur wave-lengths. Use smaller coils. Q.: Is it possible to receive KGO using circuit

(Continued on page 552.)

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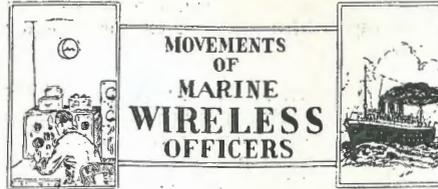
Professor Fleming needs no introduction. His reputation is world-wide, and this new edition of his work brings the first edition right up to date. A tremendous amount of new information has been incorporated, which makes it a much more bulky volume and decidedly more exhaustive than previously. Everyone taking a serious interest in wireless would be well advised to include this in his library, as it is difficult to over-estimate its value and importance to keen experimenters.

CHAPTER HEADINGS.

SCIENTIFIC PRINCIPLES, Types of Electric Waves, Origin of Electrons Emitted from Hot Metals — THE FLEMING RECTIFYING VALVE, Various Types, Modes of Use and application — THREE AND FOUR ELECTRODE VALVES, Their Evolution, Mode of Operation and Use — THE THEORY OF THE THREE-ELECTRODE VALVE—THERMIONIC VALVE CONSTRUCTION; The Problem of Valve Manufacture and Details of Construction — THE THERMIONIC VALVE AS A GENERATOR OF OSCILLATIONS — THERMIONIC VALVES AS AMPLIFIERS AND DETECTORS—THERMIONIC VALVE TESTING — FLEMING REPEATERS AND RELAYS, Its Problems and Requirements — THERMIONIC VALVE PLANT, Advantages of Continuous Wave as against Spark Systems.

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OCTOBER.

MR. P. WHELAN signed off s.s. *Warspray* at Newcastle, 18th.

Mr. G. H. Tracey signed on s.s. *Warspray* at Newcastle, 28th.

Messrs. H. F. Tye and W. L. Myers signed off s.s. *Arafura* at Sydney, 25th.

Messrs. T. Chalmers, E. T. Prentice and R. E. Mann signed off s.s. *Victoria* as senior, second and third operators respectively at Sydney, 27th.

Mr. H. J. Byrne signed off s.s. *Hewham* at Newcastle, 20th.

Mr. T. V. Tressler signed off s.s. *Iron Monarch* at Newcastle, 29th, and signed on s.s. *Iron Chief* at Newcastle, same date.

Mr. P. Whelan signed on s.s. *Iron Monarch* at Newcastle, 30th.

Mr. E. T. Prentice signed on s.s. *Echua* at Sydney, 30th.

Mr. A. W. Stewart relieved Mr. A. Stuart on s.s. *Nauru Chief* at Sydney, 30th.

Mr. V. J. Foreman signed on s.s. *Hewham* at Newcastle, 31st.

Mr. A. J. Coates signed on s.s. *Arcoona* at Sydney, 31st.

Mr. J. H. Carty signed off s.s. *Koolonga* at Melbourne, same date.

NOVEMBER.

Messrs. P. C. B. Holdsworth and L. G. Curnock signed on s.s. *Ferndale* as 3rd operators at Sydney, 3rd.

Mr. E. Pittock signed off s.s. *Moreton Bay* at Sydney, 4th.

Mr. A. Stuart relieved Mr. N. M. Leeder on s.s. *Dimboola* at Sydney, 3rd.

Mr. N. M. Leeder signed on s.s. *Ferndale* as senior operator at Sydney, 3rd.

Mr. R. E. Mann relieved Mr. A. L. Eichstadt on s.s. *Manuganui* as 3rd operator at Sydney, 4th.

Mr. A. E. Sheppard signed off s.s. *Taiyuan* as senior operator at Sydney, 4th, and signed on s.s. *Moreton Bay* as senior operator at Sydney, same date.

Mr. F. Ouvrier signed on s.s. *Taiyuan* as senior operator at Sydney, 4th.

PERSONALITIES

MR. F. W. LARKINS, of Amalgamated Wireless (A/sia), Ltd., who underwent an operation for appendicitis at Sydney, has returned from convalescing at the Mountains.

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submitted? A.: Yes. Q.: Is a two or three valve set using H.F. as efficient as a two or three valve low loss receiver? A.: Low loss receivers are only suitable for short wave-lengths.

W. S. P. (Manly). Q.: Using the P1 circuit would a .0003 variable condenser across the reaction coil give better results? A.: Your receiver would be more selective. With fine adjustment you will probably increase your range. Q.: What make and ratio audio transformer would you suggest for a two-valve set, using the P1 circuit? A.: Any reputable make, 3½ or 4 to 1. See our advertisers' announcements.

C. B. (Young). Q.: What is the lowest number of valves necessary to receive 2FC and 2BL, distance approximately 300 miles? A.: At least three valves to give you satisfactory results. Q.: What would be the approximate cost of the three-valve receiver published in *Radio*, No. 40? A.: See advertisements in issue referred to, giving prices of various parts. Q.: Would it be possible to pick up other than Sydney broadcasting stations using this receiver? A.: You should be able to pick up the Melbourne stations and possibly the one at Perth.

P. F. (Balmain). Q.: What are the correct connections for the rheostat shown in Fig. 3, *Radio*, No. 36? A.: You should experience no difficulty if you wire up your receiver as per Fig. 1. Fig. 3 is a pictorial diagram. Q.: Why is difficulty experienced in tuning in 2FC on a two-valve crystal set (English)? A.: This receiver is probably designed for reception of the British broadcasting stations on short wave-lengths. Use one of the two valve circuits published in *Radio*, No. 41. Q.: How can receiver referred to be modified to cut out the crystal? A.: Without a circuit diagram we are unable to advise. Use the two-valve broadcast receiver in *Radio*, No. 38. Q.: Would a 17-plate condenser be satisfactory instead of the 23 plate? A.: Depends upon the size of the plates.

E. W. F. (Parramatta). Q.: Using the special three-valve receiver in *Radio*, No. 40, what should be the resistance of the filament rheostats and voltage of the A and B batteries? A.: This depends upon the valves you use. See answers given in this and previous issues. Q.: How many plates are there in a .001 and .0003 m.f. variable condenser? A.: Usually 42 and 22 respectively.

G. H. P. (Parkes). Q.: How can carrier waves be tuned out when receiving on short wave-lengths (diagram and particulars of receiver submitted)? A.: The UV200 valve is essentially a detector. You will probably overcome your trouble by using the R valve in the first stage and the UV200 in the second. Notice you are using a plate voltage of 30, which is too high for the UV200 and much too low for the R valve. Former requires from 18 to 24 volts, while latter functions best with from 60 to 80 volts plate potential. Q.: What is principal of circuit as regards action of first and second valve? A.:

Circuit is one stage radio and detector tuned anode with reaction on the detector valve.

C. D. (Broken Hill). Q.: Would crystal valve receiver (circuit submitted) be satisfactory for long distance reception? A.: For better results use one of the circuits published in *Radio*, No. 39. Q.: What is cause of difficulty in receiving 2FC? A.: You are using your condenser in series and not in parallel. You are also using the wrong coils, these should be 150 and 200.

T. M. F. (Barcaldine). Q.: Can V24 valves be repaired in Australia? A.: No. Q.: Can a potentiometer be used in the P1 circuit? A.: This may be used for varying the voltage of the B battery.

G. W. B. (East Melbourne). Q.: What is cause of unsatisfactory results using two valve receiver (diagram and particulars submitted)? A.: The value of the grid condenser is rather high, try one of .00025 to .0003 m.f. It is possible you do not require a grid leak. Try cutting this out or increasing its value. Circuit is otherwise O.K. Try different valves such as Marconi-Osram or Radiotron type. As an alternative try either of the two-valve circuits published in *Radio*, No. 41.

C. W. B. (Strathfield). Q.: Using two independent receivers and two separate aeriels, why are signals considerably increased when both receivers are tuned to the same wave-length and considerably reduced when the receivers are tuned to different wave-lengths? A.: If the smaller receiver employs regeneration, the receiver on the other aerial may be acting as a heterodyne, thus causing interference. The fact that signals are best when both sets are on the same wave-length suggests that energy from the larger set is re-radiated and received on the smaller one. This is a very common experience in England, where large numbers of receivers are in use in congested areas, and phenomenal results on crystal sets may sometimes be attributed to re-radiation. The larger aerial would not constitute a very efficient counterpoise, nor would it cause very serious absorption for reception. A filter circuit in the smaller receiver will probably overcome your trouble.

T. E. E. (Melbourne). Q.: What size coils are required for receiving KGO (circuit submitted)? A.: Primary, 35; and Secondary, 50.

J. G. (Mosman). Q.: Which would be the better radio amplifier—A.P. or Marconi R valves? A.: Marconi R valves. Q.: Please supply me with a wave-trap for cutting out 2FC when receiving 3LO, Melbourne. A.: You should experience no difficulty, with careful adjustment, in cutting out 2FC when receiving 3LO. See article on "Wave Trap" in *Radio*, No. 41. Q.: Can B batteries be re-charged? A.: Not to our knowledge.

H. W. S. (Cooroy). Q.: Is receiver (diagram submitted) efficient? A.: Dia-

gram only shows panel wiring; we cannot advise. Communicate with the manufacturers. Q.: Would 201A valves be satisfactory? A.: Yes, for preference use a UV200 as detector.

R. S. P. (West Maitland). Q.: Using the three-valve receiver in *Radio*, No. 40, what valves are recommended? A.: Any standard English or American, either dry cell or accumulator type. Q.: What voltage B battery would be required? A.: For the dry cell type such as UV199, 20 to 80 volts; for WD12's, 20 to 100; for Marconi "R," UV200 and UV201A, 70, 15-25 and 20-100 respectively. Q.: What type of aerial would be most satisfactory? A.: Single wire, 100 feet long and as high as possible, or a two-wire, 50 feet long, either inverted L or T, depending upon the space available and the position of the receiving apparatus with relation to the aerial. Q.: Could an additional amplifying unit be added to the above circuit? A.: Add a stage of radio, particularly if you are receiving in the country.

"Tono Bungay" (Young). Q.: What would be the approximate cost of the three-valve receiver in *Radio*, No. 40, and the two-valve receiver in No. 41? See various advertisers' announcements, giving detailed prices of the apparatus required for two, three and four valve receivers.

WIRELESS AT SEA.

THEY who go down to the sea in ships have much to be thankful for in the entertainments afforded by means of wireless. During the voyage of the steamer *Roma* to Niue Island, those on board were in touch with the San Francisco and Sydney wireless stations each evening and occasionally the ship was able to hear Auckland and Wellington. On one evening, when about 1,300 miles from the New Zealand coast, the Auckland station was heard with remarkable clearness. The Secretary of the Cook Islands Department, Mr. J. D. Gray, who made the voyage in the *Roma*, states that each item was heard as distinctly as though the listeners had been in the room with the performer. The songs, "Banks of Allan Water" and "The Requiem" and a pianoforte solo, "The Brook," came through with excellent clearness. One evening a political speech from San Francisco was heard. On the passage to Auckland from Niue, San Francisco could be clearly heard up to within 50 miles of the Great Barrier.

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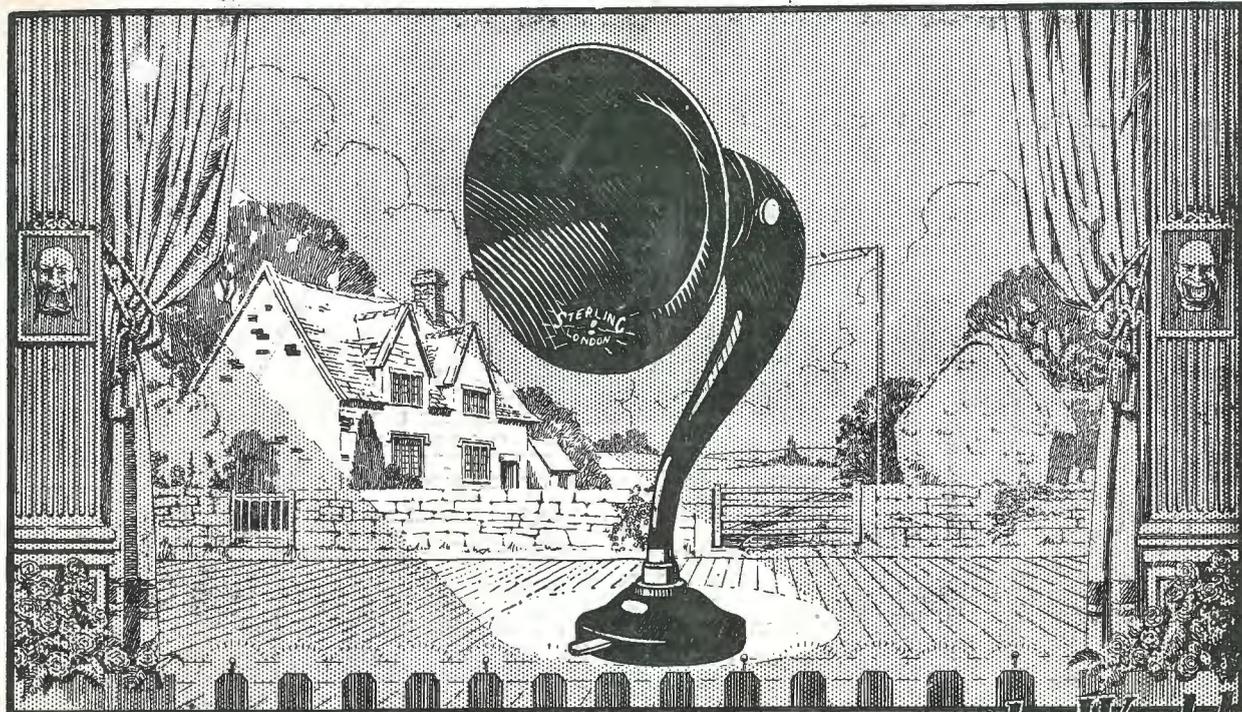
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Loud Speaker
The Baby's Big Brother!**

Clear, melodious and perfect in tone—ample in volume without any sign of distortion. It is an all-purpose loud speaker—indoors or outdoors 'Audivox' results are perfect results.

STERLING BABY Loud Speaker

Height overall 19"; diam. of flare 10 1/2"; diam. of base 5 1/2"

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