ISSUED EVERY — — SECOND WEDNESDAY

SIXPENCE

RADIO

IN AUSTRALIA & NEW ZEALAND

Incorporating "Sea Land and Air"

VOL. I. MAY 2, 1923 No. 3

—Underwood Photo.

SIX-YEAR-OLD RADIO ENTHUSIAST.

(See page 63.)

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RADIO
IN AUSTRALIA & NEW ZEALAND
Incorporating New Zealand and Air

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Trans-Pacific Tests

THE near approach of the Trans-Pacific radio tests directs attention to their importance to the wireless amateurs of Australia. For some considerable time past a large number of enthusiastic experimenters all over Australia have been hard at work building apparatus and completing arrangements in order that the best possible results may be achieved.

It cannot be too strongly emphasised that these tests have a national as well as a world-wide interest.

Therefore, it behoves all who have the progress of radio at heart to do all that lies in their power towards ensuring a large measure of success being recorded to the credit of Australian experimenters.

It can safely be assumed that those engaged in the actual task of attempting to receive the messages transmitted by the American amateurs will spare no effort to accomplish the aim they have in view. We trust that those not taking part in the tests will co-operate loyally with them to the extent of closing down their stations at the actual times at which it is calculated the messages will reach Australia. It is only a small sacrifice they are being asked to make, but non-compliance therewith will certainly have a very detrimental effect on the efforts of those who are out to win new distinctions for Australian radio experimenters.

There are some thousands of holders of receiving licenses in the Commonwealth, and it naturally follows that each and every one is anxious to employ all his spare time in "listening in" to the signals, music and speech which, to a more or less extent, fills the air every night. It is these enthusiasts who are asked to call a halt while the tests are on in order that a clear field may be allowed those who are seeking to establish a new long-distance record for low-power reception.

The forthcoming test is easily the most important event that has yet engaged the attention of amateurs in Australia. A wide appeal was made for entrants, and while the results, numerically comprise only a small percentage of those holding licenses, the standard of the competitors is exceptionally high. This only emphasises the necessity of non-competitors allowing them a clear field. There is no means of ensuring this other than by appealing to the honour of those indirectly concerned in the success of amateur experimentation.

We feel that once this fact is realised every radio experimenter who possesses a valve receiving set will fall into line with the wish of th Trans-Pacific Test Committee and suspend his activities during the currency of the test. By doing so he will be acting in strict conformity with the high moral standard which has characterised the doings of radio experimenters in Australia, and incidentally rendering a distinct service to the cause of radio research.

Growth of Radio Clubs

THE gradual formation of radio clubs throughout Australia is a healthy sign. Less than twelve months ago the number in existence was considerably less than it is to-day, and almost every week we hear of new ones being formed. As might be expected, the growth has been much greater in and around the capital cities than in the country, but there is no reason why the country districts of the various States should not have a large number of clubs, consistent with area and population, in the very near future.

It must be obvious to anyone who cares to give the matter a moments consideration that the clubs are really stepping stones on which the great science of radio will rise to the same dominant position in Australia that it occupies in America and England. That the public here are not yet educated to the value and possibilities of wireless communication is not at all surprising. The average person regards radio as a subject far too complicated for his untechnical mind, and even when it is demonstrated that the science is simplicity itself to a person of ordinary intelligence he still remains more or less unconvinced. It is in cases like this that radio clubs are able to render valuable service. The educational influence of a few lectures and demonstrations is beyond question, and the formation of a radio club in any district is certain to arouse the interest of many who would otherwise remain indifferent to the march of this truly wonderful science. For this reason, if no other, the growth of clubs is to be encouraged, and enthusiasts in country centres, no matter how small they may be numerically, should band themselves together for the advancement of their hobby. The outback districts offer every facility for experimentation, and a practical demonstration of transmitting and receiving messages between different towns will do more to arouse public interest than the most eloquent word picture of the possibilities of radio communication which it is possible to paint.

We hope to hear of the inauguration of many country radio clubs in the near future, and those who undertake to form them can rest assured that the work they are doing will stand as a monument to their faith and enterprise long after radio has overstepped the limits which bound its horizon to-day.

Radio Entertainment

Wentworth Club's Successful Effort

Large and Appreciative Audience

THE members of the Wentworth Radio Club, which is presided over by Mr. Spencer Nolan, have every reason to feel elated at the success which attended their demonstration of wireless music at the Club rooms, Rose Bay, on the night of April 18.

The committee went to considerable trouble to ensure success, and the hour the audience in the Club room at Rose Bay, as well as a large number who had gathered on the lawn outside, were delighted and entertained with the vocal and instrumental items which came in loud and clear.

At 8.30 p.m. Mr. Colville, another well-known experimenter, commenced transmitting, and half an hour later Mr. C. D. Maclurcan's messages were picked up, although at the time he was conducting experiments with Melbourne amateurs. At the conclusion of the demonstration all present voiced their appreciation of the work of those responsible for the evening's entertainment, and as was his due, Mr. R. C. Marsden, who operated the receiving set, was warmly congratulated. The receiving apparatus consisted of three valves with a detector and two stages of audio frequency amplification. The whole outfit was built by its pardonably proud owner, Mr. Marsden.

The Wentworth Radio Club has only been in existence a short time, but its members are determined that no other club in Australia shall outdo it in boosting the possibilities of radio. The fact that its first demonstration was such an unqualified success will spur it on to further efforts, and radio circles generally cannot fail to derive considerable benefit from such progressive moves as the holding of demonstrations designed to educate the general public to the possibilities of entertainment by radio.

Flashlight photo. of section of the audience at the Wentworth Club's headquarters. On the right is Mr. Spencer Nolan, president of the Club, and near the receiving apparatus is Mr. R. C. Marsden, the operator. Seated next to Mr. Marsden is Mr. Arthur Peters, hon. treasurer. In the centre is Mr. L. Skinner, vice-president, and on the extreme left Mr. Wallace Best, hon. secretary. A large section of the audience listened to the music from the lawn in front of the club house.

whole-hearted appreciation of the large audience must have convinced them that the effort was well worth while.

The first broadcast items to be picked up came from Mr. F. Basil-Cooke's up-to-date station at Clifton Gardens. Punctually at 7.30 p.m. Mr. Cooke commenced his experimental transmission, and for just on an

Inductance, Capacity AND Self Capacity of Coils

By E. JOSEPH

THE author has written this article owing to the vague knowledge of the meaning of the above terms among radio experimenters and dealers in radio supplies. On several occasions he has exhibited coils wound in different ways to various persons who have asked: "What wave length are they?" A coil, whatever its inductance, has no wave length until it is connected with a condenser.

No really satisfactory methods of measuring the absolute inductance, capacity or self-capacity at radio frequencies has yet been devised. This statement applies with particular emphasis to the last of these three quantities.

As a result of lack of knowledge on this subject, one frequently hears extravagant claims made for coils wound in various ways.

The writer will not go into mathematics, but will explain in a simple way what is meant by the terms at the head of this article to consider the connection between inductance and the self inductance of coils, and to explain the importance of the resistance of a coil.

Inductance may be defined as the capability of a coil to store up energy in the form of a magnetic field in the surrounding medium.

When an electrical pressure is applied to a circuit containing inductance the current rises comparatively slowly to its final value. In most cases the rise is so rapid as to cause the delay to pass unnoticed, but where the inductance is very great it may be several seconds. This delay is caused by the current having to build up a magnetic field (approximately to its strength), and as this field is built up it induces in the windings an electro-motive force which opposes the applied pressure, thus leaving only a small resultant pressure available to force current through the coil.

Again, on opening the circuit, the current falls comparatively slowly to zero, because the magnetic field, in collapsing induces a pressure which tends to assist the flow of current. The magnitude of these effects depends upon the inductance of the circuit.

Our whole system of units is based upon the assumption that if a conductor is cut by one hundred million (10^8) magnetic lines of force in one second there will be induced in it one volt. If there are two turns then half this number 5 by 10^7 lines will suffice. Generally, a coil of n turns must be linked with a field of $\frac{10^8}{n}$ lines to generate one volt by their complete removal in one second.

1 Number of turns ..	1	2	3	4
2 Circumference	1	.5	.33	.25
3 Diameter	.319	.16	.106	.08
4 Area	.08	.02	.009	.005
5 Lines per unit area	1	2	3	4
6 Total magnetic lines	.08	.04	.027	.02
7 Relative inductance	.08	.08	.08	.08
8 Square of turns ...	1	4	9	16

Figure 1.

Any coil which when carrying a current of one ampere has 10^8 by n lines threading through it is said to have an inductance of one Henry. (If 100 n lines are produced the inductance is one micro-henry.)

Now, the passage of a current through a coil gives us a definite number of lines per unit of area enclosed by the coil. Therefore, doubling the area must double the inductance. But to enclose a greater area usually means using a greater length of conductor, thus the resistance is increased.

In all circuits, except those used primarily for the production of heat, resistance is objectionable, especially in radio circuits, whereas resistance causes loss of energy, damping, and "broad tuning."

We will investigate the question of the best shape of coil by taking unit length of wire and forming a coil of one turn of various shapes, such as a circle, a square and a rectangle, with sides in the ratio of 2 to 1:

(a) Formed into a circle it will have a diameter of .319, and will enclose an area of .08.

(b) Formed into a square it will have sides of length .25, and will enclose .0625.

(c) Formed into a rectangle it will have sides .33 and .166, and will enclose .0548.

Thus the circle is the most effective shape for the turns of an inductance.

The unit length of wire can be wound in one large turn or a number of smaller ones. Neglecting magnetic leakage we will wind it in circular form in a coil of 1, 2, 3, and 4 turns.

The table (Fig. 1) gives the results, dimensions in lines, 1, 2, 3, and 4. Now the number of lines per unit of area depends upon the value of the prduct current times turns, and line 5 gives relative number of magnetic lines per unit area. Line 6 gives the product of "lines per unit area, times area, and equals total magnetic lines."

The relative inductances are given by multiplying this by the number of turns, as in line 7. Now, square the number of turns and get line 8. Multiply by area and we again get line 7. Thus it is seen that for a given length of conductor wound in a given shape the inductance is independent of the number of turns or size of the shape, but is dependent solely upon the length of wire used, and upon the shape.

This reasoning, however, is not strictly true on account of the effects of magnetic leakage.

It has been assumed that every magnetic line passes through every turn of wire, but in practice some do not. Each turn produces its quota of lines, just as if the others were non-existent, and the number of lines produced per ampere is the inductance (L) of the turn (also called its self-inductance or self-induction).

The total inductance of a number of turns is given by the sum of all the L's, plus the sum of the mutual inductances (M) which are due to the lines produced by one turn, also treading some of the others.

Let us consider a coil of two turns, A and B, which may or may not be the same size and shape. The inductance of A is L a, and B is L b. Some of the lines of A may pass through B, and will have an inductive effect, which we will call M ab, and some of B's lines will pass through A, giving us M ba. If the two turns are the same size and shape then L a = L b and L a by L b =2 L, which is the total inductance of the turns so situated as not to affect each other; i.e., if M ab and M ba =O. If M ab and M ba have any value, then the total inductance is given by L a + L b + M ba + M ab. Obviously M can never exceed L, nor can it exactly equal it. M must always be less than L. That is, some of the lines due to 1 turn fail to pass through the others. The greater the distance between turns the greater the leakage. Therefore, inductance must be wound as compactly and closely as possible, which is the cause of all the trouble with "self-capacity." A single layer coil soon reaches such a length that the lines due to turns at one end fail to reach the turns at the other end; i.e., M falls far below L, and the wire ceases to function efficiently.

Fig. 2 illustrates a single layer coil, assuming only 2 lines per turn, and with the turns so spaced that M is small.

The next step is multi-layer coils, which, in some cases, are essential for long wave lengths. The difficulties encountered due to self or distributed capacity are then made apparent. The meaning of self-capacity will be deferred for the present, and conclusions regarding inductances summed up.

A coil to have minimum resistance and minimum weight of wire with maximum inductance, must be wound on a circular former with the turns wound as closely as possible, that is lying in parallel planes, and in closely-laid layers.

The mathematical theory of the best proportions to give a coil are dealt with in several text books. Unfortunately, they assume a considerable mathematical knowledge on the part of the reader, and are somewhat incomprehensible to the non-technical man. Considerable departure from the dimensions so given may be made without serious loss, and numerous

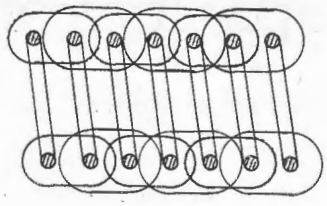


Figure 2.

types of coils now on the market will serve to indicate approximately these "best proportions."

Capacity is the capability of an insulator or dielectric to store up energy in the form of electrostatic strain.

If two adjacent conductors are at different electrical potentials, the dielectric between them is in a state of strain, and a small amount of energy is absorbed to produce the strain which energy is returned on its release by removing the potential.

The amount of energy stored depends upon the area of conducting surfaces bounding the dielectric; up on their distance apart, that is upon the thickness of dielectric; upon the difference of potential between the conductors, and finally upon the nature of the dielectric.

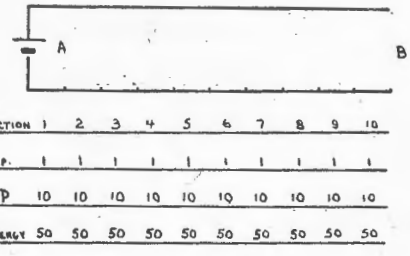


Figure 3.

The unit of capacity is the Farad, and is of such dimensions that with a difference of potential of one volt, a current having a mean value of one ampere will flow for one second before it is fully charged.

Such a unit is of enormous dimensions, so that for all practical work one-millionth of this is taken, and called a microfarad. Even this is too large for radio work, as evidenced by the number of noughts following the decimal point whenever a value of capacity is given in the text books.

The amount of energy stored is proportional to the square of the voltage, so that doubling the voltage stores four times the energy in a given condenser. The size of the individual plates has no effect, provided the total area remains unchanged.

With this brief explanation of capacity we may proceed to consider "self-capacity" in coils, and an analogy will best lead us to the concrete cases. Let Fig. 3 represent 2 line wires (say of a telephone system). Let them be connected at A to a source of potential, such as a battery, and at B let them be "open circuited." If the difference of potential at A (D. P at A) is 10 volts, then it will be 10 at B also. That is, one wire is uniformly 10 units of potential above the other wire. Now, these two wires are conductors bounding a dielectric, and, therefore, form a condenser. We will divide their length into 10 parts, assume each part has unit capacity, and will proceed to ascertain their capacity as measured at A.

We have 10 condensers, each of unit capacity, and each charged to a potential of 10 volts. Each will store an amount of energy represented by:

$$W = \tfrac{1}{2} E^2 C = \frac{E^2 c}{2}$$

and the conditions existing all along the length is indicated by the figures on the diagram Fig 3.

Each unit of length stores energy

$$W = \frac{102}{2} = 50 \text{ units}$$

The total energy stored is

50 by 10 = 500 units

and the capacity as measured at A by measuring the amount of energy required to charge the system is 10 units.

If B is "short-circuited" as in Figure 4 the DP at B is zero and there is a uniform fall from 10 at A to O at B assuming it is in steps of 1 per section, the capacity is not, however, affected.

The conditions are again indicated by the rows of figures in Figure 4.

The total energy stored in 192.5 units and the capacity as measured at A is 3.85 units only. *But we know it is* 10.

In Figure 5 B is closed through a

resistance which is of such value as to absorb 5 units of potential. The rows of numerals in Figure 5 show the total energy stored is 312, and the capacity when measured at A will appear to be 6.24 units. *But we know it is still* 10.

It will be evident that every variation in the load at B will cause a variation in the apparent capacity as measured at A. Figure 3 may be

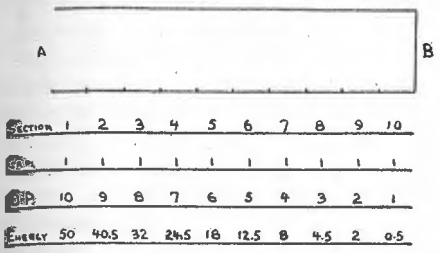


Figure 4.

taken as representing a coil of one turn and illustrates the fact that it is impossible to have a coil possessing inductance without it having capacity also.

In general, every conductor has resistance inductance and capacity, whatever the materials of which it and its insulation are composed and whatever may be its size and shape.

At the high frequencies used in wireless work the problem is not as simple as illustrated because each section carries not only the current flowing in the circuit as a whole but also the charging current for all sections beyond it. Thus section 1 carries circuit current plus full charging current, section 2 circuit current plus $\frac{9}{10}$ of charging current, section 7 circuit current plus $\frac{4}{10}$ of charging current and this uneven current distribution causes an uneven fall of potential.

When considering a coil of more than one turn the problem becomes still more complicated. Figure 6 indicates a coil of two turns using the same length and spacing as in the previous figures. It should be noted that for each unit length of wire we have now to consider three capacities at least, and that each of these capacities is subject to a different DP.

The conclusions arrived at regarding what the self-capacity of a coil depends on are:

(1) The size of the conductor.
(2) The resistance at the frequency at which it is used.
(3) The material with which it is insulated.
(4) The spacing apart of the turns.
(5) The arrangement of the turns as affecting the proximity of turns at various DP's.
(6) The current carried by it.
(7) The value of the condenser to which it is connected.

The effect of self-capacity is to cause parts of a coil to possess inherent natural frequencies and in many cases one or more of these may be so pronounced as to prohibit the reception of signals on certain wave-lengths and in any case to greatly reduce their strength.

It is therefore essential to reduce to the lowest possible value the self-capacity of inductances and the various types of winding such as "basket," "spider-web," "banked," "honeycomb," "duo-lateral," etc., which are attempts towards this end.

In considering them it must be borne in mind the conditions found necessary for inductance alone and summarise as follows:—

1st. The larger the conductor the the lower will be its resistance, the greater will be its area to provide self capacity and the further apart will be its turns so reducing M and therefore the inductance.
2nd. The thicker the insulation the further apart will the turns lie with a reduction in self capacity but also a further reduction in L.
3rd. The insulating material must be one with a low "specific inductive caparity" (SIC) or "dielectric constant."

It is impossible to devise a wind-

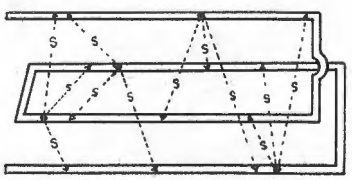


Figure 6.

ing which will fulfil all the conditions laid down many of which are antagonistic.

Some inductance must be sacrificed to enable the reduction of S self-capacity at the same time bearing in mind that a winding requiring elaborate machines of formers or one which is troublesome to arrange is objectionable.

The "basket" and "spider-web" coils reduce S but reduce L also very considerably. They cannot be wound to large valves of L and so are unsuitable for long wave lengths.

"Banked" winding followed the simple multi-layer and consisted in arranging a multi-layer coil in such a way that turns between which there existed considerabe DP were not in adjacent positions. It is very difficult to wind and is ineffective if of more than 4 or 5 layers so that for long waves a long cumbersome coil is needed.

"Honeycomb" and "duo-lateral" coils are examples of compactness and of approximation to the "best propor-

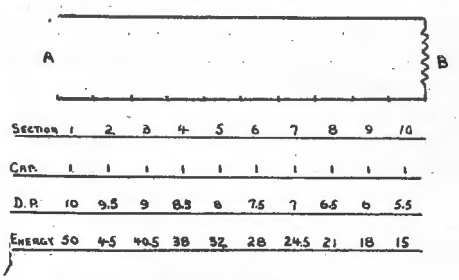


Figure 5.

tions." They reduce S to a very low figure because they are largely "air spaced" coils and air has a lower SIC than any other insulator. The valve of L, however, is not as high as it might, be, firstly because the turns are not circular but are in the form of an eclipse which is then bent along its minor axis, thus reducing the area enclosed, and secondly because the turns are lying at an angle with each other instead of parallel thus reducing M.

The writer has devoted a large amount of time during the last few years to the study of methods of winding for high values of L and M with low values of S and R and to investigation into methods of measuring S. These will be dealt with in another article, but certain conclusions arrived at may be useful.

1. In a simple multi-layer winding of ordinary diameter the S between adjacent turns is of negligible importance. It is the S between layers which matters. This is aggravated by the fact that the turns of one layer sink into the inter spaces of the layer next below.
2. Except in extreme cases cotton covered wire should be used thus giving a reasonable spacing between **turns.**
3. The loss in inductance due to departure from the circular form of turn is serious and should be avoided.
4. Varnish is objectionable. If used it should be used sparingly and as much as possible removed by "centrifuging" or spinning the coil at a high speed.
5. Solid spacing materials should be avioded as far as possible owing to their high SIC.
6. Never use mica to insulate between turns or layers.

How London "Listens-In"

Thousands Enjoy High-Class Programmes

COULD the average Australian take a peep at London, as it is to-day, and see the multitude of wireless aerials that have grown up like mushrooms during the past few months, he would be able to visualise what is going to happen in Australia when broadcasting commences here. It was only in January of the present year that England woke up to the fact that radio telephony was sufficiently advanced to permit of a broadcasting service being offered to the general public. Once that was decided upon no time was lost in making a commencement, and the inauguration of the service was attended with the happiest results. Well over sixty thousand applications for receiving licenses flowed in in a little over two months, and to-day, when one steps ashore at the docks in East London and walks through that cosmopolitan quarter the spectacle of an aerial jutting over the top of practically every second house—no matter how humble its outside appearance—greets one at every turn. Could there be any more convincing proof of the all-round utility of radio and its wide appeal?

Right in the heart of the city radio telephony has invaded the cafés and refreshment rooms, and customers are entertained nightly with a programme of vocal and instrumental items rendered by high-class performers at the headquarters of the British Broadcasting Co. Dancing to radio music is a nightly occurrence, and the "first night" performance at many of the big London theatres is almost invariably broadcasted to the intense pleasure and entertainment of tens of thousands listening-in. Another feature of broadcasting which has won wide popularity in London is the transmission of children's bed-time stories. Each evening for about an hour and a half the kiddies are entertained with stories and rhymes like the children of by-gone years are credited with hearing at their mother's knee. Radio telephony has taken the place of that largely mythical parent, and so well is it performing the task of fairy godmother that every home boasting a radio receiving set also boasts happy and contented children, who go to bed to dream of the wonderful voice that spoke to them and told them such lovely stories.

Anyone who has listened to the programmes broadcasted in London cannot fail to marvel at the splendid results achieved. Reception on even the most simple crystal sets, costing only a few pounds, is wonderfully clear, and the quality of the artists who contribute to the programmes is exceptionally high. An orchestra of specially picked performers plays nightly at the headquarters of the Broadcasting Company, and those behind the venture have been well rewarded for their enterprise by the enthusiastic approval which the programmes receive. If England was slow in undertaking broadcasting, she has at least been sure, and if the same results can be achieved in Australia—and they will be—the future of radio in the Commonwealth is exceedingly bright.

—"Wide World" Photo.

The Students at Cornell University, U.S.A., Skating on Lake Beebe to music supplied by Radio.

Australian Wireless Development

Need for Encouragement

By GEORGE A. TAYLOR

The following highly-interesting lecture was delivered at the annual meeting of the N.S.W. Division of the Wireless Institute of Australia by Mr. George A. Taylor, who enjoys the distinction of being the first Chairman of the Institute—the first to be formed in the British Empire.

THE world to-day is alert. For ages it had wearied on. Events happened, and the world woke for a space; then it slept again in its matter-of-fact way. To-day it is wide awake; the crash of the Great War upon history sounded a thump that is still reverberating round the earth in the changing conditions of national governments, in the altered views of human rights, but more in the realm of scientific achievement; and no where more than in "wireless communication" have better results been achieved. Yet, different from other scientific investigations, wireless development did not want war-pressure to stir it to activity. On the strength of its own merit its wonders would have risen it to the great place it now holds in human attention. Though the world to-day is aware of wireless wonders of almost daily happening, it is not truly aware of what wireless really is. In fact its development has been so rapid that there has not been time to give the new science a proper name.

Since Hertz, in 1887, marshalled electro-magnetic forces, and by means of an oscillator, sent out "beatings" that created waves that were received by a resonator, wireless has swiftly developed, and we note a great procession of clever inventors in the new science, from Branly with his "Coherer" in 1890, Oliver Lodge, Ducretel, Marconi, Fleming, Fessenden, Lee de Forest, Poulsen, and Armstrong, who have brought the science to be the most wonderful on earth to-day; in fact, within the brief space of thirty years, wireless has developed from a spark between two metal balls one inch apart, to the spread of a song from Dame Melba to listeners-in practically all over the world.

The mention of Dame Melba (Australia's soprano) brings to mind the fact that Australia holds an interesting position in the world's wireless achievements, both from an experimental, as well as from other points of view.

It is interesting to look back to the early nineties, when the great liner *Waratah,* probably with a broken propellor shaft, drifted into obscurity without ever being heard of again, when there arose a general appeal for expediting wireless development.

At that time very few considered the practical possibilities. In order to stir attention to its value a party of enthusiasts joined together to interest the Australian Military Authorities, so that at Easter (April, 1910) a party, consisting of Messrs. Kirkby, Hannam, Wilkinson, and the speaker, arranged the first two military wireless stations in Australia at the Artillery Camp at Heathcote. The aerials were rapidly erected from rough saplings, and what would to-day be called cumbersome apparatus, was carried over some of the roughest country in Australia. One station was a tent at Headquarters. Debris found by the wayside was used to fit up a cave for the second station, a dilapidated door being made use of as a table. Wireless was to be used for transmitting the result of the artillery action. After a very anxious time, in which difficulties, such as rain water coming and shortening the circuits in the cave, communication was made between the two stations, and success was achieved.

In mentioning the ardent enthusiasm of the wireless operators, one cannot refrain from putting on record the encouragement given by Captain Cox Taylor, Lieut.-Col. Wells, Captain Christian, and Major Rosenthal, the latter now being General Sir Charles Rosenthal.

Although that is but a few years ago, it seems a long distance when one studies the heavy apparatus of that time, such as the 6in. coil and other heavy gear, compared with the thermionic valves and other simple fitments of to-day, but one good result of those early experiences was the keen taking up of wireless by the Military Authorities and its general encouragement.

There was, however, one hindrance to experimenting, and that was a Wireless Act, which had been in operation since 1905, imposed a fine of £500 on unlicensed experimenters, and charged £3/3/- per year for those who desired to experiment. This so crippled wireless development, that, in 1909, this Wireless Institute was formed, and the speaker who had the honour to be its first Chairman had a motion carried by which the Postmaster-General reduced the license fee from £3/3/- to 10/6.

This encouragement gave rise to some remarkable achievements. Australia soon led the world in exploding mines and cannon by wireless in 1910 (*vide Melbourne Age,* 20/11/1910); in the transmission of pictures by wireless by Wilkinson in 1911, in exchanging messages between express trains in 1911 (*vide Evening News,* February, 1911), for showing how sound waves and wireless could be utilised for locating disturbances in 1911 (*vide Commonwealth Military Journal,* March, 1912), and in the control of airships by wireless, by Roberts, in 1912 (*vide Evening News,* 16/5/1912).

It is interesting to note that though these inventions were first exhibited in Australia on the dates mentioned, the older world claimed credit for their discovery some years later. For instance, communication between moving trains was not "discovered"

by the older world until four years afterwards, when it was chronicled that it had been achieved in America. The guidance of vessels by wireless waves had been demonstratd in Australia in 1912, yet it was reported in the Sydney *Sun* on August 28th, 1921, as having been "discovered" in America; whilst the transmission of pictures by wireless, achieved in Australia by Wilkinson in 1911, has been credited to Denmark in 1921.

Another invention which the writer was interested in, *viz.*, that of the Motorless Aeroplane, was first achieved in Australia in 1909, yet the same construction was last year utilised in Europe for the first time; an Australian paper, *The Melbourne Herald*, of October 19, 1921, stating: "Germany led the world; would Australia follow," whereas the design utilised in Germany was actually a copy of that made and flown in Australia thirteen years before.

With Naval and Military encouragement given to wireless in Australia, we find success being achieved until the Great War in 1914, when wireless came into a greater sphere of utility. It was regrettable, however, that wireless and other scientific pre-war achievements received little official encouragement; records that had been made many years before not being recognised by Military Authorities; in fact, the use of Tanks was not recognised until the War was well ahead, although it was an Australian invention of some years before, whilst sound and wireless waves that had been demonstrated in Australia as useful for sound-ranging were not made use of until the final years of the war. Even Gallipoli had been deemed before the War a useless place upon which a landing could be made; yet the pre-war official report to that effect was not brought to light until the war had been concluded.

The war, therefore, taught one great lesson, and that was to give increased attention to scientific development, so that the best use could be made of same for all purposes.

The lack of recognition of Australia's place in the world's scientific achievements, as in the ignoring of Hargrave in discovering the secret of human flight, was the incentive to the speaker to establish a Board to encourage Australian Invention, and in order that Australia could get widest recognition of her scientific achievements, Great Britain was visited, and success was obtained by winning the support of the British Science Guild to act as an Empire centre for encouraging invention. The Guild comprises the greatest of British scientists, and branches of it are now being established throughout the Empire.

The New South Wales section of the Board of Invention has had its rules and regulations remodelled, so that now it forms the New South Wales Section of the Guild. The Australian Section of the British Science Guild is encouraging inventions generally, and is linking up with various scientific bodies, in order that experimenters in these bodies should benefit by the funds that the Guild is collecting to encourage invention.

Already linked with it is a Branch dealing with Aerial Experiments, and it is hoped that the Wireless Institute will be affiliated with the Guild, in order that the money the Guild is collecting for experimental work can be at the services of wireless operators. The only fee to be paid for this linking up is a capitation fee of 1/- per member, members of the affiliated bodies having the right to apply for financial assistance to further their experimental work.

I put this before the Wireless Institute, as I recognise it as a great body that will link together the best of wireless enthusiasts, for wireless is in such a position to-day that it needs the keenest attention of a strong Institute such as this, to prevent the science being overdone. The wonders of wireless telephony have been so great that what may be termed a rush for "broadcasting" has set in. In America it became quite a craze, and the authorities were so rushed with applications that they issued them without the necessary restrictions, as to wave lengths and time, causing much "jamming."

In Great Britain, on the contrary, there was a considerable delay in the issue of licenses, both to "listeners-in" as well as to "transmitters." In fact, Great Britain was noting the mistakes that America was making and profiting by them. The speaker happened to be in Great Britain when sane conditions were being framed for regulating "broadcasting," and he is pleased to say that the Australian Government will shortly be ready to put into action what should be sensible regulations for "broadcasting," as a meeting is to be held in Melbourne towards the end of May for those interested in wireless, in order to discuss same.

The temporary delay may have its drawbacks, in that it may make many who have taken up wireless, somewhat impatient, and cause what might be called a "lack of interest," but those who have the science at heart, and who can look ahead and see its possibilities of pleasure and profit, can still wait a few weeks longer, in order that best conditions can be drawn up. In this respect the speaker is happy to report that practically all the firms in Australia connected with wireless have formed an Association for its best protection, and Australia will enter upon its "broadcasting" era, without any of the mistakes of older countries, and with every possibility of achieving something that older countries may be striving for.

The value of the linking together of wireless experts in the Wireless Institute is incalculable, for not only are all ardent experimenters in a science that is the greatest link between the natural and the etherial and with untold possibilities for human comfort and uplift, but in time of National stress the Institute means that Australia has at immediate hand a great band of experts whose apparatus could be used as relay stations, and so be of great National utility.

Note on the Care of Crystals.

In receiving outfits employing crystal detectors, the effective range depends a great deal upon the sensitivity of the crystal. Some crystals are naturally more sensitive than others, but even a sensitive crystal may be ruined by improper care. The action of the air on these crystals sometimes oxidizes their surface and prevents them from functioning properly, but a more serious trouble is caused by touching the surface of the crystal with the fingers. Where this has been done and the surface of the crystal is found to be less sensitive after continued use, it should be scraped lightly with a pen-knife.

Wireless Institute of Australia

N.S.W. Presidential Report

The following extracts are taken from the Presidential report furnished by the Vice-President (Mr. Basil Cooke) at the annual meeting of the Institute. The period covered is from September, 1922, to March, 1923.

OWING to the recent resignation of our President (Mr. C. P. Bartholomew), the presentation of the Annual Report has devolved upon me. I need hardly say that I greatly regret the necessity for Mr. Bartholomew's action.

The period covered by this report has been one of consolidation for the Institute.

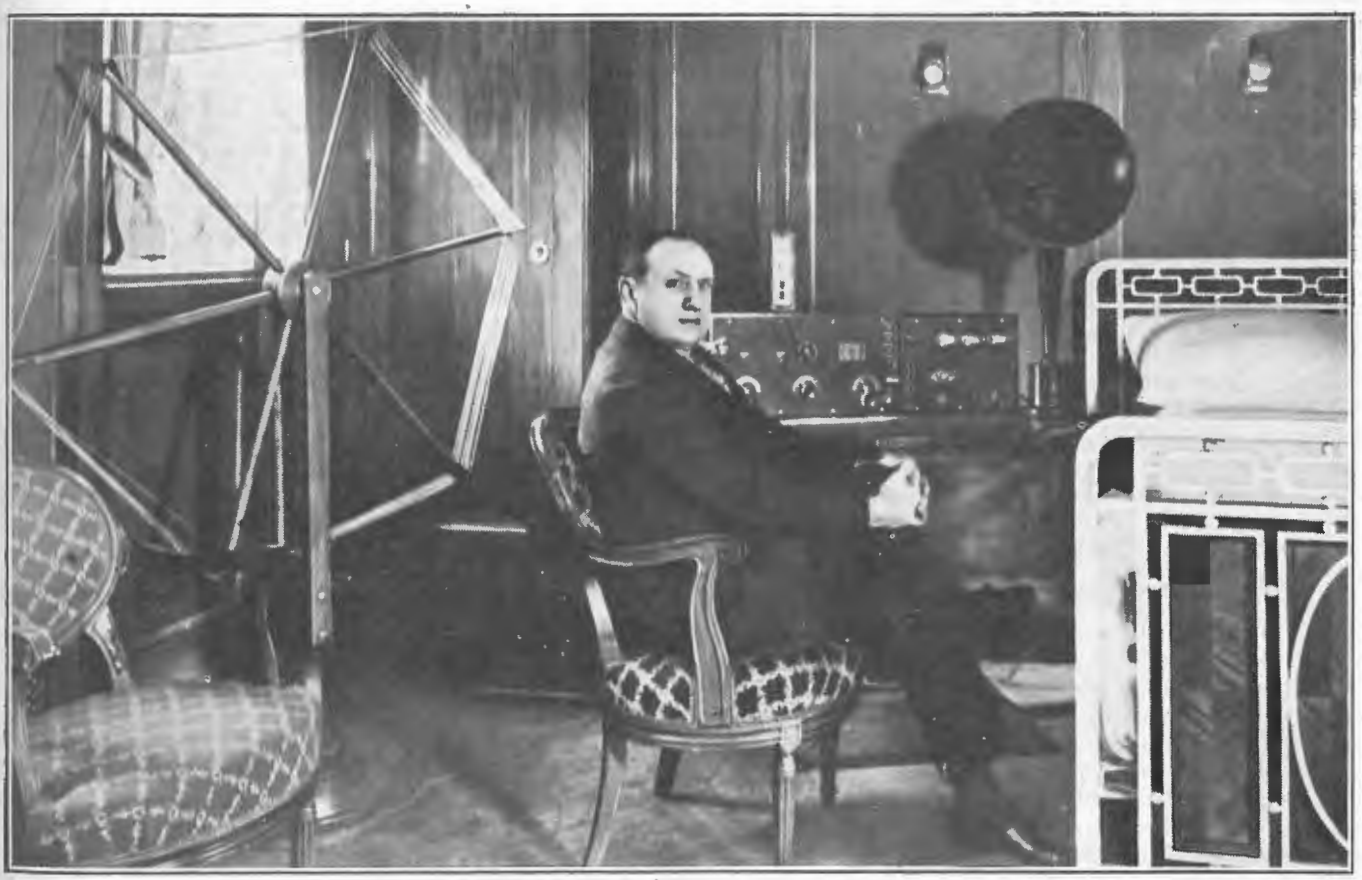
With the inception of the new Council, in September, 1922, came a feeling of security. Owing to the long absences of Mr. Fisk abroad (who was previously president) matters had been left largely to the discretion of the Honorary Secretary. However, the new Council indicated very clearly that they fully appreciated their responsibility in the election of their President (Mr. C. P. Bartholomew) and Vice-President (Mr. F. Basil Cooke); also by their regular attendance at all Council meetings.

The position of the Council, assuming office at a time when Institute affairs were at a low ebb, was not to be envied. Much publicity had been indulged in regarding the load of debt being carried by the Institute, and, as usual, such reports were greatly exaggerated.

Fortunately, the dictates of common sense influenced those governing the affairs of the Institute, and at the time of this report the indebtedness has been wiped out, and there is a credit balance at the Bank. In addition, it has been possible to raise the prestige of the Institute in such a way as to more than compensate for the trying times through which it has passed. It is now the premier radio society of the Commonwealth.

At the beginning of this period a definite move had been made by the N.S.W. Division of the Institute to co-ordinate the interests of the many radio societies which had recently sprung up around Sydney, but on account of the much-regretted illness of the Honorary Secretary all the negotiations had to be conducted second-hand, with the inevitable result that they were fruitless, and, unfortunately, provoked considerable bitter

(*Continued on page* 64.)



—"Wide World" Photo.

S. L. Rothafel, director of the New York Capitol Theatre, sitting in his state room on board the trans-atlantic liner "Berengaria," in which he had a complete radio receiving set installed.

The Experimenters' Corner

A Tuning Coil Wrinkle.

THE wire on a home-made tuning coil often comes loose owing to the expansion and contraction of the former, and the raking action of the slider. This, however, can be prevented. On the cardboard or wooden former put on a layer of adhesive friction tape in a spiral fashion with no overlap of the turns at the edges. When the wire is wound on this it will sink into the tape slightly, forming a groove or screw thread for itself, and when the tape becomes hard, as it will in time, the wire will be held firmly in place, and will not come loose.

An Alloy for Crystal Detectors.

For best results when using a crystal detector, the crystal should be

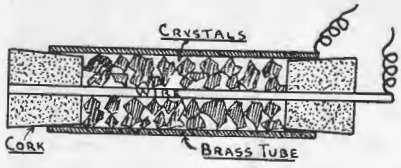


Figure A.

firmly mounted in its cup with a low temperature alloy. A suitable compound can be prepared as follows: Take a teaspoonful of mercury and in it dissolve as much tin foil as possible. Do not use lead foil. Work the mixture thoroughly in the fingers, and then in a small container, such as the lid of a tobacco tin; melt it over a small gas or alcohol flame. Pour it out into a paper mould, and break it up into small pieces containing sufficient material to mount one crystal. When needed, it melts at a very low temperature, and can then be poured into the crystal cup ready for mounting the crystal. Solder should under no circumstances, be used for this work, as the excessive heat injures the rectifying property of the crystal.

An Easily Adjusted Crystal Detector.

Obtain a piece of brass tubing about ¼in. diameter, and 1½in. long, and clean it inside and out with emery or fine sandpaper. In each end fit small corks which have been soaked in paraffin wax to increase their insulation, and through the corks pass a piece of No. 22 gauge bare copper wire. Now take a piece of the crystal which is to be used, and with a hammer break it up into small pieces, not over ⅛in. square. These must be poured into the tube and the ends sealed (see Fig. A.). Connect one wire from the radio set to the brass tube, and the other to the copper wire running through the centre of the tube. To adjust the detector tap it slightly on the outside while listening-in with the telephones.

The multiplicity of contacts makes it a very stable detector for working through strong static interference.

How to Make an Electrolytic Rectifier.

Experimenters living in the suburbs of cities and towns where alternating current is employed for lighting and power distribution, often require small quantities of direct current to charge storage batteries and do other odd jobs. With an alternating current at a pressure of 30 volts, it is possible with the rectifier described below to obtain currents of 3 to 3½ amperes for considerable periods of time, and where heavy currents up to six amperes are required, it is capable of supplying the load for short intervals. The first thing to build is the containing box, which should consist of material about ⅜in. thick, and have the following dimensions: 11in. x 7in. x 5in.

The boards at the end of the box should be cut down by about one inch to support the board which holds the plates. It should be 12in. long and 3in. wide, of ⅜in. material which has been soaked in hot paraffin wax. The containing jars are three ordinary one-pint fruit jars. Larger jars of one quart size may be used to allow of a larger quantity of electrolyte being used yith a consequent cooler operation. Four aluminium plates, 4½in. x 2in., with lugs 1½in. x ¾in., should be cut out from a sheet $\frac{1}{16}$in. thick. Then cut out three lead plates

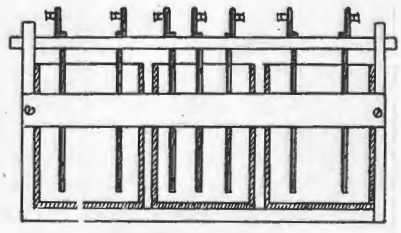


Figure B.

of the same size. After passing them through the slots bend them over, as shown (Fig. B), so that they do not fall down and short circuit during operation. Terminals for the A C and D C are fitted to the top board, and the plates wired up, as in Fig. C. The solution for the electrolytic rectifier is made as follows:—Fill the jars to within ¾in. of the top with clean water, and in it dissolve two teaspoonsful of ordinary baking soda (bi-carbonate of soda). When this is thoroughly dissolved pour in very slowly about half a fluid ounce of sulphuric acid. This will cause the solution to warm up considerably. It should be allowed to cool before being put in use.

This rectifier is very efficient, and makes use of both halves of the cycle.

A small battery ammeter mounted on the end of the box completes the outfit.

Soldering Radio Connections.

Everyone who has tinkered with a radio set has had experience with that most elusive trouble—the loose connection. Where many wires must be connected, some to other wires, some to binding posts of many kinds, the greatest care must be taken to see that every joint is tight, and, if possible, soldered.

A good electrical joint must first of all be strong enough to stand the strains of handling, etc., to which it will be subjected. When two wires are joined, they should always be twisted together for mechanical strength. A wire should be twisted around some part of a fixed terminal. Where a flat screw or nut is turned down on the wire, the latter should pass nearly around the screw, but not cross itself. This allows the screw or nut to seat itself evenly. If two or more wires are to be clamped under the same screw, a washer should be put between each wire, or the wires should be twisted together before being bent around the screw.

Avoid the kind of binding post through which a wire passes, and which clamps the wire under the tip of a screw.

The ideal connection, however, is one made on a flat metal lug, which has a notch in one or both sides, through which the wire is looped. This transmits a pull on the wire directly to the lug, and the solder is not strained. Solder is not a strong metal; a wire held by it alone can be pulled loose, and repeated bending will soon make it crystalize and give way.

Before starting to work with a soldering copper, file the tip of it to a smooth surface on all sides, then heat it, being careful to keep the tip in the flame. When heated in air, copper rapidly takes on a black coating of oxide. When hot enough to melt solder, give the tip a final rub with the file, then quickly rub it in a little sal-ammoniac powder or soldering paste, in which are a few drops of solder. The paste will dissolve the oxide on the copper, and the solder will amalgamate with the clean copper, just as water will wet a clean board, but not a greasy one.

The solder on the copper will now

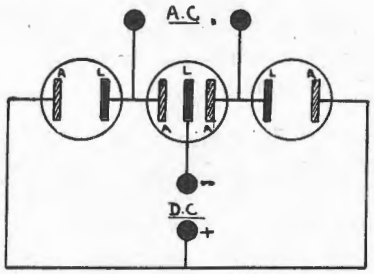


Figure C.

act as a ready means of carrying heat from the body of the copper to the work. This can easily be seen by touching a piece of cold solder first to the black surface of the copper; then to the tinned tip; it will melt more quickly on the bright surface.

The copper must be hot—not just enough to melt the solder, but hot enough to heat the parts so that the solder will adhere to them.

For all electrical work, where copper and brass are to be soldered, only resin should be used. Any paste or liquid will inevitably corrode the metals, and it is a difficult job to get all the paste off after the joint is made. For this reason, Western Electric installers use only resin-core solder wire. This is a tube of solder filled with resin, and no cleaning-up is necessary afterward.

Anything to be soldered must be "tinned," that is, covered with a coating of solder. If you use tinned copper wires, and if the lugs have been tinned by the manufacturer, you need not bother much about cleaning. If not, they must be scraped or sandpapered clean, then tinned. On heavy work, such as a lead to a ground rod, tin the parts before putting them together. An iron pipe may be tinned by scraping, heating, and applying sal-ammoniac and solder together. For copper and brass, you should use resin, usually in the form of resin-cored solder.

To connect a wire to a lug, loop the wire once only around the neck of the lug, heat the joint with the copper, and touch it with the solder. Only a drop is necessary. Take the copper quickly away and keep the wire motionless until the solder cools. If the solder is disturbed while the joint is cooling, it will crystalise, giving a dull surface and a weak joint. If you wrap the wire several times around a small lug, you will inevitably break the lug when you try to remove the wire.

Never tape up an unsoldered joint if you want it to be permanent. Many tapes contain sulphur in the rubber compound. This will form a film of copper sulphide which will work its way around all the wires and form a high resistance in the circuit. If any considerable current is carried, the joint will heat up and the sulphide will form all the faster. In radio antennas the minute voltage will not overcome a high-resistance joint. Solder, and be sure!

In Radio Land

Australian Experimenters on Their Mettle.

As the time for the commencement of the Trans-Pacific radio test draws near fresh interest is being evidenced in the ranks of experimenters.

The entries from N.S.W. total twenty-four, all of them highly proficient men, who are determined to show the world that Australian experimenters are second to none in the matter of constructing apparatus capable of receiving long distance low-power signals.

Individuals and firms commercially interested in radio have offered liberal encouragement by donating prizes to successful competitors, and there is little doubt that when the results are known more than one Australian experimenter will have covered himself with glory.

The American amateurs are sparing no trouble and expense in their preparations for transmitting the signals, and this, in itself, places an obligation upon Australian experimenters to leave no stone unturned to ensure efficient reception.

A distinction will attach to the winner, or winners, of this test which will, in itself, prove more than sufficient reward for any trouble or expense amateurs in Australia may incur. Apart from this the national aspect of the matter is of considerable moment, not to mention the benefit likely to be derived from an experimentation point of view.

This combination of circumstances invests the Trans-Pacific tests with an importance to Australian experimenters overshadowing any previous event in local radio circles. That they will rise to the occasion there is little doubt, and the whole world will await with interest the publication of the results which are expected to be available a couple of weeks after the tests conclude.

Radio Interests a Rich Man.

There is probably no more enthusiastic believer in the possibilities of radio telephony than Sir Thomas Lipton, the hero of so many exciting yachting contests.

Sir Thomas pays frequent visits to America, and greatly admires the Americans for their enterprise and initiative. He was one of those who made an early attempt to speak from America to England, but the voice failed to carry. Sir Thomas was not at all disheartened, but tried twice more, and again failed. Since then, as all the world knows, the task of speaking across the wide stretch of ocean separating the two countries has been accomplished.

Sir Thomas is intensely interested in the possibility of transmitting power by radio. He does not care to prophesy, but one can easily realise that in the back of his mind he is visualising a time when a race in which radio-driven motor boats will take part will attract wide attention. The great Lipton estate in England boasts several radio sets, and Sir Thomas is determined that wireless will play a part in the next international yacht race. Such is the progressive spirit of this millionaire gentleman who has been aptly described as the merchant prince of London.

Healing The Sick.

It is refreshing to know that radio has uses outside its commercial aspect. The average Australian does not realise the extent to which wireless telephony has invaded many avenues of life in America, nor the part it is playing in brightening the lives of many who would otherwise be condemned to a cheerless existence.

A patient in a Canadian Hospital who contracted consumption during the great war, speaks feelingly and enthusiastically of the immense benefit he has derived both from a mental and physical point of view, since a radio receiving set has been installed at his bedside.

"For the first year and a half of my confinement to the Hospital bed," said the patient recently, "I tried reading, and then bead and reed work to pass away the time, but gradually, as my strength failed, I lost all interest in these. I wanted something interesting and entertaining, and which imposed no mental or physical strain on my fast-failing constitution. That 'something' proved to be radio, and despite the scoffs of my friends and the hospital attendants I soon had an outfit installed at my bedside. It is no exaggeration to say that I have improved vastly since the mental strain of always thinking of my trouble has been banished by the soothing and entertaining musical programmes I have been able to hear. I am convinced that the time is not far distant when radio receiving sets will be installed in the majority of hospitals and sanatoriums."

"If readers should ever be called on to contribute to a fund for that purpose let them remember some of their own friends or loved ones may be amongst those cheered and entertained by the magic agency of radio telephony."

"POLICE RADIO"

A sound and convincing case for the application of radio to the business of aiding the police in locating and apprehending criminals is made out in an attractively compiled booklet, entitled: "Police Radio," issued by the Melbourne office of Amalgamated Wireless (Aust.), Ltd.

The equipment of the police patrol car in Melbourne with a radio receiving set is unquestionable evidence that the police authorities in Australia recognise the tremendous assistance they will receive by utilising this newest system of communication in tracking down evil-doers. As the booklet explains, the police authoritise all over the world are interesting themselves in radio telephony. Ever since the famous Crippen case in 1910, when that noted criminal and his associate, Miss Le Neve, were apprehended on the *Montrose* by officers of Scotland Yard, thanks to the use of wireless telegraphy, it has been considered inevitable that the police would sooner or later enlist radio as part of their every day equipment.

As a record of what has been accomplished to date, and a forecast of what may be done in the future, "Police Radio" is both interesting and valuable. It will help materially to educate the general public to a realisation of what radio telephony may accomplish in the near future, and it will likewise impress the police authorities with the wisdom of keeping right up to date in their criminal-catching methods.

SOCIAL GATHERING

An enjoyable outing, in the form of a launch picnic and gipsy tea, organised by the Wireless House Social Committee, took place on Thursday evening, April 12, and was liberally patronised by the Head Office Staff of Amalgamated Wireless Ltd.

A motor launch conveyed the excursionists to Rodd Island, where, after refreshments had been served, dancing and card games were indulged in to the enjoyment of all.

In welcoming those present the Chairman of the Social Committee (Mr. G. P. Atkinson) emphasised the pleasure the organisers felt at the success which had attended their initial effort. It was particularly gratifying to know that they had the support of the Company's responsible officers. The presence of Mr. and Mrs. Wilson, Mr. Larkins and Mr. Gardiner had put them all in good heart.

Mr. Perry, in supporting Mr. Atkinson's remarks, stressed the value of social gatherings as a means of enabling the staff to get to know and understand each other. He supported the chairman's welcome to those already mentioned.

Mr. Wilson, in expressing thanks for the kind remarks concerning Mrs. Wilson and himself, spoke of the need for making the most of opportunities for recreation which came all too seldom to the average person immersed in the cares of business life. He could not help expressing how fortunate he considered the Company was in having the services of such an excellent staff as Amalgamated Wireless possessed. He had frequently expressed similar sentiments to Mr. Fisk, prior to the latter's departure for London.

After a thoroughly enjoyable evening the party returned to the city at 11 p.m.

OUR FRONT COVER.

The six-year-old boy illustrated on the front cover of this issue is known as "Pedro"—otherwise Frank J. Powers, junr., son of a lawyer in Grand Rapids, Michigan, U.S.A. He is a radio enthusiast, and when photographed was listening to a lecture on motor cars, in which he is also intensely interested. He knows every make of car, from a Ford to a Rolls Royce, and is credited with being able to distinguish one from another a mile off.

ALL-AUSTRALIAN COMPETITION.

Some months ago *Sea, Land & Air* offered a prize of a gold presentation medal to the Australian competitor who records the best log of the messages sent from America during the test. Now that *Sea, Land & Air* is incorporated in *Radio*, it has been decided to extend the time for receiving entries for this competition to May 12. Every competitor who fills in the coupon printed below and returns same to the Editor of *Radio* not later than May 12 will have a chance of winning this handsome medal.

COUPON.

Editor, "Radio,"
97 Clarence Street, Sydney.

Dear Sir,—

I desire to enter for the competition you are holding in connection with the forthcoming trans-Pacific test, and agree to accept your award (based on the decision of the Central Committee in Melbourne) as final.

Name in full .....
Postal Address .....
.....

(*See page 65.*)

(*Continued from page* 59.)
feeling between the various societies. It is very gratifying that such feelings have now been replaced by a cordial fraternisation between the societies, and it is expected that the Radio Association of N.S.W., which has risen from the ashes of last year's negotiations, will soon have full support from all the societies, and it can be confidently expected that if the Association proves a success the Institute will be the first to tender its congratulations.

It might be here mentioned that during this period a few members have resigned from the Institute with the specific object of forming local societies in their own districts, and other members of the Institute have been successful in initiating local societies, whilst still preserving their identity with the Institute.

The annual subscriptions to the Institute have been increased during this period for two reasons, viz.: to preserve the dignity of the Institute, and in order that the subscriptions may be commensurate with the standard adopted.

One feature which deserves mention in this report, seeing that it was primarily responsible for bringing the Division through the dark days of 1922, is the loyalty of its members.

Throughout, they have not failed to look for the silver lining, and much credit must be given to our late President (Mr. C. P. Bartholomew) for his wise counsels when difficulties were encountered. If we can look to the future for progress, as we have progressed during the last seven months we have little to fear, and I have no doubt that it will be a very short time, indeed, until the Institute in New South Wales will be in regular wireless telephone communication with the Divisions in the other States of the Commonwealth.

In this regard it may be said that the N.S.W. Division keeps well in touch with the other Divisions, which are, at all times, whole-hearted in their co-operation in all matters of mutual interest. Indeed, the good fellowship between the respective Divisions leaves little to be desired. A very pleasing matter is the recent inception of a Divison of the Institute in Tasmania, where Mr. L. W. Scanlon has been successful in getting matters on to a satisfactory footing, and a strong following is assured. The establishment of the Tasmanian Division was first mooted in 1919, when Mr. P. Renshaw visited that State, but, unfortunately, the negotiations ended unsuccessfully, and it remained for Mr. H. R. Gregory to take this matter up seriously when in Tasmania early this year, when he had the good fortune to find such an enthusiastic wireless experimenter as Mr. Scanlon, who is now Honorary Secretary of that Division.

In Queensland there have been many changes, and now the Honorary Secretaryship is in the hands of Mr. W. Finney, a real enthusiast with a live station. Mr. Finney was the last President of that Division, and succeeds Mr. L. O. Kurlin, who has left Queensland. It will be remembered that Mr. S. V. Colville, who is now a full member of N.S.W. Division, was the inaugural Hon. Secretary in Queensland, and held the position for many years.

The Victorian Division has been very live indeed, and is looking well to the Institute's laurels in having undertaken the Trans-Pacific Tests, which promise to be epoch-making as far as experimental wireless is concerned. It is but fair to express our deep interest in the movement, and our appreciation of Mr. Kingsley Love's efforts to bring it to success. Mr. Steane, a member of the Victorian Division Council, recently visited Sydney, and was fortunately enabled to be present at the annual dinner given by this Division. Credit must be given to Mr. Maddick, Hon. Secretary in Melbourne, for the co-operation he extends at all times, and to the Victorian Division generally for their sincerity.

We can always look to South Australia for concerted action. Indeed, the South Australian Division has always loyally stood up for the rights of the Institute as a whole, and its attitude on many points, notably the reduction of license fees, is commendable. Mr. Clement E. Ames, the Hon. Secretary, is regularly in touch with this Division.

From the Far West the voice of the Institute is plainly heard, and we have been glad to note that the Western Australian Division has been upholding the traditions of the Institute by the quality of its lectures and its generally progressive activities. Very cordial relations exist between ourselves and the West and their keen interest in affairs way down east can always be confidently anticipated. Mr. A. E. Stevens, the Honorary Secretary, shows himself as seized with the importance of keeping in touch with New South Wales.

Now for a few words regarding the

Interstate position from our own viewpoint. Firstly, we are glad to know that all the Divisions are aware of the importance of having their proceedings recorded in the one Journal. "Radio" is the official organ, as it has incorporated *Sea, Land and Air,* and the feeling from the other States is appreciated.

This Division has set a very high standard, and it is confidently hoped that the other Divisions will carefully look to their position as the premier radio bodies in order that a high standard may be maintained. The opinion has freely been expressed in governing circles in Sydney that it would be a wise move for all the Divisions to follow our example and register under the Companies' Act in their respective States, in order that their constitutions become leagly binding and their liabilities limited.

It is expected that this Division will very shortly be in a position to erect and maintain a transmitting and receiving station under the terms of the license recently granted by the Controller of Wireless. Then we hope to be in direct communication with all the Divisions, even far-away Perth.

To indulge in a little retrospect, I must extend the sincere thanks of the Institute to those members and others who assisted in providing lectures, demonstrations, etc., during the period just ended. Specially would I mention the excellent demonstration and lecture on "Sound Ranging," given by Mr. Edgar Booth, M.C., B.Sc., at Sydney University, before our members, on February 1. Our special thanks are also extended to Mr. Newman for his endeavours to provide this Division with suitable headquarters at minimum cost. It is regretted that the negotiations have not been finally successful, though we have been indebted to him for arranging our accommodation at the Railway Institute up to date.

We regret that Mr. Jack Pike, one of Australia's oldest experimenters, has just resigned for domestic reasons, but hope he will be back with us before long.

The Division has been governed strictly in accordance with its Memorandum of Articles of Association up to the present, and I look forward to the future government of this Division on similar lines, as it is only by being constitutionally sincere that we can expect the support of our officers and members.

The future looks hopeful, and we anticipate great things from many of our members, especially Mr. E. T. Fisk, whose early return is now certain. I cannot conclude without congratulating him on his successful mission abroad, and trust he will long retain his interest in this Society, his many years as President having endeared him to many of us.

I must acknowledge the devotion of our Honorary Secretary (Mr. Phil Renshaw, and extend to him the Institute's warmest thanks. We are glad to congratulate him on his recovery from a recent illnesss.

To our Treasurer (Mr. Mingay) we must extend our appreciation of the good work he has done, and are glad to know he has successfully piloted us from debit to credit.

Mr. Charlesworth, who unselfishly filled the breach in Mr. Renshaw's absence, merits the warmest thanks of the Division and his good work on many occasions has been greatly appreciated.

TRANS-PACIFIC RADIO TESTS.

Prize List.

First six prizes to be given to entrants having the most complete log of signals received during the tests. Prizes donated by:—Western Electric Co., Ltd., open order, £10/10/-; Colville & Moore Wireless Supplies, open order, £5/5/-; Burgin Electric Co., open order, £5/5/-; Wireless Weekly, open order, £5/5/-; Australectric, Limited, open order, £5/5/-; Electricity House, open order, £5/5/-.

Four prizes for entrants having the most complete log of signals on the least number of valves. Separate heterodyne not counted as a valve. Prizes donated by:—W. Harry Wiles, open order, £5/5/-; Radio Company, open order, £3/3/-; Sydney Dynamo & Motor Works, open order, £3/3/-; Continental Radio & Electric Co., open order, £3/3/.

Two prizes for entrants who receive the greatest number of different American amateur stations. Prizes donated by:—F. E. O'Sullivan, open order, £2/2/-; Universal Electric Co., open order, £2/2/-.

Two prizes for the most complete log of entrant using a hard valve as a detector. Prizes donated by:—Radio House, open order, £1/1/-; Miss Wallace, open order, £1/1/-.

One prize for the most complete log of entrant using a soft valve as a detector. Prize donated by J. H. Dewis, open order, 10/-.

One prize for the most complete log of entrant using the most original circuit. Prize donated by Malcolm Perry, open order, £3/3/-.

Call Letters

This is the third list of call letters of Australian and New Zealand ship and land stations. In subsequent issues of "Radio" further lists will appear, all of which should be preserved so that readers will have a complete list of both local and overseas stations.—Ed.

M K A s.s. *Ruahine*
M K B s.s. *Ruapehu*
M K D s.s. *Palma*
M K K s.s. *Medic*
M K R s.s. *Beltana*
M K V s.s. *Remuera*
M M D s.s. *Malwa*
M M E s.s. *Mantua*
M M F s.s. *Morea*
M M L s.s. *Macedonia*
M O F s.s. *Orsova*
M O J s.s. *Orvieto*
M O S s.s. *Waimate*
M O Y s.s. *Osterley*
M Q C s.s. *Persic*
M R F s.s. *Hororata*
M R G s.s. *Opawa*
M R I s.s. *Whakatane*
M R M s.s. *Orari*
M R S s.s. *Kaikoura*
M R V s.s. *Waiwera*
M S B s.s. *Karamea*
M S E s.s. *Euripides*
M S O s.s. *Poona*
M U Z s.s. *Zealandic*
M V S s.s. *Sussex*
M W C s.s. *Runic*
M W E s.s. *Arawa*
M W F s.s. *Tainui*
M W I s.s. *Ionic*
M W N s.s. *Athenic*
M Y N s.s. *Tahiti*
N P G San Francisco Radio
N P L San Diego, California, Radio
N P M Honolulu Radio
N P M Pearl Harbour Radio
N P N Guam Radio
N P O Cavite Radio
N P P Peking Radio
N P U Tutuila Radio
P M C s.s. *Houtman*
V B B C s.s. *Canadian Traveller*
V G B F s.s. *Canadian Mariner*
V G B K s.s. *Canadian Sapper*
V G B M s.s. *Canadian Fisher*
V G B P s.s. *Canadian Victor*
V G B Q s.s. *Canadian Explorer*
V G B T s.s. *Canadian Forester*
V G B W s.s. *Canadian Skirmisher*
V G B X s.s. *Canadian Hunter*
V G B Y s.s. *Canadian Transporter*
V G B Z s.s. *Canadian Harvester*
V G D B s.s. *Canadian Winner*
V G D C s.s. *Canadian Highlander*
V G D F s.s. *Canadian Freighter*
V G D K s.s. *Canadian Scottish*
V G D T s.s. *Canadian Runner*
V G D Z s.s. *Canadian Rover*
V G J L s.s. *Canadian Cammander*
V G J T s.s. *Canadian Squatter*
V G J W s.s. *Canadian Coaster*
V G J X s.s. *Canadian Leader*
V G K M s.s. *Canadian Carrier*
V G L B s.s. *Canadian Observer*
V G L F s.s. *Canadian Otter*
V G L N s.s. *Canadian Pathfinder*
V G L Q s.s. *Canadian Engineer*
V G L S s.s. *Canadian Logger*
V G L T s.s. *Canadian English*
V G L X s.s. *Canadian Conqueror*
V G L Y s.s. *Canadian Challenger*
V G L Z s.s. *Canadian Constructor*
V G N B s.s. *Canadian Cruiser*
V G N C s.s. *Canadian Trapper*
V N P s.s. *Apolda*
V N W s.s. *Wonganella*
V P D Suva Radio
V P E Labasa Radio
V P F Taveuni Radio
V P K Cocos Radio
V P S Cape D'Aguilar Radio
V P W Singapore Radio
V P X Penang Radio
V Q A Jesselton Radio
V Q B Sandakan Radio
V Q K Ocean Island Radio
V Q L Savu Savu Radio
V S B Nukualofa Radio
V X A s.s. *Oonah*
V X B s.s. *Bambra*
V X C s.s. *Period*
V X D s.s. *Talawa*
V X E s.s. *Dilga*
V X F s.s. *Ashridge*
V X G s.s. *Enoggera*
V X H s.s. *Kooyong*
V X I s.s. *Iron Monarch*
V X J s.s. *Kooringa*
V X K s.s. *Iron Prince*
V X L s.s. *Moira*
V X M s.s. *Barwon*
V X N s.s. *Ooma*
V X O s.s. *Corio*
V X P s.s. *Dromana*
V X Q s.s. *Rona*

BOOK REVIEW.

"Mast and Aerial Construction for Amateurs." — By F. J. Ainsley, A.M.I.C.E. 82 VI. p.p. The Wireless Press, Sydney. (Price, 10s. 6d.)

ONE of the chief problems confronting the amateur fitting a wireless set is the provision of an aerial. A good, well-elevated aerial is a good investment, as with it satisfactory results can be obtained with simpler and less expensive receiving apparatus. Judging from the type of aerial one usually sees in suburban back gardens, this little book should meet a definite need.

The subject matter is divided into eight chapters. Chapters one and two provide general information regarding types of masts and materials. The succeeding chapters are devoted to detailed instructions for the building of various types of masts. These masts include scaffold pole masts, plank masts, stayed lattice masts, self-supporting lattice towers and tubular steel masts.

The final chapter describes aerial systems suitable for small receiving installations, and gives much useful information on roof atttachments, leading-in and soldering. The last few pages contain useful hints on frame aerials.

Considering the small size of the masts under consideration, it is doubtful whether, from a cost point of view, any other type but the scaffold pole is justified. On the other hand, the amateur is not wholly influenced by reasons of first cost in regard to a hobby, and the designs would provide much interesting work.

Generally the information in this attractive little volume appears to be accurate. The ultimate strength of yellow deal, given on page 13, appears to be lower than usually assumed by engineers, while on page 18, by an obvious slip, the breaking strain of iron wire is given as 55 lbs. per square inch.

The book is well printed, and contains 65 clear and useful drawings. It is confidently recommended to all amateurs seeking information on the subject.

Movements of Wireless Officers

Mr. E. J. Webb, transferred from s.s *Period* to s.s. *Hobart*, at Melbourne on 13th April.

Mr. R. S. Bastin, transferred from s.s. *Warspray* to s.s. *Wear*, at Melbourne.

Mr. G. Illingworth, who was relieved on s.s. *Marama* by Mr. L. R. Dickson, joined the s.s. *Kaiwarra* at Auckland.

Mr. W. A. Hawkins, transferred from s.s. *Navua* to s.s. *Tofua*, at Auckland, on 29th March.

Messrs. E. I. Hyde and O. S. Kelly, signed off s.s. *Changsha*, at Sydney, on 9th April, and are now on home port leave.

Mr. R. Jordan, late operator on the ill-fated s.s. *Mindini*, joined s.s. *Melusia*, at Sydney, on 12th April.

Messrs. R. L. Beatty and P. Whelan joined s.s. *Eastern*, at Sydney, on 12th April, as second and third operators respectively.

Mr. J. A. Guy joined s.s. *Iron Prince*, at Newcastle, on 10th April.

Mr. J. D. Wood joined s.s. *Echuca*, at Sydney, on 9th April.

Mr. J. W. McKay signed off s.s. *Macedon*, at Newcastle.

Mr. E. F. Hayes signed off s.s. *Cycle*, at Newcastle, on 12th April.

Mr. L. A. Paul signed off s.s. *Aeon*, at Newcastle, on 12th April.

Mr. W. S. Ringrose signed off s.s. *Hexham*, at Newcastle, on 14th April.

Mr. J. G. Henderson re-joined s.s. *Flora*, at Auckland, on 6th April.

Mr. G. H. Hugman signed off s.s. *Bombala*, at Melbourne, and returned to Sydney.

Messrs. H. W. Barnfield, E. I. Hyde and H. A. Stiepwich joined s.s. *Carina* at Sydney on April 20 as 1st, 2nd and 3rd operators respectively.

Mr. M. A. Stuart relieved Mr. C. J. Lilley on s.s. *War Spray* at Newcastle on April 20.

Mr. G. Maxwell signed off s.s. *Yankalilla* at Sydney on April 16.

Messrs. F. M. Basden and J. I. Carew joined s.s. *Gascoyne* at Falmouth on December 23, 1922, as assistant operators.

Mr. W. J. Peell signed on s.s. *Iron Baron* at Newcastle on April 21.

Mr. A. V. Middleton joined s.s. *Urilla* at Sydney on April 20.

Note on Filament Regulation.

As a general rule most experimenters are tempted to have the filaments of valves burn too brightly. The proper brilliancy is the lowest one at which signals are good. Increasing the filament current beyond this point does not increase the signal strength, but does lessen the life of the valves considerably. A good general rule to follow is that of keeping the filament temperature as low as possible, consistent with good reception.

Moreover, certain types of valves operate at very low filament temperatures. It is, therefore, best for the novice to follow closely the directions furnished with each valve receiver.

How to Keep the Wireless Ground Damp.

Experimenters who live in districts where the ground is of such a nature that the surface moisture drains off very readily and leaves the earth connection from the radio set, making a poor connection, will welcome the following idea whereby a damp ground can always be maintained.

Obtain a piece of galvanised iron water piping, and after scraping clean of any paint or rust, drive it into the earth for a distance of about three feet. Over this pipe place an old pail —through the bottom of which the pipe projects—using a pie-dish or other piece of metal for a cover. Every morning and evening fill the pail with water. This will be absorbed by the surrounding earth, thereby lowering its resistance to the radio currents.

Question (J.F.B., Neutral Bay): My receiver will not oscillate on wave lengths under 600 m., and I am puzzled to know why.

Answer: Probably the reaction coil is not large enough to set up oscillation on low wave lengths. We suggest you add a few more turns.

Low Power Tests

Victorian Amateur's Performance

Although it is only a few months since the Melbourne experimenters commenced transmission in earnest, some almost record breaking results have already been obtained. Now that the winter months are approaching, it is expected that even greater distances on reduced power will be achieved.

A series of tests with C.W. on a wave length of 400 metres was organised by Mr. R. A. Hull with Mr. W. T. Watkins of Hobart, Tasmania, seven stations in all taking part in the tests.

Each station was to have been limited to five watts plate input, but as some of the stations showed hardly any radiation on that input, it was decided to extend the power to eight watts. As some of the inputs were not measured at all, it was not definitely known what the plate inputs were, but they were probably not more than 12 watts. However, Mr. Newman's plate input was measured accurately on standard meters, and on one occasion was as low as 3.8 watts, the highest reading being 4.4 watts. On this plate input his radiation was 600 milliamps with a tuned counterpoise. The radiation of the other stations varied from 400 to 800 milliamps.

So as to make the tests of a more official nature, each station was allotted a four-letter code word which was used in place of the call letters of the station, so that the receiving operator did not know what was transmitting. In addition, each station sent a sentence of ten words which was different for each night's transmission.

STAN—SURE—3 A M—Mr. G. S. Dohrmann and Mr. Dixon.
GOAT—GAME—3 B D—Mr. E. H. Cox.
JUMP—EAST—3 B M—Mr. H. K. Love.
LONG—BEER—3 B Q—Mr. W. F. M. Howden.
HIGH—DIAL—3 B Y—Mr. H. Holst.
FORD—WORD—3 J U—Mr. R. A. Hull.
MORE—MOON—3 M C—Mr. S. M. Newman.

The tests commenced at the conclusion of the ocean forecast transmitted by the Melbourne Radio Station at 9 o'clock, and each station continued its transmission for exactly ten minutes.

The results of these tests were very satisfactory, all seven stations being heard in Hobart, and at least four had their ten-word sentence copied correctly.

Although no telephony was arranged for in the tests, Mr. Watkins and several other amateurs copied some of the telephone conversation between 3BY, 3JU, and 3MC before and after the tests on several occasions. This is now almost a nightly occurence in spite of the fact that the operators in Hobart are only using single valve receivers.

Although the tests were intended for Hobart, Mr. C. D. Maclurcan and Mr. J. H. A. Pike, both of Sydney, also heard the C.W. test signals and were successful in copying the whole sentence of Mr. Newman's transmission and heard the code words of four other stations.

Encouraged by the success of the Hobart tests, the seven stations concerned arranged for a similar test with Sydney, Adelaide and Hobart amateurs, on much the same lines as the Tasmanian tests, except that each station finished up with a few "Hullo's" on telephony.

These tests were even more successful, as not only were the C.W. signals copied in all three cities, but faint speech was also heard, and it is reasonable to suppose that good speech would have been received had the receiving stations used a stage of high frequency amplification.

The outstanding feature of the tests was that Mr. Newman (3MC—"MORE" in the first test and "MOON" in the second) was only using an ordinary Marconi-Osram receiving R type Valve with 550 volts on the plate, the plate current being 7-8 milliamps, which is about 3.8-4.4 watts. This is less than half the power of any other station. In spite of this, Mr. Newman's signals were received equal in strength to the other stations at Hobart (360 miles) and much stronger at Sydney (460 miles); even stronger signals were received at Adelaide (400 miles). Mr. Snoswell of Adelaide reports that "MOON'S" C.W. could be heard 8-10 feet from the Receivers.

This is possibly accounted for by the directional effect of the inverted L Aerial which Mr. Newman uses, the maximum radiation being towards the west and minimum to the south.

Radiofun

At considerable expense we have made exclusive arrangements for the publication of "Radio Ralf's" adventures, which is one of our regular features. Hereunder is one of Ralf's adventures, and in subsequent issues of "Radio" his many thrilling experiences will be recorded, which we believe our readers will enjoy.—Ed.

RADIO RALF AND HIS FRIENDS---

By Jack Wilson

Beat This One.

Two hard-boiled Hams were discussing wireless, whilst a novice stood by listening to the pearls of wisdom that fell from their lips.

First Hard-boiled Ham: "Well, thank the Lord, I've got rid of that body capacity I used to suffer from."

Second Hard-boiled Ham: "That's good. It used to trouble me a lot, but I got rid of it, too."

"Novice: "My goodness, I never heard of that complaint before. I guess it's some new radio disease. What did you fellows take to get rid of it?"

Wonders of Radio.

Come, for the night is falling,
And my set is tuned so fine
It will pick up a peal of thunder
Or the red ant's plaintive whine.

Come! And sit close beside me,
My headphone's made for two;
It will be a night of rare delight
With the world's wild sounds—and you!

The Reception Was Mushy.

A society note headed the local column in a country newspaper as follows:

"Mr. Reo Statt was host at a party in honour of his fiancee, Miss Milly Henry."

Suppose a large number of guests were invited to metre.

Our Set Often Does That.

Mat (reading): "The radio waves are sent out at vibrations as high as 1,000,000 a second, which would carry them around the earth six times in a second."

Pat: "Be gorry! It won't be long before they'll be receivin' thim before they start."

Club Notes & News

WIRELESS INSTITUTE OF AUSTRALIA

New South Wales Division.

The next General meeting of the N.S.W. Division, to be held in the Education Building Lecture Hall, Loftus and Bridge Streets, Sydney, on Thursday, May 10th, at 8 p.m., will be an All-Clubs' Night.

A special lecture, entitled: "The Co-Relation of Different Forms of Energy," will be delivered by Mr. Alec. Hector, manager of Messrs. Burroughs, Welcome & Co., who is an eminent physicist.

All clubs and societies are specially invited to attend in full strength, and should any club or society not have been notified they are asked to take this as a direct invitation to be present.

All experimenters are also invited to attend, but it will be necessary for those not attached to a Club or Society to obtain a card from Mr. Phil Renshaw, Honorary Secretary, 3rd Floor, 85 Pitt Street, Sydney.

It is desired to make this gathering a truly representative one, and all interested are specially requested to be present.

South Australian Division.

The April meeting of the above Division of the Institute was well attended, and members present had the pleasure of hearing an excellent lecture on "Automatic Transmission at High Speeds, by Mr. Milne.

The lecturer explained the circuits and methods of using valve receivers capable of receiving 1,500 words a minute. He exhibited a number of circuits and detailed their functioning in such a clear manner that all present were able to thoroughly grasp the explanations.

In conveying the thanks of all present to Mr. Milne, the President (Mr. Hambly Clark) mentioned that he had consented to deliver a further lecture on the "Creed System" at the next meeting. A tape reading machine and other apparatus provided by Mr. R. B. Caldwell would enable a demonstration to be given at that meeting.

The President further announced that in view of the large number of new members who were joining up the Executive Council had decided to form the Society into two divisions. One will consist of a junior, or associate division, with advancement after a suitable examination to the senior or full member division.

It is hoped to have this scheme working shortly, and it will undoubtedly prove of great benefit to the younger and less experienced members.

A committee has been formed to make preliminary arrangements for a social meeting and demonstration, with the object of promoting a more sociable spirit, and bringing the members closer together.

Box Hill Radio Club.

The President (Mr. Howden) took the chair at the regular meeting of the above Club, at which there was an excellent attendance.

The Secretary gave an interesting lecture on "Wireless Construction For Beginners," in the course of which he outlined several suitable circuits, and gave details of construction. The Club transmitting license has been applied for, and as soon as granted the set will be assembled and put into working order. It will be only 5 watt at first, but will later be increased to 25. The receiver will be the 3-valve type.

At the next meeting, Mr. Love, Chairman of the Trans Pacific Test Committee, will lecture on the forthcoming tests, which are arousing a lot of interest amongst members. At a later meeting Mr. Howden will lecture on the construction of sets suitable for Short Wave work.

All enquiries relative to the Club's activities should be addressed to the Hon. Secretary (Mr. H. Hurst), No. 3 Wellington Road, Box Hill (Vic.).

Manly and District Radio Club.

An interesting lecture on "Aerials" was delivered by Mr. F. C. Swinburne at the third meeting of the above Club, held in the Manly Literary Institute. The keenness of those present to gain information was evidenced by the number of questions asked, and in order that those interested might gain a better knowledge of the subject, the lecturer illustrated his remarks by blackboard diagrams wherever possible.

The Club has now come to a satisfactory arrangement with the Committee of the Literary Institute regarding accommodation, and an aerial 150 feet long by 50 feet high will shortly be erected in the Institute grounds.

It is also proposed to hold a number of social entertainments on a big scale in the near future, and the Committee have every expectation of being able to educate the Manly public to the value of radio telephony as a medium of entertainment at an early date.

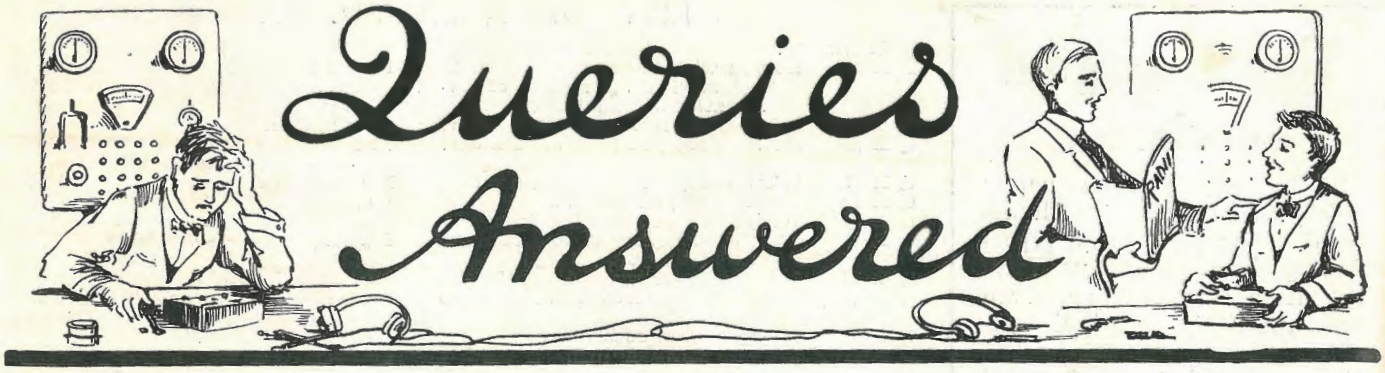
The Club meetings are held each second Monday night in the Literary Institute, and buzzer classes every Wednesday night. New members and visitors are always welcome.

LIST OF ABBREVIATIONS

Abbreviation.	Question.	Answer or Advice.
P R B	Do you wish to communicate with my station by means of International Signal Code?	I wish to communicate with your station by means of the International Signal Code.
Q R A	What is the name of your station?	This station is ———.
Q R B	How far are you from my station?	The distance between our stations is ——— nautical miles.
Q R C	What are your true bearings?	My true bearings are ——— degrees.
Q R D	Where are you bound?	I am bound for ———.
Q R F	Where are you coming from?	I am coming from ———.
Q R G	To what company or line of navigation do you belong?	I belong to ———.
Q R H	What is your wave length?	My wave length is ——— metres.
Q R J	How many words have you to transmit?	I have ——— words to transmit.
Q R K	How are you receiving?	I am receiving well.
Q R L	Are you receiving badly? Shall I transmit . . . — . 20 times for you to adjust your apparatus?	I am receiving badly. Transmit . . . — . 20 times for me.
Q R M	Are you being interfered with?	I am being interfered with.
Q R N	Are the atmospherics very strong?	The atmospherics are very strong.
Q R O	Shall I increase my power?	Increase your power.
Q R P	Shall I decrease my power?	Decrease your power.
Q R Q	Shall I transmit faster?	Transmit faster.
Q R S	Shall I transmit slower?	Transmit slower.
Q R T	Shall I stop transmitting?	Stop transmitting.
Q R U	Have you anything for me?	I have nothing for you.
Q R V	Are you ready?	I am ready. All is in order.
Q R W	Are you busy?	I am busy with another station (or with ———). Please do not interrupt.
Q R X	Shall I stand by?	Stand by. I will call you at ——— o'clock (or when required).
Q R Y	What is my turn?	Your turn is No. ———.
Q R Z	Are my signals weak?	Your signals are weak.
Q S A	Are my signals strong?	Your signals are strong.
Q S B	Is my tone bad? / Is my spark bad?	The tone is bad. / The spark is bad.
Q S C	Is my spacing bad?	Your spacing is bad.
Q S D	Let us compare watches. My time is ——. What is your time?	The time is ———.
Q S F	Are the radiotelegrams to be transmitted alternately or in series?	The radiotelegrams are to be transmitted alternately.
Q S G	———	The transmission will be in series of 5 radiotelegrams.
Q S H	———	The transmission will be in series of 10 radiotelegrams.
Q S J	What is the rate per word to ——?	The rate per word is ———.
Q S K	Is the last radiotelegram cancelled?	The last radiotelegram is cancelled.
Q S L	Have you got the receipt?	Please give a receipt.
Q S M	What is your true course?	My true course is ——— degrees.
Q S N	Are you communicating with land?	I am not communicating with land.
Q S O	Are you in communication with another station (or with ——)?	I am in communication with ——— (through the medium of ———).
Q S P	Shall I signal to —— that you are calling him?	Inform ——— that I am calling him.
Q S Q	Am I being called by ——?	You are being called by ———.
Q S R	Will you despatch the radiotelegram?	I will forward the radiotelegram.
Q S T	Have you received a general call?	I have received a general call for all stations.
Q S U	Please call me when you have finished (or at —— o'clock)?	I will call you when I have finished.
Q S V	Is public correspondence engaged?	Public correspondence is engaged. Please do not interrupt.
Q S W	Must I increase the frequency of my spark?	Increase the frequency of your spark.
Q S X	Must I diminish the frequency of my spark?	Diminsh the frequency of your spark.
Q S Y	Shall I transmit with a wave-length of —— metres?	Let us transfer to the wave length of ——— metres.
Q S Z	———	Transmit each word twice. I have difficulty in receiving your signals.
Q T A	———	Transmit each radiotelegram twice. I have difficulty in receiving your signals; or, Repeat the radiotelegram you have just sent. Reception doubtful.
Q T C	Have you any traffic to transmit to me?	I have traffic to transmit to you.

In addition to these signals, which, it will be observed, are uniform in construction, the following signals of the Interational Telegraph Code may be used in these communications:

. . — — . . Repeat sign (as well as mark of interrogation).
. . . — . Understood.
. — . . . Wait.



J. C. M. (Gretna, Tas.) asks: (1) What time does VPW work at night? (2) Does VIM work with VMR at 10 p.m. daily?

Answer: (1) V P W (Singapore Radio) is open continuously for commercial traffic, and has no fixed time for working, but being a very busy station, is heard here frequently every night on 600 metres. (2) No.

R. A. (Brighton) asks: (1) The construction of radio frequency transformers for all wave lengths used in Australia. (2) Can he use these without a condenser across the primary? (3) The circuit using 1 valve R.F. crystal detector, passing the current back through the valve and amplifying at audio frequency.

Answer: A full description covering the design and construction of radio frequency transformers for all waves between 200 and 30,000 metres will appear shortly in this journal, and in the same article reflex amplification using valves and crystals will be discussed more fully than could be done here.

F. N. (Oakleigh, Vic.) asks: (1) The number of turns required for slab coils to be used as primary, secondary and reactance used in conjunction with the following variable condensers: P .001, Ser-Par, S .0005, Par and 5 plate in Par with reactance, to tune between 1,500 and 25,000 metres. (2) Is the number of turns on honeycomb and slab coils for the same wave length identical? (3) The windings for air core HF transformers for use on 150-25,000 metres?

Answer: (1) Slab inductances wound with No. 30 D. S. C. wire, having an internal diameter of 2in. should have the following number of turns:

P = 1,000 turns.
S = 1,500 turns.
R = 1,250 turns.

(2) Yes.

(3) Windings as follows:

Range Metres.	Turns on 1½in. former.
150-450	50
500-1,500	150
1,000-3,000	320
2,500-7,500	650
5,000-15,000	1,250
10,000-30,000	2,500

An article dealing with the construction and application of radio transformers will appear shortly in this magazine.

K. L. W. (Willoughby) asks what minimum and maximum wave lengths he would get using a double slide tuning coil 2½" deep, wound with 100 turns of 24 D.C.C. wire and a variable condenser having 11 plates (six movable and five fixed), with a diameter of 3in. (large), and 2½in. (small).

Answer: Your coil possesses an inductance of approximately 400 microhenries, and assuming an aerial of 0.0003 microfarads, this, in conjunction with your condenser of approximately O .0002 mf. would give a wave range between 500-900 metres, using a series and parallel connection for the latter.

C. W. H. (Ravensworth): As you did not enclose a sample of the wire, as stated in your letter, we cannot reply to your questions.

Poldhu (Arncliffe, N.S.W.) asks: (1) For a formula for finding inductance of the primary and secondary coils of a loose or vario coupler given winding length and diameter of coils? (2) A formula for calculating wave length for the above coils (maximum and minimum). (3) A formula for finding variations of wave length, due to the variation of angle of rotor and primary?

Answer: (1) The inductance of any single layer coil is calculated as follows $L \text{ cms} = \frac{(Pi\ D\ N)^2}{B} \times K$

D = diameter in cms.
N = total number of turns.
B = length of coil in cms.
K = factor given below, which depends on the rate of diameter to length.

Note: One microhenry = 1,000 cms of inductance.

D/B	0	0.1	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
K	1.0	0.96	0.82	0.69	0.60	0.53	0.47	0.43	0.39	0.37	0.34	0.32

A graph prepared from these figures will give intermediate values by interpolation.

(2) The wave length of a coil is a function of its inductance and the capacity connected across its terminals. With the inductance expressed in microhenries and the capacity in microfarads the wave length bears the following relation: $W\ L = 1885 \sqrt{L.\ C}$

(3) There is no simple formula whereby this variation can be calculated in the case of a variocoupler. Each case would have to be dealt with individually, taking into account the respective capacities and the load impedance of the secondary.

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