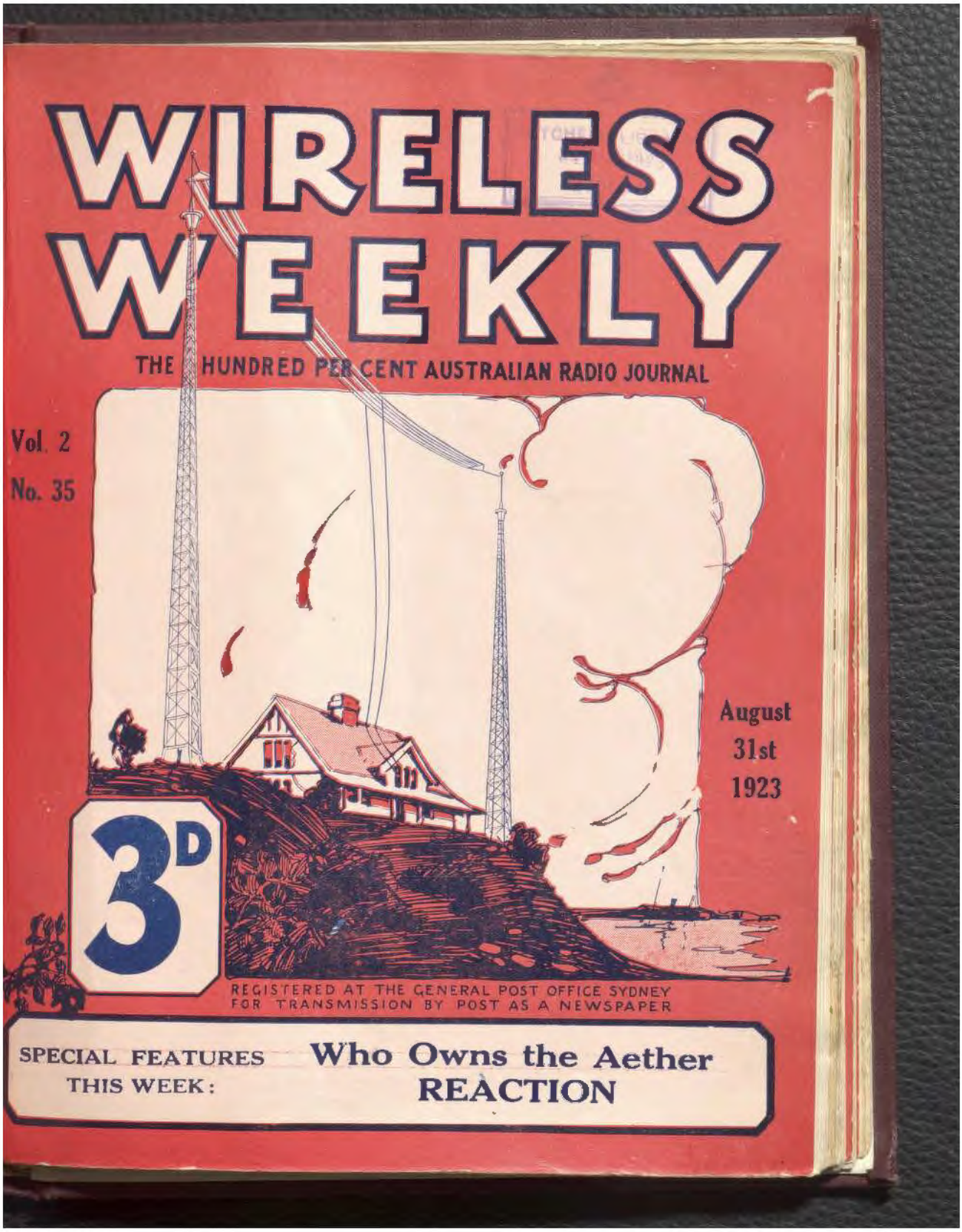
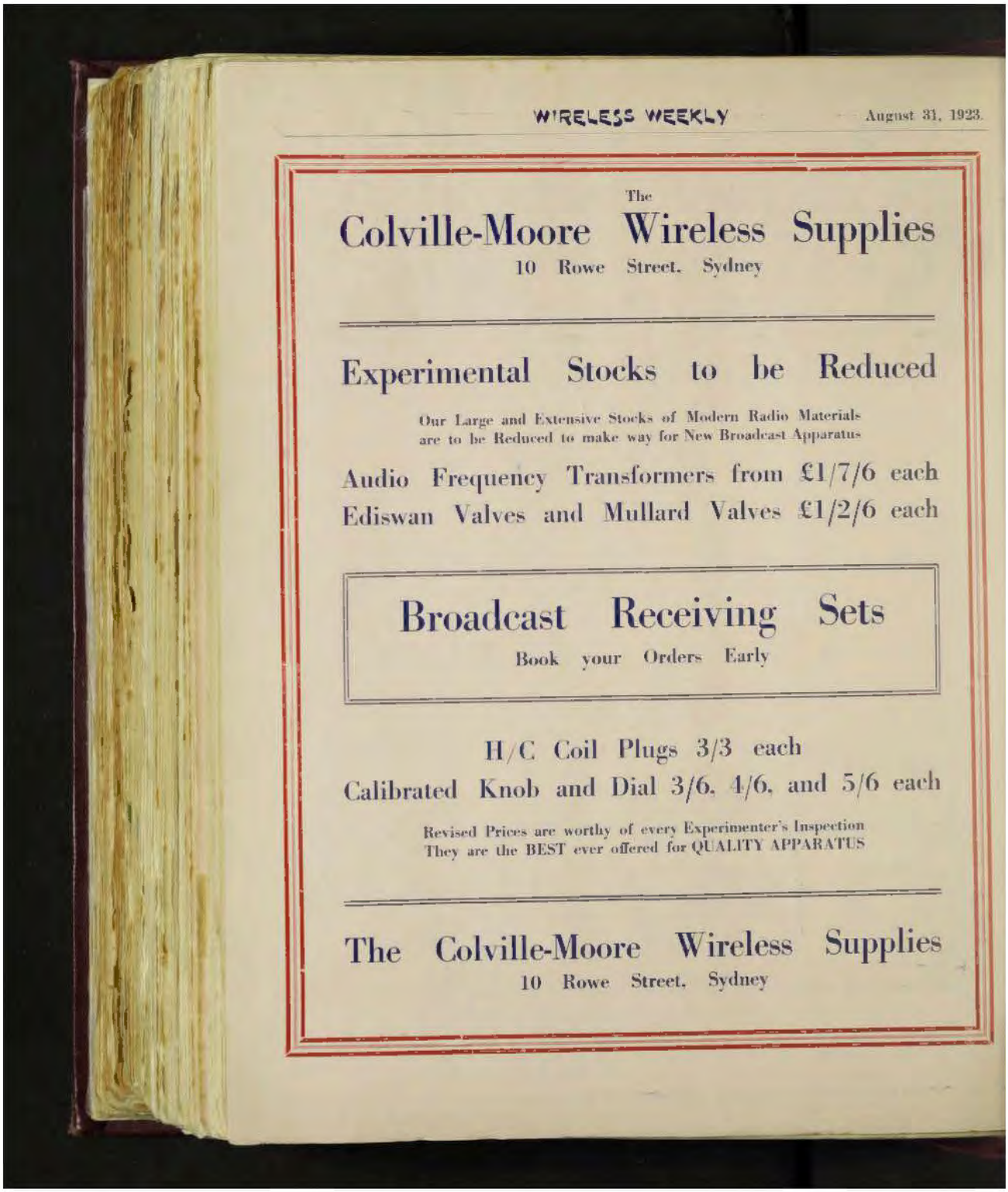




THE WIRELESS WEEKLY

A Journal Devoted to the Interests of Wireless Enthusiasts both Amateur and Professional

OFFICIAL ORGAN OF THE AUSTRALASIAN RADIO RELAY LEAGUE.

Vol. 2. August 24, 1923. No. 35

WHO OWNS THE AETHER?

At the recent Wireless Conference the Postmaster General stated that the Government controlled the Land, the Sea, and was then about to issue regulations to control the Air. These regulations came into force on August 1.

There seems to be some doubt just now as to whether the Government has the right to issue a license to use the air, in other words, to use a wireless set. This has been brought about by the circulation of a form called License No. 4, and is an agreement between Messrs. Amalgamated Wireless Ltd. and the experimenter to use certain patents. A fee of 5/- is requested for this right.

CAN THIS LICENSE No. 4 BE ENFORCED?

We are emphatic in our opinion that it can not, provided that the experimenter builds his set and uses it for experiments only. Who can say he does not?

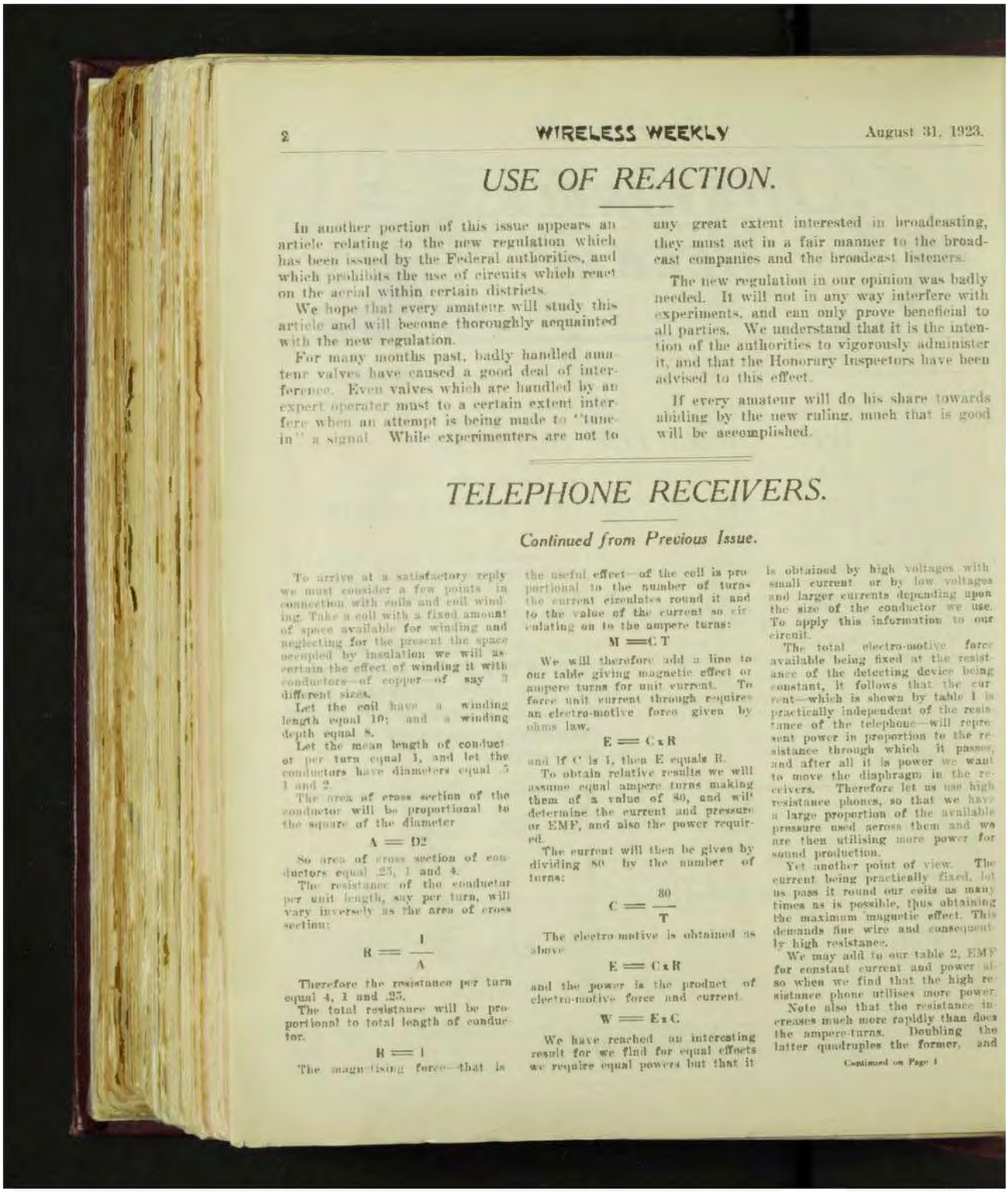
WERE THE GOVERNMENT MEMBERS SITTING ON THE BOARD OF DIRECTORS WHEN THIS UNPRECEDENTAL DOCUMENT WAS SUBMITTED? IF NOT, IS THE GOVERNMENT GOING TO SIT TIGHT AND TAKE NO ACTION?

Roster for Week ending 5th Sept., 1923

	7.30 to 8.0	8.0 to 8.30	8.30 to 9.0	9.0 to 9.30	9.30 to 10
Thursday, 30	2 GR	2 KC	2 CI	2 UW	2 FA
Friday, 31....	2 WV	2 WV	2 UW	2 CI	2 CI
Saturday, 1 ..	2 GR	2 DS	2 GR	2 UW	2 FA
Sunday, 2 ...	7 to 8 2 GR		8 to 9 2 KC		9 to 10
Monday, 3 ...	2 CI	2 GR	2 WV	2 WV	2 FA
Tuesday, 4 ..	2 GR	2 CI	2 FA	2 UW	
Wednes., 5 ...	2 GR	2 WV	2 UW	2 FA	2CI

Vacant times may be booked by Transmitters by ringing Red. 732 between 9 a.m. and 5.30 p.m. daily

or by calling 2 HP by Radiophone between 7.0 and 7.30 p.m. every evening.



USE OF REACTION.

In another portion of this issue appears an article relating to the new regulation which has been issued by the Federal authorities, and which prohibits the use of circuits which react on the aerial within certain districts.

We hope that every amateur will study this article and will become thoroughly acquainted with the new regulation.

For many months past, badly handled amateur valves have caused a good deal of interference. Even valves which are handled by an expert operater must to a certain extent interfere when an attempt is being made to "tune-in" a signal. While experimenters are not to any great extent interested in broadcasting, they must act in a fair manner to the broadcast companies and the broadcast listeners.

The new regulation in our opinion was badly needed. It will not in any way interfere with experiments, and can only prove beneficial to all parties. We understand that it is the intention of the authorities to vigorously administer it, and that the Honorary Inspectors have been advised to this effect.

If every amateur will do his share towards abiding by the new ruling, much that is good will be accomplished.

TELEPHONE RECEIVERS.

Continued from Previous Issue.

To arrive at a satisfactory reply we must consider a few points in connection with coils and coil winding. Take a coil with a fixed amount of space available for winding and neglecting for the present the space occupied by insulation we will ascertain the effect of winding it with conductors—of copper—of say 3 different sizes.

Let the coil have a winding length equal 10; and a winding depth equal 8.

Let the mean length of conductor per turn equal 1, and let the conductors have diameters equal .5 1 and 2.

The area of cross section of the conductor will be proportional to the square of the diameter

$$A = D2$$

So area of cross section of conductors equal .25, 1 and 4.

The resistance of the conductor per unit length, say per turn, will vary inversely as the area of cross section:

$$R = \frac{1}{A}$$

Therefore the resistance per turn equal 4, 1 and .25.

The total resistance will be proportional to total length of conductor.

$$R = l$$

The magnetising force—that is the useful effect—of the coil is proportional to the number of turns the current circulates round it and to the value of the current so circulating an to the ampere turns:

$$M = C T$$

We will therefore add a line to our table giving magnetic effect or ampere turns for unit current. To force unit current through requires an electro-motive force given by ohms law.

$$E = C \times R$$

and if C is 1, then E equals R.

To obtain relative results we will assume equal ampere turns making them of a value of 80, and will determine the current and pressure or EMF, and also the power required.

The current will then be given by dividing 80 by the number of turns:

$$C = \frac{80}{T}$$

The electro-motive is obtained as above

$$E = C \times R$$

and the power is the product of electro-motive force and current.

$$W = E \times C$$

We have reached an interesting result for we find for equal effects we require equal powers but that it is obtained by high voltages with small current or by low voltages and larger currents depending upon the size of the conductor we use. To apply this information to our circuit.

The total electro-motive force available being fixed at the resistance of the detecting device being constant, it follows that the current—which is shown by table 1 is practically independent of the resistance of the telephone—will represent power in proportion to the resistance through which it passes, and after all it is power we want to move the diaphragm in the receivers. Therefore let us use high resistance phones, so that we have a large proportion of the available pressure used across them and we are then utilising more power for sound production.

Yet another point of view. The current being practically fixed, let us pass it round our coils as many times as is possible, thus obtaining the maximum magnetic effect. This demands fine wire and consequently high resistance.

We may add to our table 2, EMF for constant current and power also when we find that the high resistance phone utilises more power.

Note also that the resistance increases much more rapidly than does the ampere-turns. Doubling the latter quadruples the former, and

Continued on Page 4

AN IMPORTANT REGULATION.

THE USE OF VALVES. REGENERATE CIRCUITS PROHIBITED.

WHAT NEW RULING REALLY MEANS.

(By J. W. Robinson, Honorary Radio Inspector.)

The Federal authorities, through the Chief Manager for Wireless (Mr. J. Malone), have issued an important regulation regarding the type of circuits which may be used by amateurs in connection with the reception of wireless signals.

The new ruling prohibits the use of any circuit which reacts upon the aerial in any town or city the population of which exceeds one thousand, within a radius of 20 miles of any such city or town, or within a radius of 20 miles of any commercial, defence or broadcasting station.

In more remote districts the use of circuits employing reaction is not prohibited, and they may be employed by experimenters without any evidence being furnished of an ability to send and receive Morse at 12 words per minute.

The authorities are prepared to make exceptions to the ruling under very special circumstances, but excellent reasons must be furnished to the State Radio Inspector before permission will be granted, and in all cases the applicant must prove that he is competent to handle his set, and furthermore, that he is a qualified Morse operator with a speed of not less than twelve words per minute.

To some experimenters the new ruling may at first sight appear rather strict, and perhaps even drastic, but if the matter is carefully considered it will be generally recognised that it is very necessary, and that it will ultimately prove very advantageous to the experimenters themselves.

As is generally known, three types of wireless signals are received by amateurs. These comprise spark signals in code, speech and music by wireless telephony, and continuous wave telegraphy in code. A non-regenerative circuit will receive spark signals as well as, if not better than, a circuit employing regeneration, so that for the exception in this class of wireless traffic the new regulation will not in any way affect experimenters. Speech and music transmitted by wireless telephony may also be received without the use of regeneration, in fact the clearest reception in connection with this type of transmission is achieved by the use of a crystal receiver. There is no doubt that when higher power is used in connection with the transmission of regular programmes by broadcasting companies, the crystal receiver will be looked to as the most efficient as well as the cheapest on the market for reception within easy distances.

Continuous wave telegraphy in code is however somewhat different to spark transmission and to the transmission of telephony, and reaction must be employed before C.W. signals can be tuned in.

It may be thought then that the new ruling will put an end to experimental work in connection with this class of wireless, but such is by no means the case. Reaction need not only be applied to the aerial or secondary coils, but can be used in some other portion of the apparatus. For instance, where radio frequency valves are employed the reaction may be applied to the the radio frequency transformer, and will prove quite effective. Since broadcasting commenced in England this method of reception has been carried out very largely, and according to all reports has proved successful. In our own country, too, this type of circuit has also been used with success.

The ordinary three honeycomb coil circuit, comprising primary, secondary and tickler, is illegal under the new regulation, but no experimenter need demolish or scrap his set to rectify the matter. A coil-fitting may be mounted quite close to one of the radio transformers, and the tickler coil plugged into this holding. The reaction coil will then be loosely coupled to the radio transformer, and the reaction will consequently be applied to the transformer and not to the aerial directly. This type of circuit will meet with the approval of the authorities, and the user of it will not be required to furnish the operating qualification.

The genuine experimenter should, therefore, find very little to trouble him in the new regulation. On the other hand his cheerful compliance with it should be a means of demonstrating that he is actually an experimenter, because in cases where this method of applying reaction has not been tested the new rule will be furnishing further grounds for the carrying out of experimental work.

It will surely need very little imagination to devise some mechanical arrangement for the mounting of the tickler coil in a convenient position in the interior portion of the set, and some device which will enable it to be controlled from the outside of the cabinet or the panel.

The most important aspect of the regulation is the effect it will have in minimising interference. As most amateurs are aware, the use of valves with all types of circuits has led to a good deal of interference lately. Badly handled valves cause much interruption during the transmission of speech and music by amateurs, and during the interval between transmission by different amateur stations on the roster the roar which is audible is in on some occasions almost deafening.

One well-known amateur transmitter remarked some little time ago that when he was transmitting he could always ascertain whether his apparatus was in order by pausing for a little while and listening for "howling" valves. If he heard none he concluded that he was being badly received, but if while pausing he could hear many valves joining together in a chorus, he knew that everything was in order!

The prohibition of the use of reaction is of course very necessary now that broadcasting is about to commence. Experimenters have rights and vigorously defend them, but it must also be remembered that broadcast listeners also have rights which must not be interfered with. The broadcast receivers will be constructed so as not to be capable of causing interference, and it would be most unfair if the broadcast listener who purchased an expensive set and paid the necessary fees, found his reception mutilated every evening by faulty reception.

I have discussed the position as created by the new ruling with some of the leading experimenters, and find that in almost all cases the action of the authorities is considered wise and in fact the only one possible. No experimenter has yet voiced any complaint regarding the alteration of his station to comply with the new rules, the view being expressed that the regulation has not come along one moment too soon.

The Honorary Radio Inspectors have received certain instructions from the authorities, and have been asked to see that all experimental stations are arranged in conformance with the terms of their licenses.

It is to be hoped that experimenters as a whole will see the wisdom of Mr. Malone's action and will do their utmost to assist the authorities in the administering of the regulation. Should this be done the "howling" valve nuisance which for so long has been the bugbear of the experimental movement should quickly disappear.

Continued from Page 2

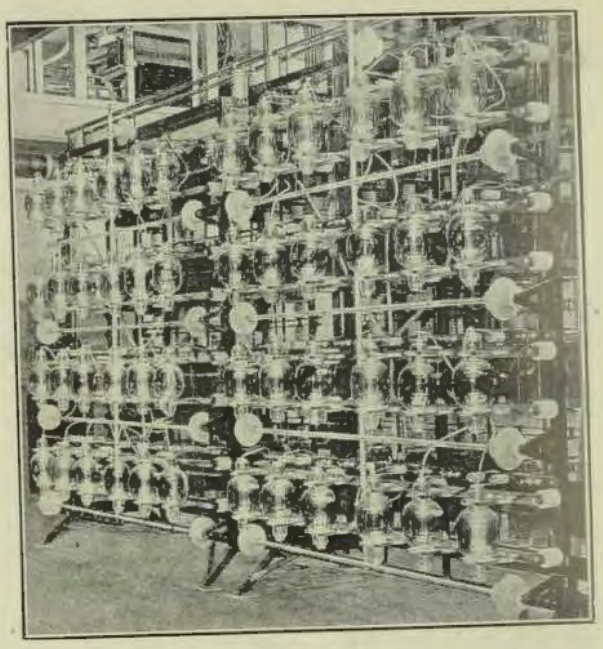
in the case of the two assumed resistance of 100 and 1000 ohms for the phones in table 1, we should find that while we have increased the resistance a hundredfold, we have increased the magnetic effect at constant current only tenfold and allowing for the 16 per cent. decrease in current, the actual advantage will be only about 8.5 fold.

We must now remember that the space occupied by insulation on the wire is useless in producing ampere-turns, and that the insulation thickness bears a much larger ratio to the size of conductor on thin wires than on thick, so that the high resistance phone does not usefully employ as much winding space as the low. Actually this amounts to saying that the wire used must be smaller than that indicated by the ratio of turns and the result is that our phones of table 1 will give results as 1 to 5 instead of 1 to 8.5.

As stated above this applies also to the primary of a telephone transformer—where one is used. Provided the losses in the transformer can be kept very low, it pays to use one with a low resistance secondary, and of course a suitable low resistance phone.

The design of telephone transformers is not yet at such a stage that data indicating how to determine their dimensions can be worked out and as the author does not believe in giving details of construction to be more or less blindly followed by his readers, but rather in placing before them reasoning which will enable them to follow the action of and to decide by trial where calculation is impossible (but by calculation wherever possible). On the best dimensions and proportions to give to apparatus, he does not propose to deal with telephone transformers.

As to the reason for this article. A certain operator who had been using low resistance phones and a transformer decided upon eliminating the latter. He understood high resistance phones were "comme il fault," so to obtain extra high resistance he rewound his telephones with Eureka wire. He certainly got his extra high resistance, but not his good results.

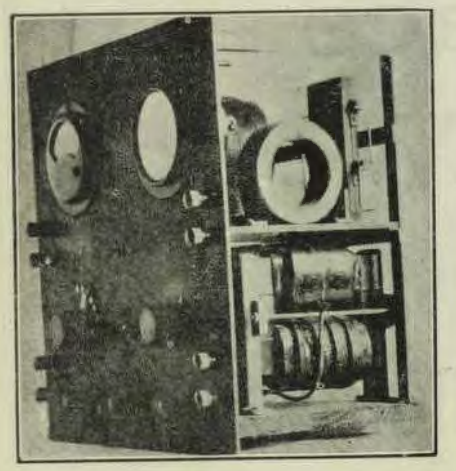


The largest valve ever used in the world, at the Carnarvon Station of the Marconi Company which has transmitted wireless messages direct to Australia.

Length of coil winding	10	10	10
Diameter of conductor	.5	1	2
Turns per layers	20	10	5
Depth of winding	8	8	8
Number of layers	16	8	4
Total Number of turns	320	80	20
Total length of conductor	320	80	20
Resistance per turn	4	1	.25
Total resistance of coil	1280	80	5
Ampere turns for unit current	320	80	20
EMF. for unit current	1280	80	5
Current for 80 ampere turns	.25	1	4
EMF. for 80 ampere turns	320	80	20
Power for 80 ampere turns	80	80	80
Power for unit current	1280	80	5

MAKE YOUR OWN

A 5 Watt. RADIOPHONE.



Front View of 5 Watt. Transmitter

The author here describes the method whereby he constructed his own transmitter at 2BJG. By following his directions and drawings it should be possible for any amateur to readily duplicate this installation.

An amateur usually spends more time in thought than in the actual building of his apparatus and with the wide diversity of articles on transmitters and claims of the work they will perform his thoughts are so divided between different types of sets that he sometimes gives up the task of building a set before he has actually started to invest money in parts for it. We will make no claims for this type of set except to say that once it is finished it will be ready to work day and night and is about the most simple set for anyone to construct. The range depends entirely upon local conditions, antenna, ground, etc.

Before a man starts anything he usually wants to know what the effect will be upon his pocket book, and here we will say that the cost will depend upon whether he builds the parts or buys them ready-made. If he builds them, considerable money can be saved in the cost of constructing the set. We will describe the construction of as many of the parts of the set as possible so that they may be constructed by the builder. The following is a list of all parts which it will be necessary to obtain, and from this list the approximate cost may be figured.

LIST OF MATERIALS.

2 1 mfd. W. E. Co. No. 21 AA condensers.
1 Inductance.
1 5-Watt tube.
1 Socket.
1 Rheostat.
1 8000 ohm grid leak.
1 Antenna Condenser (.0015 mfd.).
1 Grid Condenser (.0008 mfd.).
1 Milliammeter (0-150).
1 Ammeter, Hot Wire (0-1).
2 150 Milliampere chokes.
1 L 200 honeycomb coil.
1 Rectifier.
1 C.W. Transformer.
1 Hand Microphone.
1 Inductance Switch and 10 points.
1 Key Switch.
1 Panel 12in. x 12in. x 3/16in. (Bakelite).
1 Shelf, 6in. x 6in. x 3/16in.
11 Binding Posts.

The panel should be laid out carefully and drilled. The holes for the meters had better be done in a machine shop equipped for such work. After all the holes for the various parts are drilled the panel should be grained by rubbing down with fine emery cloth and oil. This will give it a finished appearance, which is much superior to the shiny black when it comes from the factory.

After making the panel, obtain a base as shown in the picture and drawings and fasten the panel to it. Then start the brass framework, which is made of 3/32in. x 1in brass strip. When this is finished the shelf should be made according to the drawings and drilled for the parts to be put upon it. Then fasten it in place by means of the 2 brass angle pieces. Before putting the shelf in place the transformer and choke coils should be fastened to the base by means of wood screws because after the shelf is in place it is impossible to get these parts fastened down. The inductance coil should then be put in place and fastened by means of several small angle braces. Next the meters should be put on the panel followed by the key switch, rheostat switchpoints and binding posts. After these have been placed the parts to go on the shelf should be

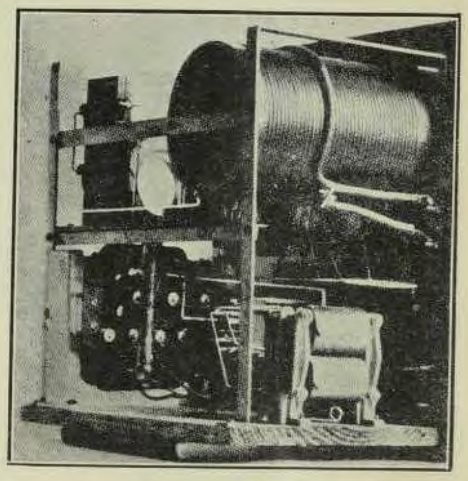
mounted, namely, the socket, condensers and the honeycomb coil.

If all the parts have been purchased, the set will be ready to wire, but if the parts are to be made, the necessary construction data may be obtained from the following:

The inductance L is wound upon a bakelite tube threaded to fit the wire. The tube can be threaded at any machine shop for a small sum. Another way to make the inductance is to use a cardboard tube, 4in. in diameter and 6in. long, which has been boiled in paraffin. It should be wound with heavy twine or fish line which will make a thread upon which the No. 14 copper wire may be wound. 40 turns are to be put on and should be tapped from one end at every other turn until the twentieth turn is reached, giving ten taps. These taps should be connected to the switch points on the panel by means of short lengths of No. 14 wire.

A honeycomb coil, shown in the wiring diagram as L3, is used as a radio-frequency choke. If the builder does not want to buy one, he may build a simple radio-frequency choke by winding 250 turns of No. 30 insulated wire on a tube 2 1/4in. in diameter and 4in. long. The inductance of such a coil is the same as a L200 honeycomb coil.

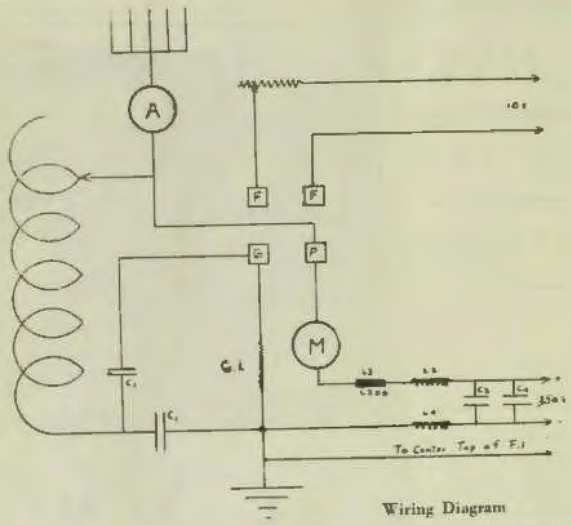
The transformer is the most difficult part to construct, and unless you have had a little experience with them it would be advisable to purchase one. The one used with this set is an Acme 50 Watt C.W. transformer. Data on a suitable transformer are as follows:



Back View of Panel.

Core—6in. long and 4in. high with a cross-section of 1 1/4 square in. Primary—550 turns of No. 20 D.C.C. wire for use with 110 volts A.C. Filament Secondary—50 turns of No. 14 D.C.C. wire with centre tap at 25th turn. This gives 10 volts. High Voltage Secondary — 4000 turns of No. 32 D.C.C. wire tapped at 2000 turns. This gives 400 volts on both sides of the centre tap. The core should be made of transformer iron, and if black sheet iron is used the cross-section should be doubled. The number of turns will remain the same. To make the windings use a block of wood slightly larger than the cross-section of the core and wind the wire upon this and when the coil is finished the wood should be taken out and the coil shellacked and tapped up before the core is put into it.

The rectifier is made up of 20 small jars 2½in. in diameter and 4in. high. The elements consist of a strip of aluminium 3in x ⅜in. x 1/16 in. bolted to a piece of lead of the same size. These two pieces are then bent into a U shape in order that the lead may fit into one jar and the aluminium into the next. After these are made up and inserted in the jars the solution which is to fill the jars should be mixed and poured into each jar, filling it to



Wiring Diagram

within ½ in. of the top. A saturated solution of borax should be mixed in a jar large enough to hold as much as will be needed to fill all the small jars.

The filter consists of two Acme 1½ henry choke coils and two 1-mfd. Western Electric Co. condensers, No. 21 AA tested for 1000 volts.

Two mica condensers are necessary, one .0008 mfd. capacity for the grid circuit, and one .0015 mfd. for the antenna circuit. They can be made into one unit as shown. This will save space and labour. The grid condenser consists of two pieces of copper foil 1 1/4 in. square separated by a sheet of mica .003in. (3 mils) thick. A heavy piece of mica is put on both sides of the condenser to keep it from touching the bakelite plates. The antenna condenser is made up of three pieces of copper foil, 1 1/4in. square separated by two pieces of 3 mil. mica. After these parts are finished the two condensers are clamped between the two bakelite plates and the piece of angle brass is used to fasten it to the base.

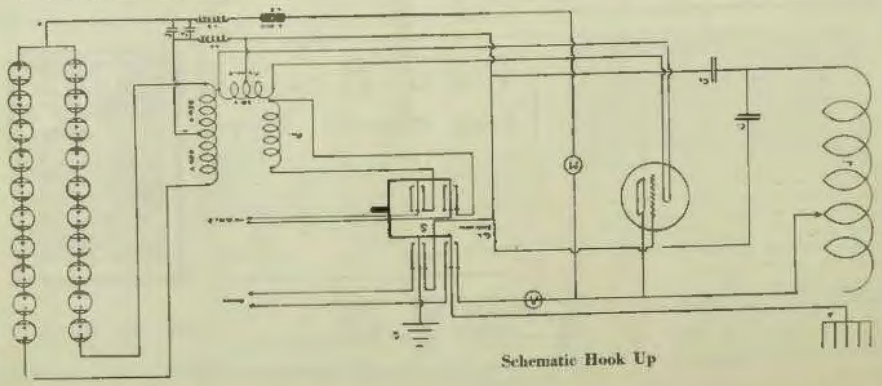
After everything has been set up and is ready for a trial throw in the 240 volt switch and start to form the rectifier plates. The transformer secondary should be watched carefully as it will get very hot because the rectifier is a dead short circuit on it until the plates are formed. The forming will take place 15 or 20 minutes and the transformer should only be put on for two or three minutes at a time and then allowed to cool off. Once the plates are formed no further trouble will be experienced with the secondary heating.

The modulating is done by placing one turn of heavy wire around the middle of the inductance and connecting a microphone of low resistance to it.

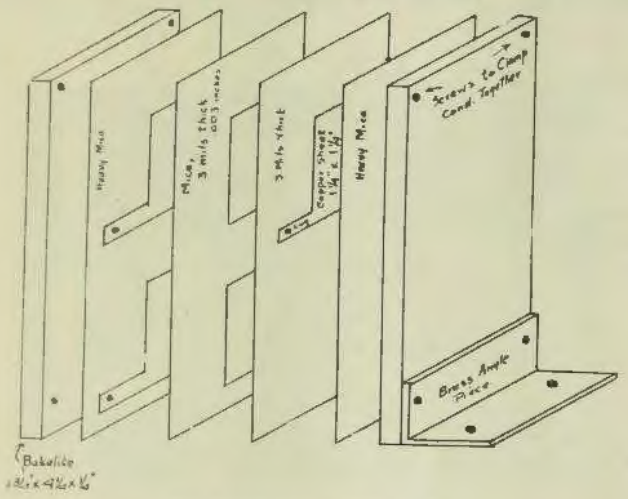
As to the operation of the set, it can be said that you will learn more in half an hour's tinkering with it than could be written in a volume.

This set is very compact and if you are interested in a small transmitter it is just the one you ought to build.

This set can be built with the key switch on the same panel for changing from sending to receiving and cutting in the 240 volts on the transformer or this switch may be left out and an external switch used with the set.



Schematic Hook Up



Detail of Condenser Construction

RADIO IN CHINA.

The Peking correspondent of "The Times," of London, reports a difficult situation with regard to radio which has arisen in China. Two years ago an American company contracted to erect radio stations in China, and it has now landed engineers and material. The government, however, refuses the necessary consent to the starting of the work, on the ground that other powers have protested that the American agreement conflicts with the rights previously acquired by other nationals. The Japanese are mostly concerned under the Mitsui Agreement of 1918, which gave them a radio monopoly for a period of 30 years. The Americans contend that the monopolistic clause of that agreement is contrary to the theory of the "open door" and incompatible with the terms of the Chinese-American Treaty of 1859. Under the Japanese agreement a large radio station has been for several years under construction near Peking, but it is not yet open for traffic owing to technical difficulties.

PUBLIC NOTICE.

Trans-Pacific Tests.

Having recently been appointed sole adjudicator by the Trans-Pacific Test Committee in the matter of prizes to be awarded to Mr. C. A. Gorman, I hereby notify all those persons wishing to speak for or against the decision of the Trans-Pacific Test Committee ("That the first prize only of £10 be awarded") that I will be available to hear same on Thursday, August 30th; Friday, 31st August; and Monday, 3rd September, between the hours of 5.15 p.m. and 6.30 p.m., on each day mentioned at Radio House, 619 George Street (by kind permission of Mr. C. V. Stevenson).

I also request the Secretary and Chairman of the Trans-Pacific Test Committee to forward to me all minutes, etc., which deal with the above subject.

(Signed) W. J. MACLARDY.

The above public notice is published by me for the following reasons. On being appointed adjudicator by the Trans-Pacific Test Committee, I had an interview with the Secretary, Mr. Tatham, and a telephone conversation with the Chairman, Mr. Perry, and I suggested to both of them that they appoint a delegate and that Mr. Gorman appoint a delegate; both to sit with me and hear such evidence that might be brought forward.

Both of the above gentlemen agreed with me, and it was decided that it should be done. After waiting some time I wrote to the Secretary asking what had been done, and requesting that the matter be finalised. To date I have not had the courtesy of a reply. Mr. Gorman informs me that he had appointed his delegate, but had not had a reply.

Inverse Duplex.

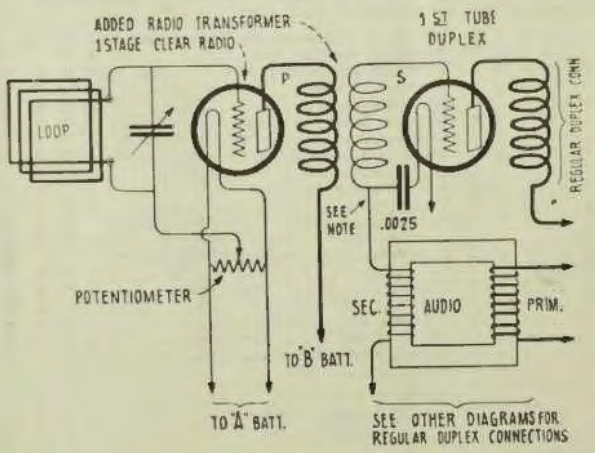


FIG. 4

Note. This block was omitted from last week's issue, page 6.

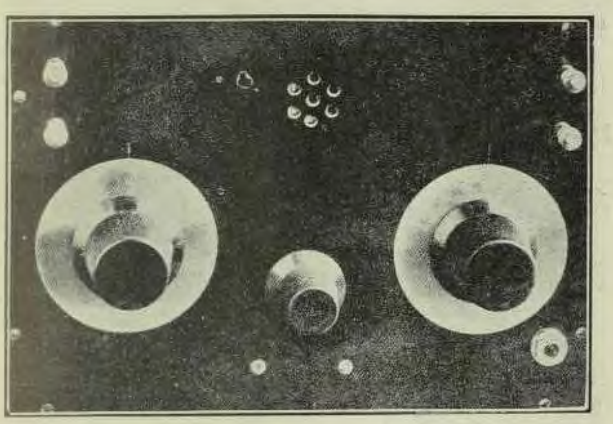
WIRELESS NO-MAN'S LAND.

Between Washington and Baltimore, a distance of about forty miles, transmission of radio waves is quite impossible. Direct messages cannot be sent, and these have to be transmitted via Chicago, or other stations much further away. Scientists term this a "dead spot," and have been trying to discover and pierce the seemingly impenetrable barrier. According to some of them, Radio activity already at work there causes certain layers of the ether to become impervious to signals. Other quarters put forth the theory that the electric railways running between the two cities, and numerous high tension conduits and electric cables are the cause. Similar difficulties exist between Pittsburg and Cleveland, and messages have to be relayed from a third and more distant station.

CORRECTION

Below the photographs on Page 18 of last week's issue, the name appears Mrs. V. Colville. This should read, Mr. S. V. Colville. We apologise to the Colville family for any inconvenience they may have been caused by this error.

The Simplified Reinartz Set.



Front View of Two Control Reinartz Receiver

Because of the excellent results that many amateurs have secured with the Reinartz circuit especial value attaches to this description of a simplified set employing such a circuit. The reputation of the author is sufficient guarantee that it will work.

Experiments with the Reinartz circuit show that three of the controls ordinarily used can be eliminated by doing away with switches. This is in accord with a very definite tendency in the design of receiving equipment. In operating the Reinartz receiver, it will be found usually that, if the inductance is properly designed, the three switches connected with the plate, antenna and grid are seldom varied. It is awkward, often times, to tap the coils for the customary switches and to do the work of soldering the leads to the switch points. Also, the use of these switches somewhat complicates the mechanical design and adds a certain amount to the cost of parts necessary.

In Figs. 1 and 2 is illustrated the two-control Reinartz receiver, while in Fig. 3 a diagram of the conventional connections and of the two-control circuit are given. You will see, upon going over the two-control circuit, that the leads from the coil are taken off as if the switches in the other diagram were all set at maximum. Wave length and regeneration are entirely controlled by the two condensers.

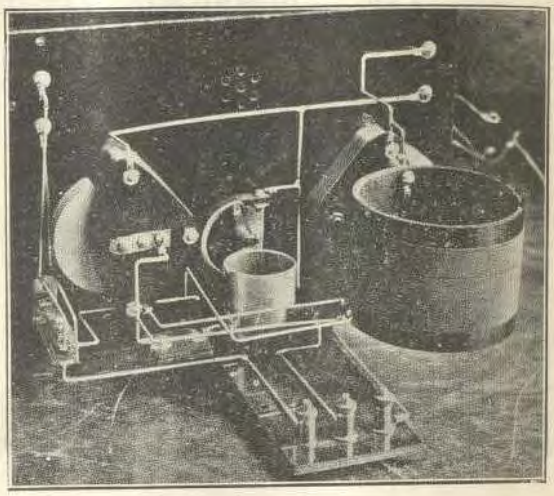
The construction of the set is quite simple, as it involves the use of a plain single layer coil, two 11-plate condensers, a jack, grid and condenser, and a support for the battery connections. It is very convenient to mount the coil on the rear plate of the left hand variable condenser. This is done by means of two short mounting pillars secured to the end plate by screws from underneath and to the coil by screws from the inside. A variety of methods can be employed for mounting the binding posts which carry the battery terminals. A satisfactory method is to use a socket which can be mounted directly on the panel by means of bushings moulded into the base. Then a small Formica panel is fastened by means of machine screws to the under side of the socket and the binding posts put on the rear end.

A litle careful planning of the inductance will save considerable trouble in making connections. The coil can be seen clearly in the rear view. It is wound on a Formica

tube 3½ ins. in diameter by 3¼ ins. long with a 1/8-in. wall. The plate winding is started at the top, 1/8 in. down. There are 24 turns in the plate coil. The tuning inductance is started close to the other winding. At the tenth turn a tap is taken off for connections to the ground. Then 35 more turns are wound on for the balance of the coil. No. 24 SSC wire is used for both windings. From the top of the coil a lead is run down to a machine screw and lug 90 degrees around from the mounting pillar. One half-inch toward the left, looking at the set from the front, there is a screw and lug connected to the bottom of the winding. Another ¼in. around is a terminal for the ground tap. A little farther to the left is a terminal for the lead to the antenna. The lower end of the plate inductance is connected by a lug and screw which holds the tube to the upper coil mounting pillar. By checking the foregoing against illustrations you will see that this arrangement works out to the best advantage in making the leads short and direct.

A plain Dubilier condenser was used in the grid circuit. There was a tendency on the part of the tube to block at first. This trouble was remedied by scratching the surface of the condenser clamping plate with a scriber and marking between the two terminals with a soft lead pencil. This gave quite as good results as when a regular grid leak was employed, and is an inexpensive way to get around the use of a separate grid leak. At the right hand side of the panel there is a double-circuit Pacent jack connected so that when the plug is not inserted the plate circuit goes to the two output binding posts in the upper right hand corner. No difficulty from squealing was experienced when the set, just as it is shown, was connected to an ordinary two-step amplifier. Some experimenters have found that by-pass condensers or radio frequency choke coils are necessary but that is not true in the case of this receiving set.

In operation the right hand condenser is adjusted for wave length and the left hand condenser for regeneration. Four hundred metres is about the maximum wave length to which the set will respond. If it is necessary to tune to higher wave lengths, the right hand condenser

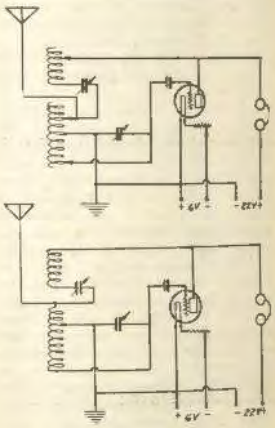


Rear View of Two Control Receiver

can be replaced with a 23 or even 43 plate type. Perhaps the easier method is to make the first part of the lower coil of two banks, starting the banking after the ground tap has been taken off. If the coil is banked for fifteen sections, the inductance will be increased sufficiently to tune up to 600 metres with an eleven-plate condenser.

The standard size of panel 7 in. by 10 in. was used to carry the receiving set. This is about as small a panel as can be used, although the height might be decreased if that appears necessary. Mahogany cabinets can be obtained at practically any of the radio stores for this size panel. Holes should be drilled at the rear so that the leads can be brought in to the three binding posts which are connected with the filament and plate circuits.

In very thorough tests made on this receiving set no loss has been found because of the elimination of the three switches. For DX reception at 200 metres, this is a decided advantage, for a station can be tuned in very quickly. Any trouble experienced in adjusting the left hand condenser for maximum regeneration can be overcome by



Convential (upper) and Simplified (lower) Circuit.

burning the filament at a little below normal brilliancy. If, then, the regeneration control is brought up nearly to the peak, the final adjustment can be obtained by increasing the filament brilliancy slightly.

The Great Work Field of Radio.

Radio is rapidly outgrowing all expectations. Providing entertainment for the world's music lovers is becoming less important in an ever widening field of Service. As a medium of public education, the apprehension of criminals, and political discussion radio is functioning in a remarkable way. This development must go on, properly directed and controlled. Whether public or private enterprise shall do the broadcasting is already a lively issue in many countries. Those who are interested in radio from the commercial standpoint should follow these tendencies closely.—Editor.

"I hear it, but know it isn't so," said a man recently in Philadelphia when the music of an opera came in from Chicago. Another man said "I know the fellow who invented this thing could not have been anything but a liar," and indeed the developments of radio during the past few months read more like an addition to the tales of Baron Munchausen than like the intensified technical research which has made them possible.

The reaction upon popular taste and appreciation of the finer things must be very great. Just as the phonograph manufacturers found a few years ago that it was more profitable for them to stress in their advertising the higher priced records made by artists of world-wide reputation, so in this present-day free broadcasting the same tendency is noticed for a group of listeners to cut out the cheaper productions and go hunting for the better things that come in over the air. A New York newspaper told the other day of a camp of rough woodcutters somewhere up in the Canadian wilderness who had invested in a receiving set and picked up the music of the Nibelungen Ring from the Wagner Festival in New York. Not one of those men probably had ever heard anything more uplifting than the strains of a mouth organ, and a great new world was brought instantly within their ken. So when the music of the great organ in the Wanamaker store—by far the largest in the world—was first broadcast by radio, acknowledgments came in from lumbermen in northern Maine and New Brunswick, and from the office of one concern there came a stenographic report of Mr. Wanamaker's speech delivered that evening. The organ has been heard in home gatherings in Porto Rico, in trading posts along Hudson Bay, and as far away as Berkeley, California. A few weeks ago when Dupre, the organist of Notre Dame Cathedral in Paris ,visited Philadelphia, additional power was put on the transmission, and his playing was heard in Paris and the titles repeated by cable during the performance. Another gentleman in Philadelphia who broadcasts organ selections through one of the local stations, has a love for the English poets and illustrates his music with spoken selections from Shakespeare or Milton or Tennyson.

That all this is a refining influence with great possibilities everyone recognises, though the practical question must be in many minds how long it can be regarded as profitable expenditure on the ground of commercial publicity. One radio organisation in the United States is proposing to the larger cities the establishment of public or municipally owned broadcasting stations. Already through some of the larger stations such items of municipal news as warrants issued for apprehension of criminals, records of stolen automobiles, etc., are being broadcast by arrangement with transmitting stations. One very interesting instance of the ability of the radio broadcast to block a crime was the kidnapping of the child of one of the world's best known radio engineers connected with a great station in the State of New York. So general was the alarm sent out that it was impossible for the criminals to get beyond the state boundaries, and they were forced to leave the child in safety at a place where their pursuers could find him. A municipally owned broadcasting station would, of course, open other fields of usefulness, and although the question that first occurs is, how far it may be a public function to provide such service, it is yet a fact that most of the large cities in the United States are at present offering free concerts throughout the summer months by subsidised bands and orchestras. All

this, however, remains a question for the future, and in the meantime popular interest is such that the great department stores, newspapers, telephone and power companies are finding it to their advantage in a business way to offer to a public of growing discrimination programs that are steadily improving in both content and performance.

The application of the new art to political discussion may become very great. In a hot campaign a few months ago in the State of New York the personal appeals of leading candidates were broadcast. Already the sinister side has appeared in the service of one station suspected of revolutionary aims and affiliations, and said to be the subject of serious attention by Government inspectors.

There are many organisations of national standing working along various lines for the public benefit which have struggled against difficulties in getting their message to the general public for whom they are working. No doubt this need will be met in large part in future by broadcasting the proceedings of the more important conventions. With this thought in mind the Philadelphia Commercial Museum has recently equipped a commodious convention hall, with a seating capacity of about one thousand, and provided a public address system that can be connected by telephone line with any broadcasting stations. It was used for the first time at the annual hardware show held last February in the exhibition hall of the museum.

The uses of radio to the sick and afflicted are innumerable. Many hospitals are being equipped with receiving stations varying in extent from the single portable set to the equipment of the entire hospital. Hotels and apartment houses are adding radio receiving to the regular equipment offered their guests. One large apartment house which is being completed in Philadelphia will have a set in every room. In Detroit the Welfare League is distributing many sets among the blind of that city, and anounces its intention to see that every blind person in Detroit has one. The unfortunates are being helped through the installation of radio in numerous jails and penitentiaries.

THE "LEVIATHAN'S" RADIO SET.

Eclipsed only in importance by her powerful machinery and delicate controls, the radio installation aboard the "Leviathan," which re-entered the trans-Atlantic service some time in June, flying the U.S. Line's flag, will be the most powerful and elaborate steamship radio equipment in the world. The radio equipment of this huge ship will enable her passengers to exchange messages with two continents regardless of her position on the high seas. With equipment six times as powerful as that carried by the average ocean greyhound, uninterrupted communication with points 3000 miles distant is assured. Upon leaving her berth in New York Harbour, the "Leviathan's" radio officers will be able to link the ship with various marine centres in Europe, and, vice versa, to communicate with America when leaving European ports. In addition to telegraph service, a radio telephone installation, which will provide voice contact with other vessels and shore stations, is also to be installed. While it is not expected that a commercial telephone service will be inaugurated immediately on the "Leviathan's" going into commission, it is quite probable that shore stations will, in the not distant future, be erected to handle wireless telephone traffic from ships in mid-ocean to points inland over the conventional land-line systems. The principal radio telegraph transmitter to be used consists of a high power vacuum tube outfit which will deliver to the main aerial about six times as much power as the apparatus now used on the average steamship. The second transmitter is a duplex telephone outfit which will permit simultaneous telephone and continuous wave telegraph communication. The third or emergency sending equipment is a standard spark set which will normally operate on 600 metres. Several super-sensitive vacuum tube receivers will be used for reception.

KILLARA RADIO CLUB.

The last meeting of the Killara Radio Club was held on the 17th instant. A lecture on the construction of valve sets was given by Mr. Gray. After this a discussion on the regulations took place among the members.

Amateurs in the district who do not belong to the club are invited to come along. Buzzer practice is held for half an hour (starting at 7.30) prior to each meeting. Meetings are held in the Congregational Hall, Florence Street, Killara, every alternate Friday. Inquiries received by the Secretary. 'phone J2661.

WAVERLEY AMATEUR RADIO CLUB.

Mr. M. Perry occupied the chair at the meeting of the Waverley Amateur Radio Club, held on the 23rd August. A number of members who had attended the screening of scientific films at the Railway Institute the previous evening (22nd inst.), at the invitation of the Railway Institute Radio Club, reported that the entertainment has been highly interesting and instructive.

The 6th September was fixed for the debate with the Metropolitan Club.

The club's rules and regulations, which had been revised by a special committee, were then put before the meeting, and the majority of them confirmed. One of the altered rules was that the name of the club be "The Waverley Radio Club"—omitting the word "amateur." The new rules will come into operation within a month's time.

PAN PACIFIC CONGRESS.

One of the most important addresses to be given at the Pan Pacific Science Congress at the Sydney University on Monday last at 10 a.m., was one given by George A. Taylor, at the Geology Lecture Hall, on Aerial Sciences, dealing with wireless and aeronautics, during which will be shown for the first time how natural coloured photographs can be transmitted by wireless.

CROYDON RADIO CLUB.

At the meeting held on Saturday, August 18th at the club's rooms, "Rockleigh," Lang St., Croydon, it was decided to commence building the club's receiver.

After this a debate was held on the subject of loose couplers v. variometers.

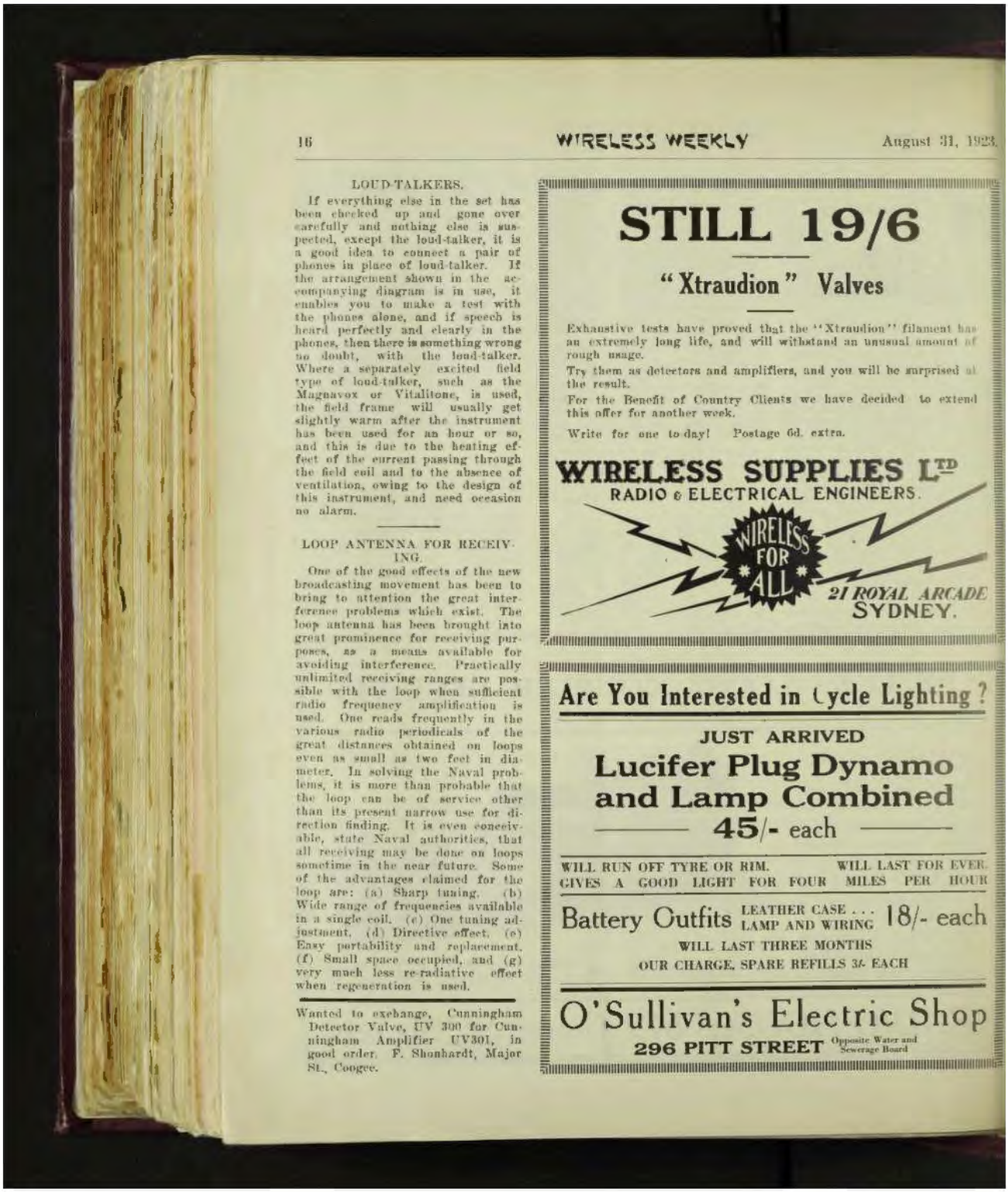
Mr. R. J. Walker pointed out the advantages of a loose coupler for tuning, and Mr. Bundle spoke in favour of variometers.

Mr. H. Lees acted as judge and declared that Mr. Walker's arguments were more convincing.

The club intends to hold a number of such debates, as much is gained by those listening.

Meetings are held every Saturday evening at 7.30 p.m.

All communications will be answered by the Hon. Secretary, G. Maxwell Cutts, "Carwell," Highbury St., Croydon.



LOUD-TALKERS.

If everything else in the set has been checked up and gone over carefully and nothing else is suspected, except the loud-talker, it is a good idea to connect a pair of phones in place of loud-talker. If the arrangement shown in the accompanying diagram is in use, it enables you to make a test with the phones alone, and if speech is heard perfectly and clearly in the phones, then there is something wrong no doubt, with the loud-talker. Where a separately excited field type of loud-talker, such as the Magnavox or Vitalitone, is used, the field frame will usually get slightly warm after the instrument has been used for an hour or so, and this is due to the heating effect of the current passing through the field coil and to the absence of ventilation, owing to the design of this instrument, and need occasion no alarm.

LOOP ANTENNA FOR RECEIVING.

One of the good effects of the new broadcasting movement has been to bring to attention the great interference problems which exist. The loop antenna has been brought into great prominence for receiving purposes, as a means available for avoiding interference. Practically unlimited receiving ranges are possible with the loop when sufficient radio frequency amplification is used. One reads frequently in the various radio periodicals of the great distances obtained on loops even as small as two feet in diameter. In solving the Naval problems, it is more than probable that the loop can be of service other than its present narrow use for direction finding. It is even conceivable, state Naval authorities, that all receiving may be done on loops sometime in the near future. Some of the advantages claimed for the loop are: (a) Sharp tuning. (b) Wide range of frequencies available in a single coil. (c) One tuning adjustment. (d) Directive effect. (e) Easy portability and replacement. (f) Small space occupied, and (g) very much less re-radiative effect when regeneration is used.

Wanted to exchange, Cunningham Detector Valve, UV 300 for Cunningham Amplifier UV301, in good order. F. Shonhardt, Major St., Coogee.

THE STORY OF WIRELESS.

By J. J. HONAN, A.M.I.E.E.

This brief article relating to the development of Wireless Telegraphy lays stress on the process by which theory may clear the road for practical invention. It is not always the theorist who can grasp the importanceof the phenomenon he is investigating for the purpose of applying it to advancement and progress.

There is no more interesting chapter in the long history of scientific achievement than that which records the discovery of ether waves and the manner in which they were finall ybrought to serve as a means for human intercourse across the barriers of space.

The mysterious nature of the medium involved, and the unusual methods and apparatus employed in the art of wireless, combine to clothe the subject with a fascination that is peculiarly its own. Throughout the story "speculation" is followed by "application," until one of the most elusive of Nature's resources has been brought under control. At the end, the reward of the theorist is but a place in the text books, whilst the "practical" inventor reaps both fame and wealth.

For many centuries before the birth of wireless, philosophers had taught the futility of belief in "action at a distance." They insisted that wherever an "effect" of any kind is separated by space from its "cause" the logical mind must seek for some connecting link between the two events.

Upon this basis of reason was built up the hypothesis of a luminiferous ether, an intangible all-pervading "fluid" which penetrates alike the outermost confines of stellar space and the minute interstices of all material objects. Heat and light from the sun and distant stars, travel through this medium in the form of alternate stresses and strains which may be likened to the ripples set up by a stone thrown into smooth water.

The early Greks were well acquainted with the attractive forces exerted by static or "amber" electricity, and knew something also of the magnetic powers of the loadstone. At the beginning of last century Michael Faraday pointed out the existence of similar phenomena in the case of current or "moving" electricity. He discovered that when the electric fluid passed along a metal wire, the whole of the action was not confined to the metallic path. Some considerable part of the energy concerned spread outwards from the wire through adjacent space, and, like the electrified amber and the magnet, making its presence felt at a distance.

All these manifestations involve "action at a distance," and therefore require the presence of a connecting link or medium by means of which the observed effects can be produced.

In 1865, Clerk Maxwell, by a brilliant mathematical generalisation, built up a theory which (a) identified the older luminferous ether with the medium required to explain the static, magnetic, and Faraday effects; (b) established the fact that light and heat are simply forms of electro-magnetic energy, and (c) foreshadowed the existence of ether vibrations similar to those giving rise to optical and radiant heat sensations but immensely greater wavelength. Clerk Maxwell's prophecy found its fulfilment at the hands of other men, but the first conception of wireless science is undoubtedly due to him.

Twenty-three years were to elapse before the German professor Heinrich Hertz succeeded in putting this theory to the proof. By discharging a Leyden jar through a spark-gap he produced oscillatory currents of such enormous frequency that they set up vibrations in the ether of the kind anticipated by Clerk Maxwell.

These electric disturbances travelled outwards from the "oscillator" in all directions through space. Hertz demonstrated this to be so by using a detector formed of a metal loop which he called a "ring resonator." The ether waves falling upon the distant resonator set up or "induced" electric currents which, in turn, caused minute electric sparks to pass across a small gap formed in the ring.

Here in actual fact was the first wireless transmitter and receiver. Unfortunately the range was limited to a few yards at most, so that the system was useless as a practical means of signalling.

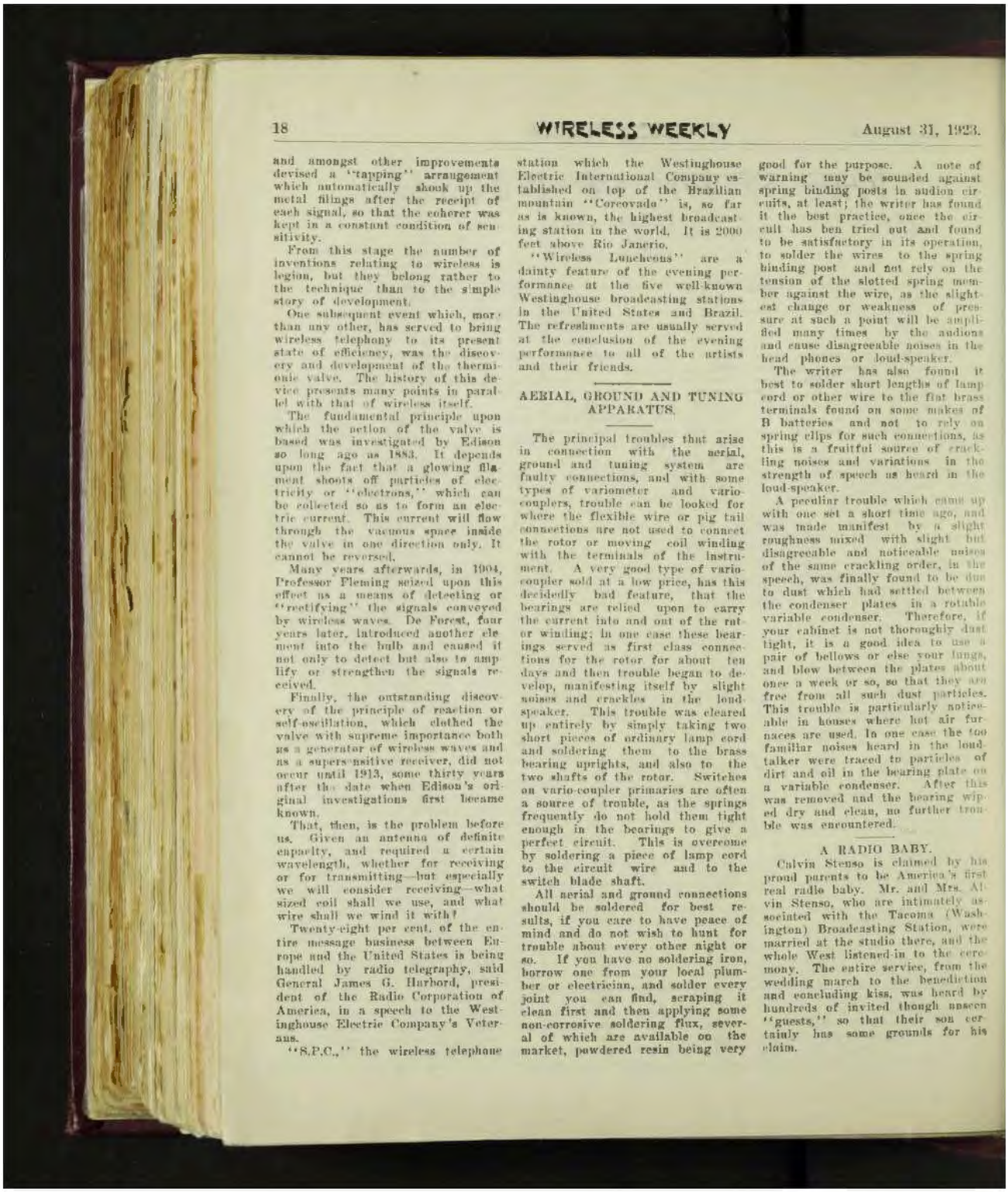
Matters were left at this stage during a further period of eight years. In 1896 Marconi left his Italian home for England, bringing with him the grain of genius which was to fertilise so much dead weight of theory into practical activity. By the simple addition of an upright wire or "aerial" to the Hertz oscillator, and the provision of a similar device at the receiving end, he achieved success, and wireless communication was put upon a commercial footing.

Within three years of his invention of the elevated aerial, Marconi had increased the range of wireless signalling to a hundred miles. Two years later, at the end of 1901, the Atlantic had been bridged and telegraphic communication set up between Newfoundland and the village of Poldhu in Cornwall.

The young Italian's extraordinary faculty for extracting the essential marrow from theory and applying it to practical use is further exemplified in the means he utilised for detecting his wireless messages over these relatively enormous distances.

Some years before, in the year 1890, Profesor Branley of Paris had discovered that sparks from a Hertz "oscillator" had the peculiar property of breaking down the air spaces between a mass of metal filings contained in a glass tube. Normally such an arrangement, if placed across the poles of a battery, would stop the passage of any current. In the presence of a Hertz "oscillator," however, the insulation was destroyed and a current passed, which could, of course, be used to operate a suitable indicator. Unfortunately, once the insulation had been so destroyed, the device was insensitive to further reception until the metal filings had been shaken up and re-arranged.

Marconi took the Branley "coherer," as this device was called,



and amongst other improvements devised a "tapping" arrangement which automatically shook up the metal filings after the receipt of each signal, so that the coherer was kept in a constant condition of sensitivity.

From this stage the number of inventions relating to wireless is legion, but they belong rather to the technique than to the simple story of development.

One subsequent event which, more than any other, has served to bring wireless telephony to its present state of efficiency, was the discovery and development of the thermionic valve. The history of this device presents many points in parallel with that of wireless itself.

The fundamental principle upon which the action of the valve is based was investigated by Edison so long ago as 1883. It depends upon the fact that a glowing filament shoots off particles of electricity or "electrons," which can be collected so as to form an electric current. This current will flow through the vacuous space inside the valve in one direction only. It cannot be reversed.

Many years afterwards, in 1904, Professor Fleming seized upon this effect as a means of detecting or "rectifying" the signals conveyed by wireless waves. De Forest, four years later, introduced another element into the bulb and caused it not only to detect but also to amplify or strengthen the signals received.

Finally, the outstanding discovery of the principle of reaction or self-oscillation, which clothed the valve with supreme importance both as a generator of wireless waves and as a supersensitive receiver, did not occur until 1913, some thirty years after the date when Edison's original investigations first became known.

That, then, is the problem before us. Given an antenna of definite capacity, and required a certain wavelength, whether for receiving or for transmitting—but especially we will consider receiving—what sized coil shall we use, and what wire shall we wind it with?

Twenty-eight per cent. of the entire message business between Europe and the United States is being handled by radio telegraphy, said General James G. Harbord, president of the Radio Corporation of America, in a speech to the Westinghouse Electric Company's Veterans.

"S.P.C.," the wireless telephone station which the Westinghouse Electric International Company established on top of the Brazilian mountain "Corcovado" is, so far as is known, the highest broadcasting station in the world. It is 2000 feet above Rio Janerio.

"Wireless Luncheons" are a dainty feature of the evening performance at the five well-known Westinghouse broadcasting stations in the United States and Brazil. The refreshments are usually served at the conclusion of the evening performance to all of the artists and their friends.

AERIAL, GROUND AND TUNING APPARATUS.

The principal troubles that arise in connection with the aerial, ground and tuning system are faulty connections, and with some types of variometer and vario-couplers, trouble can be looked for where the flexible wire or pig tail connections are not used to connect the rotor or moving coil winding with the terminals of the instrument. A very good type of vario-coupler sold at a low price, has this decidedly bad feature, that the bearings are relied upon to carry the current into and out of the rotor winding; in one case these bearings served as first class connections for the rotor for about ten days and then trouble began to develop, manifesting itself by slight noises and crackles in the loud-speaker. This trouble was cleared up entirely by simply taking two short pieces of ordinary lamp cord and soldering them to the brass bearing uprights, and also to the two shafts of the rotor. Switches on vario-coupler primaries are often a source of trouble, as the springs frequently do not hold them tight enough in the bearings to give a perfect circuit. This is overcome by soldering a piece of lamp cord to the circuit wire and to the switch blade shaft.

All aerial and ground connections should be soldered for best results, if you care to have peace of mind and do not wish to hunt for trouble about every other night or so. If you have no soldering iron, borrow one from your local plumber or electrician, and solder every joint you can find, scraping it clean first and then applying some non-corrosive soldering flux, several of which are available on the market, powdered resin being very good for the purpose. A note of warning may be sounded against spring binding posts in audion circuits, at least; the writer has found it the best practice, once the circuit has ben tried out and found to be satisfactory in its operation, to solder the wires to the spring binding post and not rely on the tension of the slotted spring member against the wire, as the slightest change or weakness of pressure at such a point will be amplified many times by the audions and cause disagreeable noises in the head phones or loud-speaker.

The writer has also found it best to solder short lengths of lamp cord or other wire to the flat brass terminals found on some makes of B batteries and not to rely on spring clips for such connections, as this is a fruitful source of crackling noises and variations in the strength of speech as heard in the loud-speaker.

A peculiar trouble which came up with one set a short time ago, and was made manifest by a slight roughness mixed with slight but disagreeable and noticeable noises of the same crackling order, in the speech, was finally found to be due to dust which had settled between the condenser plates in a rotable variable condenser. Therefore, if your cabinet is not thoroughly dust tight, it is a good idea to use a pair of bellows or else your lungs, and blow between the plates about once a week or so, so that they are free from all such dust particles. This trouble is particularly noticeable in houses where hot air furnaces are used. In one case the too familiar noises heard in the loud talker were traced to particles of dirt and oil in the bearing plate on a variable condenser. After this was removed and the bearing wiped dry and clean, no further trouble was encountered.

A RADIO BABY.

Calvin Stenso is claimed by his proud parents to be America's first real radio baby. Mr. and Mrs. Alvin Stenso, who are intimately associated with the Tacoma (Washington) Broadcasting Station, were married at the studio there, and the whole West listened-in to the ceremony. The entire service, from the wedding march to the benediction and concluding kiss, was heard by hundreds of invited though unseen "guests," so that their son certainly has some grounds for his claim.

The Australasian Radio Relay League

By J. W. Robinson, Publicity Officer, Australasian Radio Relay League

Although the support which is being accorded to the recently formed Australasian Radio Relay League affords some evidence of the fact that amateurs as a whole realise how valuable the movement will be to them, there are many experimenters in possession of receiving licenses who have not yet linked up with the League.

Much has been said in these pages regarding the advantages of membership of the League, either as associate or as full members. From the receivers' point of view the main matter to be considered is that the League will be the means of providing something which will make it worth one's while to operate an amateur station. Definite and correct transmission will be carried out by League members and associate members will have an opportunity of entering for one of the various classes of competitions which it is hoped will shortly be arranged.

Furthermore the League hopes to secure the full support of all members so that it may be in a position to voice the views of the experimenters should necessity demand that those views be aired.

We are now passing through a critical period and some body should exist which will be able to speak collectively. Membership of one of the already existing Radio Clubs need not prevent any amateur linking up with the League. The Relay League will carry out work which differs greatly from the work of any Radio Club. Members may quite easily belong to one or more Radio Clubs and also support the Relay League.

AMERICAN LEAGUE.

A communication has been received by the League from the American Radio Relay League. A meeting will be held shortly when the letter will be discussed. Should it be found possible to link up with the American amateurs and establish a chain of relay stations from Australia to America, much will have been done towards putting a girdle of amateur stations around the globe.

Applications for Membership.

Applications for membership may be addressed to the Hon. Secretary or to the Hon. Organising Secretary, Box 378, General Post Office, Sydney.

Cut out the attached form and post it without delay to the Secretary, together with your subscription for one year.

The Secretary,
The Australasian Radio Relay League,
New South Wales Division,
Box 378, General Post Office, Sydney.

..... 192 ..

I, ...

of .....

beg to apply for admission as an active / associate member of the Australasian Radio Relay League. If accepted, I agree to abide by the rules and regulations of the League.

License No. ..... Date of issue .....
Address at which station is maintained .....
Postal Address of applicant .....
Particulars of station .....
Particulars of license (transmitting or receiving) .....
I enclose herewith .....being payment of fees for one year.

Usual signature.....

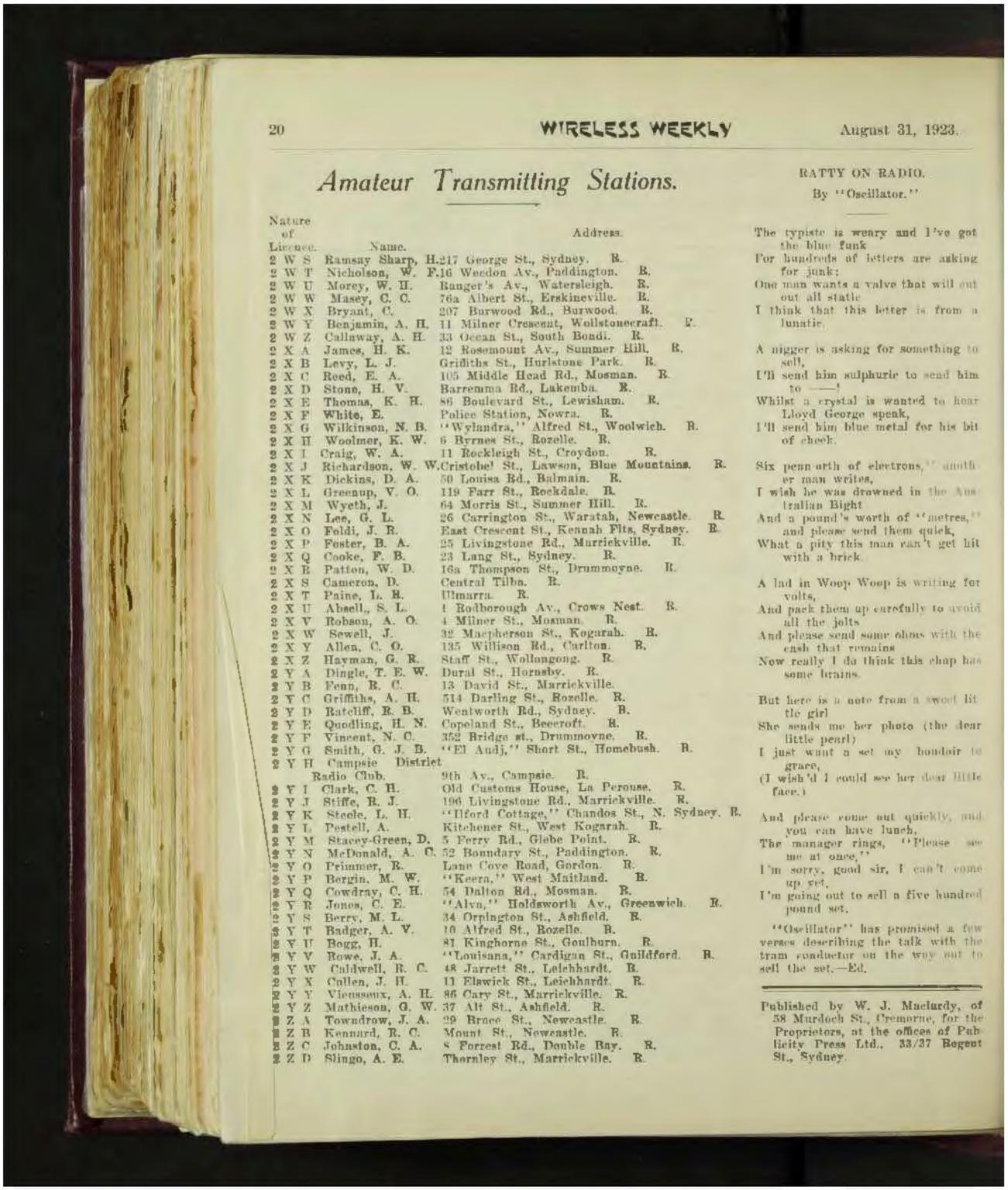
Active membership only to holders of transmitting licenses.
Associate membership to holders of receiving licenses only.

QUALIFICATION FOR MEMBERSHIP:

(a) A bona-fide interest in experimental wireless.
(b) Holder of an experimental license.

P.S.—This form must be accompanied by one year's subscription when lodged.

Fees: Active members, 20/- per annum: associate members, 10/- per an.



Amateur Transmitting Stations.

Nature of Licence.	Name.	Address.	
2 W S	Ramsay Sharp, H.	217 George St., Sydney.	R.
2 W T	Nicholson, W. F.	16 Weedon Av., Paddington.	R.
2 W U	Morey, W. H.	Ranger's Av., Watersleigh.	R.
2 W W	Masey, C. C.	76a Albert St., Erskineville.	R.
2 W X	Bryant, C.	207 Burwood Rd., Burwood.	R.
2 W Y	Benjamin, A. H.	11 Milner Crescent, Wollstonecraft.	R.
2 W Z	Callaway, A. H.	33 Ocean St., South Bondi.	R.
2 X A	James, H. K.	12 Rosemount Av., Summer Hill.	R.
2 X B	Levy, L. J.	Griffiths St., Hurlstone Park.	R.
2 X C	Reed, E. A.	105 Middle Head Rd., Mosman.	R.
2 X D	Stone, H. V.	Barremma Rd., Lakemba.	R.
2 X E	Thomas, K. H.	86 Boulevard St., Lewisham.	R.
2 X F	White, E.	Police Station, Nowra.	R.
2 X G	Wilkinson, N. B.	"Wylandra," Alfred St., Woolwich.	R.
2 X H	Woolmer, K. W.	6 Byrnes St., Rozelle.	R.
2 X I	Craig, W. A.	11 Rockleigh St., Croydon.	R.
2 X J	Richardson, W. W.	Cristobel St., Lawson, Blue Mountains.	R.
2 X K	Dickins, D. A.	50 Louisa Rd., Balmain.	R.
2 X L	Greenup, V. O.	119 Farr St., Rockdale.	R.
2 X M	Wyeth, J.	64 Morris St., Summer Hill.	R.
2 X N	Lee, G. L.	26 Carrington St., Waratah, Newcastle.	R.
2 X O	Foldi, J. R.	East Crescent St., Kennah Flts, Sydney.	R.
2 X P	Foster, B. A.	25 Livingstone Rd., Marrickville.	R.
2 X Q	Cooke, F. B.	23 Lang St., Sydney.	R.
2 X R	Patton, W. D.	16a Thompson St., Drummoyne.	R.
2 X S	Cameron, D.	Central Tilba.	R.
2 X T	Paine, L. R.	Ulmarra.	R.
2 X U	Abaell, S. L.	1 Rodborough Av., Crows Nest.	R.
2 X V	Robson, A. O.	4 Milner St., Mosman.	R.
2 X W	Sewell, J.	32 Macpherson St., Kogarah.	R.
2 X Y	Allen, C. O.	135 Willison Rd., Carlton.	R.
2 X Z	Hayman, G. R.	Staff St., Wollongong.	R.
2 Y A	Dingle, T. E. W.	Dural St., Hornsby.	R.
2 Y B	Fenn, R. C.	13 David St., Marrickville.	
2 Y C	Griffiths, A. H.	514 Darling St., Rozelle.	R.
2 Y D	Ratcliff, R. B.	Wentworth Rd., Sydney.	R.
2 Y E	Quodling, H. N.	Copeland St., Beecroft.	R.
2 Y F	Vincent, N. C.	352 Bridge st., Drummoyne.	R.
2 Y G	Smith, G. J. B.	"El Audj," Short St., Homebush.	R.
2 Y H	Campsie District Radio Club.	9th Av., Campsie.	R.
2 Y I	Clark, C. H.	Old Customs House, La Perouse.	R.
2 Y J	Stiffe, R. J.	196 Livingstone Rd., Marrickville.	R.
2 Y K	Steele, L. H.	"Ilford Cottage," Chandos St., N. Sydney.	R.
2 Y L	Pestell, A.	Kitchener St., West Kogarah.	R.
2 Y M	Stacey-Green, D.	5 Ferry Rd., Glebe Point.	R.
2 Y N	McDonald, A. C.	52 Boundary St., Paddington.	R.
2 Y O	Primmer, R.	Lane Cove Road, Gordon.	R.
2 Y P	Bergin, M. W.	"Keera," West Maitland.	R.
2 Y Q	Cowdray, C. H.	54 Dalton Rd., Mosman.	R.
2 Y R	Jones, C. E.	"Alva," Holdsworth Av., Greenwich.	R.
2 Y S	Berry, M. L.	34 Orpington St., Ashfield.	R.
2 Y T	Badger, A. V.	16 Alfred St., Rozelle.	R.
2 Y U	Bogg, H.	81 Kingborne St., Goulburn.	R.
2 Y V	Rowe, J. A.	"Louisana," Cardigan St., Guildford.	R.
2 Y W	Caldwell, R. C.	48 Jarrett St., Leichhardt.	R.
2 Y X	Cullen, J. H.	11 Elswick St., Leichhardt.	R.
2 Y Y	Vieusseux, A. H.	86 Cary St., Marrickville.	R.
2 Y Z	Mathieson, G. W.	37 Alt St., Ashfield.	R.
2 Z A	Towndrow, J. A.	29 Bruce St., Newcastle.	R.
2 Z B	Kennard, R. C.	Mount St., Newcastle.	R.
2 Z C	Johnston, C. A.	8 Forrest Rd., Double Bay.	R.
2 Z D	Slingo, A. E.	Thornley St., Marrickville.	R.

RATTY ON RADIO.

By "Oscillator."

The typiste is weary and I've got the blue funk
For hundreds of letters are asking for junk:
One man wants a valve that will cut out all static
I think that this letter is from a lunatic.

A nigger is asking for something to sell,
I'll send him sulphuric to send him to ——!
Whilst a crystal is wanted to hear Lloyd George speak,
I'll send him blue metal for his bit of cheek.

Six penn'arth of electrons," another man writes,
I wish he was drowned in the Australian Bight
And a pound's worth of "metres," and please send them quick,
What a pity this man can't get hit with a brick.

A lad in Woop Woop is writing for volts,
And pack them up carefully to avoid all the jolts
And please send some ohms with the cash that remains
Now really I do think this chap has some brains.

But here is a note from a sweet little girl
She sends me her photo (the dear little pearl)
I just want a set my boudoir to grace,
(I wish'd I could see her dear little face.)

And please come out quickly, and you can have lunch,
The manager rings, "Please see me at once,"
I'm sorry, good sir, I can't come up yet,
I'm going out to sell a five hundred pound set.

"Oscillator" has promised a few verses describing the talk with the tram conductor on the way out to sell the set.—Ed.

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