# WIRELESS WEEKLY

THE HUNDRED PER CENT AUSTRALIAN RADIO JOURNAL

Vol. 2
No 39

Sept. 28th 1923

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SPECIAL FEATURE THIS WEEK: **Free Wave Lengths**

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# 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. September 28, 1923. No. 39


## *Should a Free Band of Wave Lengths be Allotted?*

It is contended by some traders that by allotting a range of wave lengths from 0 to 550 for free broadcasting that a more interesting proposition can be put before the public and so increase the sale of apparatus. Meaning that the listener-in when tired of listening to a high class service, will be able to switch over and listen to either the free service or amateur transmissions. There is no doubt that this would be an added incentive to the purchaser, BUT who is going to give these free services and continue them for five years? Would the free service be worth listening to? Or would it be a deterrent to the would-be listener-in, and prevent him buying a set to hear a first-class service.

Though not an actual alteration of the regulations, it was certainly never intended by the proposals put forward at the Conference that a multi band of wave lengths be granted.

There is no doubt that eventually open receivers will be permitted, but as to whether the time is yet ripe is another matter, and we are emphatically of the opinion that the scheme of the "sealed set" proposed and accepted at the Broadcast Conference should be at least given a fair trial.

## *Roster for Week ending 3rd October, 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 |
|---|---|---|---|---|---|
| Thur, Sep. 27 | 2 GR 390 | 2 ER 232 | 2 UW 230 | 2 CI 252 | |
| Friday, 28..... | 2 JM | 2 WV | | | |
| Saturday, 29.. | | 2 GR | 2 JM 236 | 2 ER 232 | |
| Sunday, 30... | | 7 to 7.45<br>2 GR 390 | 7.45 to 9.15<br>2 CM 240 | | 9.15 to 10<br>2 JM 236 |
| Mon., Oct. 1 | 2 GR 390 | 2 WV | 2 UW 230 | 2 CI 252 | 2 ER 232 |
| Tuesday, 2.... | 2 CI 252 | 2 GR 390 | 2 JM 236 | | |
| Wednes., 3..... | 2 GR 390 | 2 WV | 2 UW 238 | 2 CI 252 | |

Transmitters are requested to ring Redfern 732 (during day) and North 226 (at night) to book Roster Times, or call 2 H.P. (330) by Radio Phone return 7 p.m. and 7.30 p.m. daily.

The figures shown beside call sign denote wave length

# HINTS FOR AMATEURS.

Do not burn the thoriated filament tubes at too great a brilliancy; do not turn up the filament rheostat above normal. This will force too much current through the filament and release the electrons so fast that the filament will become "run out" of free electrons in a short time. The filament will burn all right, but there will be little or no signals.

The correct current for the C-301-a, or the UV 201-a, is 1/4 ampere.

If your tubes are of the type mentioned above and they have stopped working and still the filaments appear to be in perfect condition you can bring them back to usefulness by burning them at the correct filament current (1/4 ampere) for an hour or so without the "B" battery being connected to them. This will cause a redistribution of thorium atoms around the surface of the filament which will again start and maintain the requisite stream of electrons for proper operations.

When learning the code, do not study by the eye, but do it by the ear. Do not learn that the letter A, for instance, is represented by a dot (.) followed by a dash (—), but, from the first effort to memorise the code, learn that the letter A sound like Dit-Da-a-a-ah (say it with your mouth); the better B sound like Da-a a-ah—Dit—Dit—Dit, and so on.

Do not use acid soldering flux under any consideration.

An easy way to sharpen up the tuning in a set is to put up another wire, the same length as the original antenna wire and running parallel with it. The new wire should not be closer than four feet to the first wire.

This will increase the capacity of the antenna system and will allow the use of a smaller coil in the antenna circuit which will decrease the resistance and permit looser coupling.

Do not use a "B" battery when its voltage drops below 60 per cent. of its original value. A battery in this condition will have an increased resistance and will reduce the strength of signals and cause all sorts of extraneous noises. Get a new battery.

Clean away any excess soldering paste from the terminals of your set with alcohol and save yourself a lot of trouble in finding out what is wrong with the set.

Make the grid wires in that set of yours as short as possible and keep them isolated from the other circuit wiring.

Do not use shellac or any form of binder on the wire of the coils used in the four-circuit tuner. If you leave the coils dry they will work well but if they are covered with any form of insulating paint they are almost worse than useless.

For the radio experimenter, a useful article to have on hand is a small coil of bell wire. This is a copper wire of about No. 18, and it is wrapped with two thick coverings of waxed cotton thread. It comes in handy for connections when experimenting with new circuits.

A small quantity of vaseline taken on the finger and rubbed on the contacts of a switch will keep the contacts from wearing and grinding themselves away. Contrary to what one would naturally think, this also insures a better electrical contact.

This stunt is used in most of the large electrical research laboratories on delicate measuring instruments.

Keep the distilled water in your storage "A" battery just above the level of the plates. If you do this the top part of the plates will remain "active"; if you do not, the portion above the water-line will not generate any current and you will have lost part of the ampere-hour capacity of the battery—it will not last as long for each charge.

In wiring up a set it is a good plan to use little copper tabs (obtainable in almost all of the electrical stores) for making connections to the instrument terminals and the binding posts. The tabs are inserted underneath the screw of the binding posts and the wires soldered to the tab. Then if you want to tear the set apart to try some other circuit you do not have the instruments all gummed up with solder. The tabs come away clean.

Always turn down the rheostats when you first connect up a new set that you have just completed, and try out a single tube in the sockets before putting in all the tubes. This will save two or three tubes if you have made a mistake in the connections.

The condensers used in the four-circuit tuner should be "low loss" condensers, especially the one used in the stabiliser (absorption) circuit. This is extremely important for if the condensers are poor, the losses will be great and the regenerative effect will be lost.

Oil should not be used on the bearings or movable parts of radio sets. Some (quite a few) of the instruments on the market make use of the metallic bearings for the connections to the movable parts and these would be seriously affected by the film of oil between the bearing surfaces.

## RADIO TELEPHONY IN SOUTH AMERICA.

In Santiago, Valparaiso, and several smaller Chilean cities, interest in radio telephony is growing steadily, and its fuller development only awaits the establishment of a broadcasting station within the country such as those now in operation on the east coast of South America, according to a report from the Department of Commerce. It is reported that broadcasting stations recently erected in Buenos Aires, Montevideo, and Rio de Janeiro, are giving very satisfactory results, and large numbers of amateur receiving sets have been sold in these countries. This is especially true of the Argentine, where conditions for broadcasting programmes are almost ideal as the land generally is flat and radio transmission carries all over the River Plate district, Uruguay and in Southern Brazil on the north as far as the Andes on the west. For this reason the sale of radio equipment has met with great success in that country, and it is now estimated that there are approximately 25,000 sets in Argentine Republic, in comparison with about 100 less than one year ago.

# A Talk on the Care of Telephones.

This article contains some very useful hints which should enable users of telephone receivers to obtain longer life and better service from the headsets.

In the average amateur receiving station the telephones appear to come in for a great deal of neglect. The owner is generally satisfied if signals and telephony are reasonably loud, but as is often the case, additional amplification is employed unnecessarily. The telephones may be at the root of weak reception, although the blame usually attaches itself to some other portion of the apparatus.

When purchasing a pair of telephones great care should be exercised. It does not necessarily follow that the most expensive will be the best or that the cheaper variety are not efficient. The safest rule to follow is that something with a "name" is generally to be relied upon. When the two ends of a really sensitive pair are rubbed together a scratching sound will be heard in the receivers.

To those new to wireless the difference between the two terms "high" and "low" resistance may not be understood. A high resistance pair, if not marked, can usually be distinguished by the earpieces being filled in with a hard, glue-like substance. The reason for this will be obvious later For maximum efficiency the internal resistance of the phones (i.e., the resistance of the pole windings), must equal that of the detector with which they are used. Whether the latter be crystal or valve it will be of the order of several thousands ohms and it therefore follows that the phones must possess very high resistance also. Since they depend for their action upon "ampere-turns" it is useless to use a few turns of high-resistance wire. In practice, many hundreds of turns of fine gauge wire are wound on the pole pieces. It may be argued that many more turns could be put on before the required resistance would be reached if thicker gauge wire were employed but it must be remembered that the larger the wire the more bulky will be the receivers. This is of course an undesirable feature, as they must be essentially as small and light as possible to ensure comfort when worn for long periods.

In the case of high-resistance phones there is no disadvantage in connecting them directly in a crystal circuit, but it is a different matter when a valve is used as a detector. In this case a continuous current will be flowing through the windings and they may be subjected to potentials of between twenty and a hundred volts, or even more. The fine wire used has very thin insulation and is liable to break down, resulting in a continuous crackling noise being heard. In a very short while after this occurs the phones become utterly useless. The risk of shorts between adjacent turns and layers is to a certain extent minimised by pouring in some form of insulating substance such as shellac or paraffin wax and allowing it to cool. There is a possibility of burning them out through an accidental connection which subjects them to the full battery potential, and a certain risk of shocks to the wearer when certain parts of the apparatus be touched.

All these disadvantages can be overcome by using low-resistance phones and a telephone transformer. The transformer is merely an iron core over which is wound a primary and secondary. The high-resistance winding is connected in the place of high resistance phones, to whose resistance that of the winding is equal. The low-resistance winding is joined in series with the low-resistance phones. Thus although the phones are of low resistance the rule of internal and external resistances being equal is still observed. The high-resistance winding can be of relatively thick, well insulated wire, since the size of the transformer is not such an important consideration. The windings of the phones themselves may also be more robust, the ampere-turn being made up by increased current strength. Not only will they be very much less laible to break down, but both phones and wearer will be entirely insulated from the rest of the apparatus. To a great extent the extremely irritating alteration of tuning which occurs when directly connected phones are used, and a movement is made by the operator, may be prevented.

When a transformer is used, instead of the received rectified impulses passing directly through the telephones they flow through the high-resistance winding, and as the current rises and falls so does a magnetic field which it creates. This field affects the low-resistance winding and induces a current in it, which rises and falls at the same rate as that in the detector circuit.

Telephones should never receive hard knocks, such as may be caused by dropping, etc., or their sensitivity will be greatly reduced. The pole-pieces are permanently magnetised to a certain extent and a shock will destroy this magnetism. Some types have the diaphragm supported by a reed, with an adjusting screw at the back. This should be interfered with as little as possible, for it is an easy matter to "over-adjust" and break the reed.

When using phones in a valve circuit there is a right and a wrong way to connect them. While current in one direction will assist the magnetism of the poles, a reverse current will in time totally demagnetise them. This applies, of course, to directly connected phones. The ends should be marked. (This is done by the makers in some cases, but the majority are not marked at all.)

If at any time there is reason to suspect the telephones, their magnetism can be tested and if considerably weakened, the diaphragms will not stick. In some makes there is a small gap designed to protect the windings from any sudden high voltage impulses such as may be occasioned by lightning, induction from nearby transmitters, and accidental connection across the high tension. The points should be set as close as possible without touching, and examined periodically to see that no dust or moisture has caused them to be shorted. It is a good plan to have two pairs in use, changing them directly moisture begins to accumulate through wearing, and a bent or dented diaphragm should be immediately replaced.

Always remember that a pair of telephones requires as much careful handling as a valve. They are almost as delicate, and certainly more expensive when a replacement is needed. Every hard knock means a few more miles off their range.

# Questions on the Regulations.

**EXPERIMENTING—BROADCASTING—TRADING.**

Since Statutory Rules 97, of 1923, were issued on the 1st August, many and varied have been the queries regarding the respective liberties and restrictions on the EXPERIMENTER, the BROADCASTER (Transmitter and Receiver), and the TRADER.

"Wireless Weekly" now offers to its readers the correct answers to any reasonable questions on or concerning Statutory Rules 97, of 1923.

Answers will appear in these columns each week.

Address: "Questions," Box 378, G.P.O., Sydney.

The name and address must be forwarded, but will not be published unless desired.

Questions received up to noon, Friday, of each week, will be answered in the following week's issue.

# Experimental Broadcast.

Broadcasted by Mr. J. Malone (Chief Manager, Telegraphs and (Wireless), from 3DP Station, Melbourne, on Friday, 21st instant:—

"I am very glad to be associated with Sir John Monash in advising you of the competition which is to take place shortly. The prize is something that will be valued greatly by wireless amateurs, and I am sure the competition will be entered into with energy and enthusiasm. In addition to recommending the appeal to you, I desire to avail myself of this unique opportunity of saying something about the wireless regulations. These regulations, which, unfortunately, are misconstrued by some people as unnecessary restrictions on their activities, have been prepared with the object of giving satisfaction and pleasure to all concerned in wireless. To-day we have not advanced very far from the stage of groping in the dark of wireless phenomena, and there is no telling to what extent wireless will be used in five or ten years' time. It is very wise and necessary, therefore, to take early precautions to avoid the chaotic state of interference which must result unless we all obey the laws of the ether. By means of these laws we are endeavouring to regulate all wireless telegraphy activities. Some of the energetic enthusiasts are apt to forget that if the ether is not policed, at all events there are the laws for the conduct of traffic in the ether. Thus it is necessary, under Act of Parliament, in this country, as in all countries, for every wireless set to be licensed by the Government under appropriate conditions. Any person who is listening to me now, and who has no license is therefore breaking the law, and I am afraid there are more than a few. But I think it is mainly a matter of not knowing the law and the reasons for regulations, and I appeal to all who may thus be committing a breach of the law to apply for a license and learn the reasons for and conditions of licensing. We are quite busy enough at present without having to take legal action against the offenders, but it is our duty to see that all stations are licensed. There is another matter connected with traffic in the ether to which I wish to invite your attention, that is, the interference, often unintentional, I believe, caused by persons operating oscillating valves. This 'howling' valve nuisance is well known to most of you, and, while I know and appreciate that many genuine enthusiasts are endeavouring to minimise the evil by instructing their offending confreres, still the evil is great, and with the advent of broadcasting in the near future, will be serious if not checked in time. In fact, there is a danger of the offending few being responsible for undesired restrictions being placed on the work and enjoyment of the great majority of amateurs if the nuisance is not reduced. Some of you possess regenerative circuits which are now prohibited in thickly settled areas, the object, of course, being to cut out the interference caused by these circuits which are in effect small powered transmitters. Therefore, I appeal to all amateurs who are operating regenerative circuits to remember the golden rule and stop that 'howling' valve which you so strongly object to in the other fellow's set. One of the best methods of becoming acquainted with the safe and reasonable means of operating is to join the Wireless Institute or one of its associated clubs, and I strongly recommend that course as there is very useful propaganda and instruction conducted by every well managed club. Finally, I trust that all will enter into the competition with the enthusiasm and energy characteristic of the wireless amateur, and that you will not forget what I have said about getting a license and remembering the other fellow."

# Wireless Traders Take Heed!

The Editor,

"Wireless Weekly,"

33 Regent Street,

Sydney.

Dear Sir,

I will be glad if you will give publicity to the subject matter of this letter, as it appears to be one of considerable importance in interests of successful broadcasting. As you are aware, we have recently decided to closely restrict the use of regenerative circuits, with the object of eliminating the interference which would otherwise result when broadcasting becomes established. Unfortunately, I am led to believe a number of dealers are selling regenerative receivers, and probably some of these sets are sold to people who are unaware of the possibility of trouble to others that may be caused.

I am sure it will only be necessary to remind dealers who may be thus thoughtlessly sowing the seeds of discord to have the necessary action taken with their staffs to prevent the sale of regenerative receivers capable of causing the aerial to oscillate; and also to explain to enquirers that such classes of receivers will not be licensed for broadcasting or experimental reception in closely settled areas. This restriction on the use of receivers will certainly not be welcome to some experimenters, but with the advent of broadcasting we must consider the greatest good for the greatest number where we can do so without undue hardship.

Yours faithfully,

J. MALONE,

Chief Manager,

Telegraphs and Wireless.

(In publishing the above letter, we might say we heartily endorse Mr. J. Malone.—Editor.)


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# MAKE YOUR OWN

## A Vacuum Tube Wave Meter.

By L. H. La Montagne.

This is the first of a series of articles on the practical design of radio apparatus by the author. He proposes to utilise material already in the possession of most amateurs. This article may well be read in conjunction with that by Jay Emm in this issue.

Every amateur should have a wave meter. As the vacuum tube type gives more uniform results and a more sharply defined resonance point with greater ease of operation than a buzzer and phone, its construction justifies the slight additional expense.

Any standard tube may be used, but the larger the tube the better the results as more energy will be available. Very good results may be had with an amplifier tube or other hard tube with 90 volts on the plate.

There is one important point that must not be overlooked. The circuit must be used exactly as it was calibrated. By this is meant that if dry cells furnish the source of energy for the high voltage when calibrating, they must be used in all subsequent work, unless the wavemeter is recalibrated, as it has been found that a motor-generator will change the wave length of the circuit considerably. The same applies to all other parts of the circuit. However the change from one tube to the other, providing it is intended to be used for the same purpose, will make no noticeable difference in the wave length calibration. The wave meter, if carefully calibrated, will be as accurate as the one used for standardisation.

Fig. 1 gives the circuit used, which is a standard Hartley. The inductance L is an air core coil wound on a bakelite form, preferable, 3½ inch. in diameter with No. 24 d.c.c. wire with a total number of 132 turns. When shunted with a .0007 mfd. condenser, the wavelength range is from 150 to 1600 meters. By tapping honeycomb coils at the centre they may be used in place of the special coil and any range desired secured. The proper sizes of these coils may be easily obtained from the tables put out by the manufacturers. If it is not desired to have such a great range, part of the coil may be omitted. The size of wire may be varied from No. 20 to 26 as long as the total number of turns remain the same. The core may be three or four inches in diameter without changing the calibration too much. The diagram shows the arrangement and number of turns for each tap which goes to the two switches. These two switches are operated independently, though with a little ingenuity both may be operated at the same time. Both switches must be placed on the same numbered tap or the circuit will refuse to oscillate.

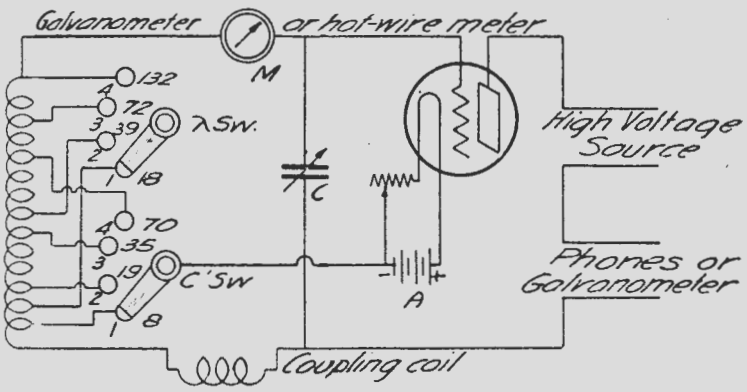


*Fig 1 Wavemeter Wiring Diagram*

The condenser used in the wave meter originally built had a capacity of .0007 mfds. with decrement type of plate. A .0005 mfd. (23 plate) condenser may be substituted with a decrease in the maximum wave length, but which will do no particular harm. It is best not to use over a .0007 condenser, as the tube may refuse to oscillate with the higher values of capacity. The condenser used should be rigidly constructed with heavy plates swung on a good-sized shaft. The end pieces should be bakelite. The contact to the moving plates should be positive. The condenser as a whole should be built so that there is a minimum amount of change possible.

The coupling coil consists of five turns of the same size wire on the same diameter core as the main coil. This coil is attached to binding posts by a flexible core to the main set so that its position may be varied. This cord must not be changed in any manner after calibration. When calibrating, the coupling coil should be in place, as it is part of the oscillating circuit. This coil is used to couple the oscillator to whatever circuit is under measurement.

The socket and rheostat is determined by the type of tube used, and may be of any standard make adapted to the tube. The high voltage may be from any source available, but must not be changed after calibration as explained before. The A battery may be a storage battery or dry cells, depending upon the tube used.

The galvanometer may be omitted and a pair of phones used, though the phones are not quite as satisfactory for several reasons. With the many transmitting sets now equipped with a high voltage voltmeter,

the voltmeter may be used as a galvanometer by omitting the external multiplier, as the meter need not be calibrated as comparative readings only are taken. The voltmeter used this way will be found satisfactory for use with receiving tubes, but, of course, is too small for larger tubes. If a meter is to be purchased, the model 301 Weston 5 milli-ampere will be found to be very satisfactory. Extreme care should be taken not to overload any of these meters. As a precaution, some kind of resistance of from one thousand to five thousand ohms should be put in series with the meter to prevent burning out if the high voltage source is accidentally shorted.

Fig. 2 gives a suggested panel layout. A small shelf should be attached to the panel for mounting the tube and inductance coil. A liberal number of binding posts should be used so that the circuit may be broken at almost any place for insertion of measuring instruments. All wiring should be rigidly soldered, and as far away from other wiring as possible. If care is not taken in the wiring, false resonance points will be introduced which will cause considerable confusion.

No grid condenser or leak is used, though with some tubes it may be necessary to use one. No difficulty was had in making the C-301 or VT-1 tubes oscillate when the grid condenser is omitted, providing the polarity of the A battery is as shown.

When the circuit is set up and the proper adjustments have been made, the galvanometer will show a very large deflection when the tube is not oscillating, and a comparatively small deflection when oscillating properly. When loosely coupled to another circuit, and the condenser C is varied to obtain resonance, a large increase in deflection will take place at exact resonance of the two circuits, showing the withdrawal of energy from the wave meter circuit. The point of maximum deflection is very sharp, and is sharper the looser the coupling. This deflection may be easily passed by if the condenser is turned too rapidly. To be sure that the deflection is due to resonance, the condenser should be touched with the finger tips, which will immediately stop the tube from oscillating, and the galvanometer will drop to its former lower value. If phones are used for determining the resonance point, the familiar click will be heard when the two circuits are in tune. If an amplifier is used, more accurate results may be obtained, as the coupling may be loosened considerably more.

The usual method of calibration is followed. If the wave meter used for calibration has a hot-wire meter on it, a double check will be afforded, as considerable energy will be transferred, thus giving a readable deflection which will be at its maximum when the pointer on our meter is at its maximum. In some instances, a much more easily obtained reading is found with the meter in the grid circuit. Binding posts should be left to do this when building the meter. A trial will show at which place the resonance point is the most easily indicated. The meter behaves in a similar fashion to one placed in the plate circuit, though the deflection is smaller as a rule.

A few words of caution in the use and calibration. It may be difficult to get the wave meter to oscillate below 150 meters because of the length of the wiring, etc. If for any reason the tube should stop oscillating, a false resonance point will be indicated. This should always be tested for by shorting the condenser with the finger tips as explained above. The readings used should be those that are indicated by a sharp rise and drop of the galvanometer. The condenser should be used between 10 and 90 degrees out of a possible hundred. If the coupling is too close to the circuit under measurement, two resonance points will be indicated. The obvious remedy is to loosen the coupling. In some cases it will be found that there is a critical coupling at which the resonance point is most easily found. The coils under measurement should be absolutely dry, as a freshly-coated coil will give no resonance indication due to the high resistance leakage along its surface. Like any other piece of apparatus, a few trials will show the correct procedure in using it.

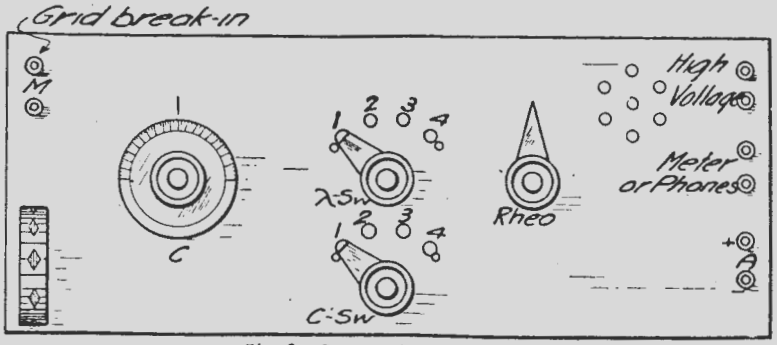


*Fig. 2. Suggested Panel Layout*

The above instrument may be used in practically every measurement that is needed in radio work, and with a very high degree of accuracy, which is only limited by the instrument from which it is calibrated.

## 6,000 NEW FANS MONTHLY IN ENGLAND.

According to report, 6,000 radio fans a month are applying for receiving licenses in England, despite the red tape and rules governing reception of broadcasting.


## BOOKS ON WIRELESS

**Radio Frequency Amplifiers,** and How to Make Them, by J. M. Avery Price, 2/3 posted.

**Wireless Component Parts,** How to Make, by B. Jones, 2/3 posted.

**How to Tune Your Radio Set,** by M. Muhleman, price 2/3 posted.

**Practical Wireless Sets for All,** by P. Harris, Price 2/3 posted.

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# *Home-made Potentiometer.*

Most of those who conduct serious experimental work with crystal detectors swear by carborundum for general use on account of its stability. Though this crystal will give respectable results when used with a carbon contact without any applied E.M.F. it is at its best when a steel contact is used and a steady voltage of from 1 to 3 volts is applied.

For detector work there is nothing to beat the centre connected battery

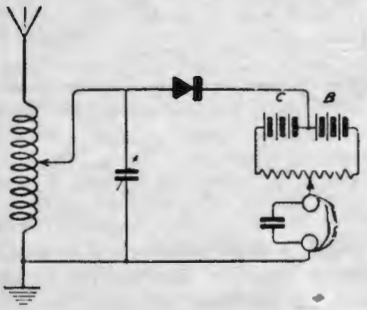


*Fig. 1.—A simple potentiometer circuit.*

and potentiometer circuit shown in Fig. 1. For this two flashlamp batteries may be used joined in series the connection being made by soldering a lead to the long strip of one battery, which is bent back and soldered to the short strip of the other.

As current flows from the negative pole to the positive it will be seen that when the slider is moved to the right-hand end of the resistance an E.M.F. of 4½ volts will be applied to the crystal, current flowing in a clockwise direction from battery B round the circuit consisting of 'phones, tuning inductance and detector. If the slider is at the opposite end of the potentiometer the flow of current will be from battery C in the reverse direction. The voltage will be decreased in either case by moving the slider towards the middle of its travel; at this point it will be zero, since the batteries are now in opposition.

A potentiometer to be suitable for use with flashlamp batteries must have a very high resistance, of the order of, say, 500 to 600 ohms, otherwise they will not last long if much work is done with the set.

Fig. 2 shows how such a potentiometer may be made. A hard wood cylinder 2 inches in diameter is mounted by means of screws between two 3-inch square ebonite end pieces each 1/4-inch thick. On to the wooden roller we wind 1½ ounces of No. 32 enamelled resistance wire, the ends of which are passed through very small holes drilled in the ebonite. A slider moving on a square rod is fitted as shown and provided with a terminal.

The instrument is now mounted on a polished wood base on which are two terminals to which the ends of the windings are secured. A small cut-out switch should be fitted between one terminal and the lead

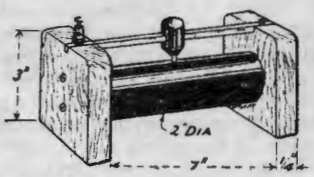


*Fig. 2.—The finished potentiometer.*

running to it so that when the set is not in use the battery current may be switched off.

This potentiometer has a resistance of about 600 ohms, and as the E.M.F. of the two batteries in series is 9 volts the current flowing will be only 15 milliamperes, which should mean a fairly long life for them, provided that the switch is used.

## A CONDENSER TIP.

The true experimenter is constantly needing fixed condensers of various values, but does not need a large collection. An excellent semi-permanent fixed condenser can be made up between two brass plates drilled at the four corners with holes to take tightening screws. (The top holes should be brushed with ebonite.) The tinfoil or copper tabs can then be bent under the top plate at one end and the bottom plate at the other, and the whole tightened up. Positive connection is then possible to the two plates without soldering; the capacity is constant and the value can be changed rapidly without wasting foil or mica.

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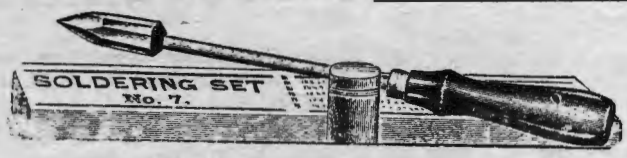


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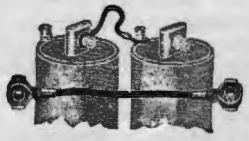

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## DOUBLE TERMINALS.

Many experimenters would make use of double terminals if they were acquainted with their advantages. When two or more wires have to be taken to one terminal, the changing of one wire is generally awkward, as all the wires drop off. Double terminals having two milled nuts are readily obtainable, and enable the permanent wires to be held fast when the others are changed.

P. W. H.

## AN IMPROVED CRYSTAL CUP.

It is surprising that so little thought has been given by the makers of wireless apparatus to the crystal cup, when one considers how unsuitable the usual pattern is. Crystal cups are generally far too shallow, with the result that when the crystal is placed in position and the clamping screw is tightened up the crystal is either forced out of the cup or the crystal is broken. Another fault is that only the top of the crystal can be utilised.

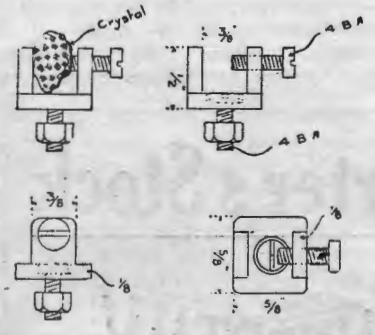



*Fig. 3.—Details of the cup.*

A glance at Fig. 3 (which is self-explanatory) shows that the crystal has a flat surface to butt against and is held in position by a substantial screw. Another point that will be noticed is that two sides of the cup have been cut away exposing as large an area as possible to the contact wire. The cup can be readily made by placing a short length of 5/8 in. square brass rod in the vice, then cut to the shape shown in Fig. 3, a hack saw being used for the purpose. A coarse file of square section with one smooth side should be used to remove the metal in the centre.

This cup has been a great success, and I think it is unfortunate that no manufacturer has placed a crystal cup of of this type on the market.

## RESISTANCE ADAPTER.

The popular tuned-anode coupling shunted with a small variable condenser, is extremely efficient on all wave lengths, but for higher wave lengths the resistance-capacity coupling is preferable. The resistance, which is non-inductive, usually has a value of about 70,000 ohms, and this little component can be easily adapted to the existing coil

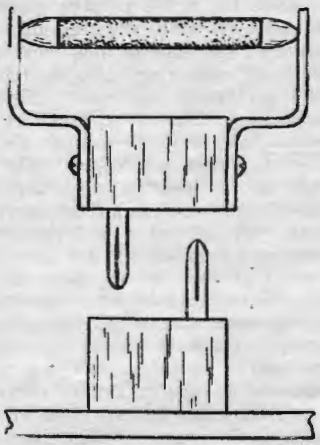


*Fig. 4.—Method of mounting anode resistances.*

socket, in the manner shown in Fig. 4, so that it is not necessary to alter the internal wiring of the receiver. Two strips of spring brass, of the same width as the ebonite coil plug, are drilled and bent to the shape indicated in Fig. 5, and attached to the sides of a standard coil plug by means of the two screws which make contact with the metal plug and socket, as shown in Fig. 4. The holes in the top portion of the strips should be just large enough to accommodate the pointed metal ends of the resistance, and these should be slightly countersunk on the insides, to ensure a perfectly clean contact. The exact length of the brass strips, will, of course, depend on the length of the resistance.

O. J. R.

## FIBRE FOR INSULATION.

"If only there was something just as good as ebonite, but much cheaper!" Most of us have said this at one time or another when we were making up apparatus and found that the cost of the panels needed ran into quite unexpected figures. Except for bakelite and the coal-tar product often used for making the bases of rheostats, there is nothing so good as an insulator for wireless purposes. Presspahn is excellent for making inductance tubes, but as usually only the thin sheets are sold, the thick sheets being somewhat difficult to obtain from the average wireless dealer, it is of little use for panels. Some constructors have tried slate, which has many advantages; it is cheap, it can be drilled and sawn in the ordinary way, and it takes a good-looking finish. Slate, however, has one serious drawback; it frequently contains metallic veins, and if they are present it is absolutely useless. If you intend to use this material, have it tested with a Megger before you start to work it, for nothing is more annoying than to find, after a panel has been finished up, that it cannot be used on account of its poor insulating qualities.

The only remaining substitute for ebonite is fibre, which has become rather discredited by wireless men. Fibre consists of practically pure cellulose. It is made by a special process from a cotton or flax basis. During manufacture it is enormously condensed, so that quite a small sheet represents a large amount of the original material. The one great drawback in the use of fibre as an insulator is its hygroscopic nature. Oils will not sink into it, but it readily absorbs water up to 5 per cent. or more of its own weight. When damp the insulation that is provided is so poor as to be quite useless for high frequency work.

Though fibre is not recommended for use as the material of entire panels which have to deal even with the less rapid oscillations of speech frequencies, it can be employed in various parts of the set if it is properly treated, and its use will result in a certain saving, for it is a good deal less expensive than ebonite.

Fibre will do quite well for the bases of rheostats, for the formers of potentiometers, for extension handles to inductances or condensers, and for mounting battery switches. There are also various other places where high insulation is not required in which it can be used without detracting from the set's efficiency.

The best method of counteracting its hygroscopic tendencies is to dry it for five or six hours in an oven whose temperature is not allowed to rise above boiling point, and then to give it two or three coats of thin shellac varnish. As

it is apt to shrink when dried, it is advisable to give it a preliminary "cooking" before it is trimmed and drilled, and then to give it a final spell in the oven.

It can be drilled, tapped, sawn, or turned in the lathe, but as it is apt to heat up whilst being worked, oil should be used as a lubricant. For lathe work, diamond-pointed tools are to be recommended. Owing to the way in which it shrinks and swells it cannot be finished with extreme accuracy. Thus a 2 inch disc suitable for the base later from 2.01 to 1.99 in., accord- of a rheostat might measure a little ing to the dampness and dryness of the air. Most of the parts, however, for which it is suitable do not call for even such accuracy as this.

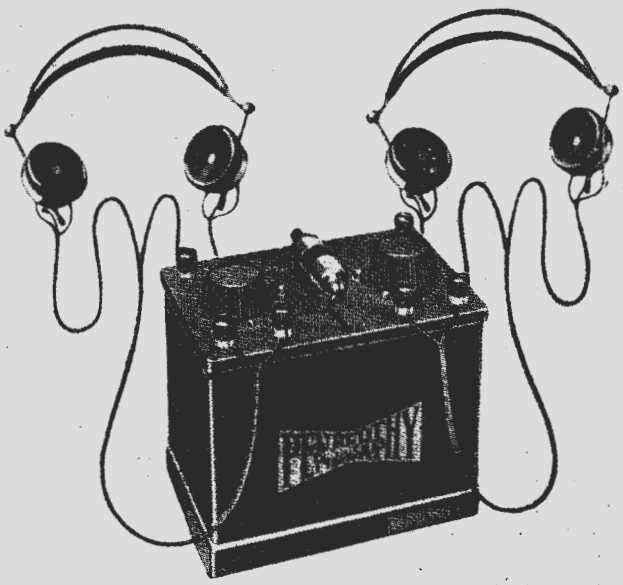
If fibre is used for potentiometers care should be taken to select resistance wire of a gauge stout enough to ensure that excessive overheating shall not take place. Fibre is unaffected by temperatures up to 100 degrees C; but if subjected to a heat of 150 degrees C. for prolonged periods it loses strength. At 200 degrees C. it begins to break up, at 250 degrees C. it smokes, and at rather less than 300 degrees C. it catches fire.

# *Crystal Points.*

On several occasions recently the writer of these notes has been asked to examine crystal receiving sets which have not been giving good results. Nearly always the trouble has been entirely due to the "cat-whisker." Many receiving sets are fitted with cat-whiskers which are much too thick to give satisfactory results with crystals of the ordinary type, and in most cases the wire is of copper or brass, both very easily oxidisable metals. Now it is necessary that the contact of the wire on the crystal should always be quite clean and bright. If the metal is oxidised in any way, the oxide forms an insulating covering on the tip of wire, and good results cannot be obtained. For this reason I recommend all users of crystal sets to fit gold wire cat-whiskers to their detectors. Such wires are now obtainable from any reputable dealer at prices ranging from fourpence to one shilling; there is no need to delay fitting them on the grounds of expense. Not only are these wires of finer gauge than is usually fitted to detectors (this in itself is an advantage) but the non-oxidisable nature of the gold ensures the point remaining in good condition for far longer periods than would otherwise be the case.

What has become of the pre-war range of crystals which we "old-stagers" used so successfully? Silicon seems to have disappeared almost entirely from the market, or at least is not generally fitted nowadays.

Fused silicon proved a very good detector and maintained its sensitivity for long periods. The writer's impression is that it kept its adjustment for longer periods than either galena or any of the treated galena crystals which now masquerade under so many trade names. Some of us used to obtain excellent results by a contact between a piece of lead pencil and silicon, although the usual cat-whisker wire serves almost as well. Good specimens of iron pyrites were frequently found to be very sensitive, and in pre-war times practically all of the French Government Stations were fitted with iron pyrites crystal detectors. An

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excellent brand of crystals of this nature used to be marketed under the name of "Ferron," and was particularly popular in the United States. It does not seem to be available now.

Many of the popular crystals are very sensitive to the effects of heating and therefore particular pains should be taken when mounting them. The standard method of mounting crystals is in "Wood's metal" an alloy containing lead, tin and bismuth. It is interesting to note that any increase in the proportion of bismuth reduces the melting point of a metal very considerably. Thus an alloy consisting of four parts of lead, four of tin, and one of bismuth has a melting point of 320 degrees Fahrenheit, whereas one with eight parts of lead, four of tin and fifteen of bismuth melts at only 150 degrees Fahrenheit, or much lower than the boiling point of water. Unfortunately many of the soft solders sold as Wood's metal have far too high a melting point. Even when the fusible metal melts at a low temperature it is quite possible to overheat it. The best method of mounting crystals is to break off the right amount of Wood's metal to fill the crystal cup, and then to hold a hot soldering iron or poker against the outside of the metal cup until it is hot enough to melt the metal inside. Immediately the alloy melts the crystal should be pressed into it with the aid of a pair of tweezers, avoidng pressing the surface of the crystal with the fingers. Genuine Wood's metal will hold the crystal quite tightly when it is set and the temperature will not be high enough to injure the crystal. As genuine Wood's metal is rather expensive and ordinary solder quite cheap, it is easy to understand that the higher melting point solders are often passed off on the unsuspecting wireless purchaser as Wood's metal.

When adjusting a crystal do not rub the wire contacts backward and forwards across the surface to find the best point, but lift the wire and replace it every time it is necessary to move contact. This will avoid scratching the crystal surface and thus injuring its sensitivity.

One frequently hears the question, "What is the best crystal to use for broadcast reception?" It is necessary to point out that there is no one crystal, or rather type of crystal, which can be unhesitatingly recommended throughout. So much depends upon the particular specimen and the way it is used. Most of the crystals sold are good, but, as is evident from the first paragraph in this note, a badly adjusted or oxidised cat-whisker may easily give trouble and create a wrong impression with the best of crystals. Some crystals seem to work best with a fairly firm contact of the cat-whisker, whilst others seem to need particularly light adjustment. Again, different parts of the same crystal may prove to need different adjustments. Many crystals seem to work excellently not with one point, but with three or four points together, such as can be made by soldering several pieces of the fine wire found in electric lighting flex on to the end of a thicker wire. The small brushes made in this way are easy to adjust and frequently improve reception.

High-resistance telephones always give the best results with crystal detectors, although when signals are strong it is quite possible to use low resistance telephones of 120 ohms. The use of low-resistance telephones will do no harm whatever to the instrument, but low-resistance and high-resistance telephones cannot be used together in parallel, or the low-resistance telephones will take all of the signals and nothing will be heard in the other pair. If, however, they are joined in series in the manner described in the previous paragraph, both pairs can be used together, although the effect will not be so satisfactory as if both of the pairs were of the same resistance.

Long-distance reception with crystal detectors is often announced in the daily paper, and while normally 25 to 30 miles seems about the limit of successful reception from a broadcasting station, with an ordinary aerial and the average crystal set, occasionally far greater distances than this are covered. In almost every case it will be found that there is no special virtue in the tuner, and no magic crystal has been discovered. Everything seems to depend on the particular locality, and in cases where such admirable results are obtained the substitution of other tuners and other crystals does not appreciably alter the result. There are of couse many "dead" spots in this country, where for some reason or other it is extremely difficult to receive broadcasting satisfactorily. But there are also several particularly "live" spots, to which very little reference has been made. In some parts of the country extraordinary good results seem to be obtainable from distance broadcasting stations,


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and very frequently one hears of cases where broadcasting has been received from stations 100 miles away on a simple crystal receiver. Of course, a good aerial makes a lot of difference, but in the dead spots the best of aerials seem to be practically useless. No full explanation has yet been found to cover these peculiarities and scientists have hardly accumulated sufficient data yet to investigate the matter thoroughly.

If you have a cat-whisker giving trouble, and which you suspect is oxidised, it is quite a simple matter to nip off the end of the wire with a pair of scissors and expose a new and fresh point. If this does not immediately improve matters the trouble can be looked for elsewhere.

## THE WIRELESS YEAR BOOK.

The 1923 edition of "The Year Book of Wireless Telegraphy and Telephony," published every year by the Marconi's Wireless Telegraph Company, is bulkier than ever. This may be ascribed to the advent of broadcasting which has caused an interest in radio matters to be generated in many new places. Though there has been no marked progress in scientific development during the year that most useful feature, the "Record of Development," still makes interesting and informative reading, and the value of this is much enhanced by Mr. Platt's "Historical Survey." On the other hand, large power wireless stations are being constructed in every part of the world, and in many ways wireless or radio is becoming more and more a part of our daily life. All this is reflected on the Year Book by an enlargement of the existing features and by the publication of fresh matter relating to direction finding. A map section shows the location of every wireless station in the world.

## NEWSPAPERS ON STRIKE.

Reports from New York state the newspapers in that city are on strike and the great departmental stores have shown a large falling off in business owing to the lack of advertising.

Different from this country advertising by wireless broadcasting is prohibited in U.S.A.

# *List of N.S.W. Radio Clubs.*

Croydon.—G. Maxwell Cutts "Carwell," Highbury Street, Croydon.
Northbridge and District Wireless Experimental Society.—A. H. Vincent, "Aberville," Sailor Bay Road, Northbridge.
Sydney Grammar.—Hon. Secretary.
Balmain.—F. W. Riccord, 77 Grove Street, Balmain.
Leichhardt.—W. J. Zech, 145 Booth Street, Annandale.
Illawarra.—W. D. Grahm, 44 Cameron Street, Rockdale.
Bondi.—A. L. Prince, 269 Birrell Street, Bondi.
Western Suburbs Amateur Wireless Association.—G. E. Challenger, 77 Park Road, Auburn.
Waverley Amateur Radio Club.—G. Thomson, 87 McPherson Street, Waverley.
Queensland Insurance Radio Club.—A. S. Llewellyn, C/r. Pitt and Bridge Streets, Sydney.
Concord Radio Club.—A. Smith, "Quondong," La Mascotte Avenue, Concord.
Drummoyne.—H. G. Lucas, "Colombo," Tavistock Street, Drummoyne.
Kuring-gai.—R. R. Wilshire, Help Street, Chatswood.
Newcastle.—Lionel T. Swain, 135 Beaumont Street, Hamilton.
Metropolitan.—Hon. Secretary, c/o Miss Wallace, Royal Arcade, Sydney.
Wentworth.—Wallace Best, Carlisle Street, Rose Bay.
North Sydney.—J. O'Brien, c/r. Alfred and High Streets, North Sydney.
Goulburn.—G. Culham, Goulburn.
Campsie and District Radio Club.—W. Hughes, "Loch Vennachar," Evaline Street, Campsie.
Wollongong Radio Club.—E. A. Williams, Williams and Son, Wollongong. 'Phone, 42 W.
Manly Radio Club.—C/o. Colville Moore.
Marrickville.—Reg. G. Ellis, 40 Park Road, Marrickville.
Armidale Radio Club.—Hon. Secretary, 149 Faulkner Street Armidale; Commonwealth Electoral Office, P.O. Building, Armidale.
Canterbury Intermediate High School Radio Club.—Jack Quirk.
Military Radio Association.—E. Husband, "Waterview," Victoria Street, North Sydney.
Broken Hill.—T. W. Erskine, 104 Thomas Street, Broken Hill.
Tamworth.—L. V. G. Todd, Denison Street, West Tamworth.
Burwood.—J. P. Cureton, "Maruna," Burwood Road, Burwood.
North Sydney Church of England Grammar School.—Hon. Secretary.
Boy Scouts' Radio Section.—Aubrey Johnston, Margaret Street.
Neutral Bay.—Hon. Secretary, "Belle Vue," 180 Kurraba Road, Neutral Bay.
Railways and Tramway Radio Association.—Hon. Secretary, Railway Institute, Sydney.
Wyong Radio Club.—S. Adams, Anzac Avenue, Wyong.
Killara Radio Club.—A. H. Gray, Hon. Secretary. "Moylough," Florence Street, Killara.
Australasian Radio Relay League.—R. D. Charlesworth, 173 Parramatta Road, Haberfield.
Parramatta Amateur Radio Club.—H. Melville, Electricity House, Church street, Parramatta.
Leichhardt Junior Technical School.—C. Hannah.
Bega Radio Club.—Mrs. R. V. Ritchie "Manoh," Hill Street, Bega.

## NEW YORK BROADCASTING.

The Broadcast Central Station has now been operating in the heart of New York City for several months, and has been functioning very well indeed, especially in view of the unfavourable summer weather and the location of that station in the chart of the metropolis The Broadcast Central is really two stations in one—WJZ and WJY. The two lofty steel towers which rise some 400 feet above 42d Street, New York City, provide support for two antennas, and this super-station transmits two broadcast programmes simultaneously, on different wave lengths. WJZ transmits on a 455lmetre wave length, and WJY on 405 metre wave length.

## CONVERTING CRYSTAL DETECTORS.

Many readers possessing cat-whisker detectors have discovered the advantages of a Perikon detector. A highly efficient detector of this latter type can be made from old or existing parts of the former type. A detector built on the lines described herein has been used by the writer with very satisfactory results. The diagram, Fig. 6, shows how it is built up. It will be seen that from its variety of movements it has many advantages over the existing types now on the market, which have practically only one radial movement. Cup 1 has a complete circular and a backward and forward movement, whilst Cup 2 has a similar movement with the addition of a ball-joint movement.

The cups are screwed on and can easily be removed to allow other cups to be replaced. Cup 1 is supported by a plain angle piece to which two terminal nuts are soldered as shown. The terminal is screwed through these nuts and into the cup, a further nut being used to tighten the cup.

Cup 2 is supported by an ordinary type of ball-socket standard, the end of the adjusting arm being screwed into the cup as before. Between the standard and the cup a spring is placed. On the other side of the standard arm a nut is forced so that the position may be al-

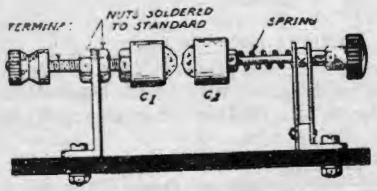


*Fig. 6.—The converted Perikon detector.*

tered if desired. The adjusting arm should be a sliding fit in the ball-socket. To adjust, cup 1 is screwed forward to a suitable position, while cup 2 is pulled back. Cup 2 is then allowed to come forward by means of the spring until it sits on cup 1. If the tension is too great, cup 1 is simply screwed back a turn. The adjustment is quite permanent when obtained.

H.B.

## A 'PHONE SAFEGUARD.

The beginner is often puzzled as to the respective merits of high and low resistance telephones. "Is it better, he asks, "to use the L.R. type in conjunction with a telephone transformer, or does one get better results with the H.R. type?"

High resistance telephones have a very large number of turns of wire crowded into a very small space, and the wire is so fine that it does not require a great current to burn out the windings or to develop a fault in their insulation, for it must be remembered that the whole plate current of the last amplifying valve flows through them. Crystal receivers, of course, are not subject to this disadvantage, and H.R. telephones are always to be recommended for them. During the war a very large number of telephones were wound with so many turns of fine wire that their resistance was 8,000 ohms, and they have since come upon the market through the Disposals Board. Although they are certainly the most sensitive telephones obtainable, these telephones have the annoying and expensive habit of burning out if carelessly used.

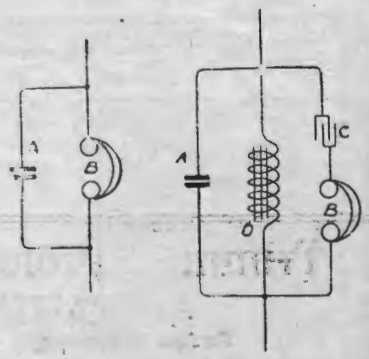


*Fig. 7.—Showing the shunt device*

Low-resistance telephones, on the other hand, are quite free from this disadvantage. The steady plate current flows through the primary of the telephone transformer, and the telephone windings are relieved from this strain. Nevertheless, the very fact of using an extra transformer tends to introduce more distortion and always causes some weakening of signal strength. High resistance telephones are, therefore, greatly to be preferred if they can be freed from their disadvantages, and this can be done quite simply.

Fig. 7 shows the way in which the telephones are usually arranged

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in the plate circuit of the last valve, shunted by a blocking condenser A if this should be the detector valve. The improvement is shown on the right. In place of the telephones a large iron-cored choke coil, D, is inserted into the circuit. The secondary of a disused Ford ignition coil is ideal for the purpose, and these coils may be picked up at almost any large garage. A is the blocking condenser, as before, havig a value of about 0.002 F, whilst C is a 2 F Mansbridge condenser.

The action of the device is as follows: The steady plate current passes freely through the choke coil D and is quite unable to pass through the telephones because of the large condenser C. Radio frequency impulses that may be present pass through A, but are prevented by the high inductance of D and B from taking any other path. Audio-frequency impulses which are to record the signals find that A and D have a very high impedance for their frequency and therefore take the easier path through B and C. If C is made large enough, no difference will be found between the signal strength of the arraugements shown on the right and on the left of Fig. 7.

A further advantage of the device is that in many cases it improves the quality of the reproduction of strong signals. This is especially noticeable in the case of high resistance loud speakers which are heavily loaded. L. A. S.

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Atmospherics. — Valuable excuse for noises made by high-tension battery.

Battery—See Assault.

Buzzer.—Appliance that makes a noise like an infuriated bluebottle. Used for finding ticklish spot in crystal's ribs.

Circuits. — Takes you back to where you started from. Ever tried arguing with the wife?

Faults, how to prevent Recurrence of—Try the coke-hammer.

Flux.—Messy compound that prevents solder from sticking.

Ground.—Term used by Americans, who are too modest to speak of "my Earth."

MHO.—An ohm turned inside out. Half a mho is the unit of expectation.

Oscillation.—Practice indulged in during broadcasting hours. Produces squeals. Not to be confounded with osculation, though times and results are similar.

Reluctance.—Feeling that comes over magnates when asked by income tax man to part. Delay in handing over what they've got is called "hysteresis." As resistance is always anticipated, envelope containing demand note is tastefully marked O.H.M.S.

Spark Signals.—Iddy-upties that ping when VIS is working. See National Physics Laboratory.

Tight Coupling.—See Jazz.

Watt.—If you multiply volts by amperes, watt is the answer?

Wireless.—New hobby. So called because any receiving set contains several miles of wire.

## SECURING LEAD-IN WIRES.

Most lead-in insulators are fitted at the outer end with a nut to secure the wires, and frequently its size is really too small satisfactorily to hold a pair of thick aerial wires of a two-wire aerial. In such cases, it will be found very convenient to cut a strip of brass about ½ inch wide and 4 inch long, of such a thickness as will not easily bend. In this drill three holes—the centre one of such a size as will slip over the end of the brass rod in the insulator. The other two holes are intended to hold two terminals of the type with a central hole. The shanks of these terminals are passed through the holes and secured by nuts. The two aerial wires can then be secured firmly and easily, and if necessary adjusted for length.

P. W. H.


# Trimm "Professional" Head Set 3000 Ohms

## A QUALITY PHONE AT A QUANTITY PRICE

**Perfect Reproduction and Articulation at Any Range—WEIGHT ONLY 10½ OZS.**

Compare these specifications with any head set on the market at any price, and see why the TRIMM "Professional" is the biggest value in the Head Set Field:—Moulded Bakelite cases and ear caps which will not warp like cheap composition; no exposed metal parts to become tarnished; Single bar Tungsten steel magnets formed to shape to insure uniform tampering and magnetising; Coils wound with maximum number of turns of No. 40 enamelled wire to full resistance of 3000 ohms; Reinforced terminals of stranded wire brought out from coil windings to solder clips; Coils covered with insulating cloth—no fine wires exposed; Arrester gap across cord terminals; Improved type head band covered with resilient tubing—comfortable, light weight, and distinctive in appearance.

Obtainable from Continental Radio and Electric Co., 165 Kent St.; Electric Utility Co., 619 George St.; Anthony Hordern & Sons, Ltd., George St.; F. E. O'Sullivan, 296 Pitt St.; Ramsay Sharp & Co., Ltd., 217 George St.; Radio Co., Ltd., 15 Loftus St.; The Colville-Moore Wireless Supplies, 10 Rowe St.; Wireless Supplies Ltd., 21 Royal Arcade; Miss F. V. Wallace, 6 Royal Arcade, and all Wireless Supply Houses.

PRICE 45/- EACH

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## KILLARA RADIO CLUB.

The tenth general meeting of the Killara Radio Club was held on September 14, at 8 p.m. After the minutes of the previous meeting had been read and confirmed, and some correspondence read, Mr. Hawley gave a very interesting lecture on "Batteries."

Two short talks were then given, Dr. Greenwell dealing with "Elementary Electricity," and Mr. Gray with "Ether Waves."

The meeting then adjourned.

The club meets fortnightly in the Killara Congregational Hall. Experimenters who do not belong to the club are invited to come along. Please send communications to the Hon. Secretary, "Moylough," Florence Street, Killara. J2661.

## CROYDON RADIO CLUB.

The usual weekly meeting of the Croydon Radio Club was held on Saturday, 15th September, at the club rooms, "Rockleigh," Lang Street, Croydon, at 7.30 p.m. The Rev. W. E. Maltby, president of the club, presided.

Mr. C. Luckman gave those present a lecture on the drawing of diagrams. He showed the way to lay out paper diagrams before drilling panels, and many other useful points for constructional work in experimenting. Buzzer practice was given as usual.

The Hon. Secretary will be pleased to give information regarding the club to persons interested. Address, G. Maxwell Cutts, "Carwell," Highbury Street, Croydon.

## NOTES ON EXPERIMENTAL TRANSMISSION.

2DS is a lot stronger and clearer since he reduced his wave length.

* * *

2JM is again transmitting. He is quite a lot stronger on the lower wave length, and is using the three coil set.

* * *

2ZG has been going strongly every evening, also in the early hours of the morning. He was heard transmitting gramophone music recently at "three o'clock in the morning."

* * *

2GR has been having some minor troubles with his set lately, but we are glad to hear him going strongly again every evening.

## THE RADIO BUGS—ANY EVENING.

10.40 p.m.: 2JM, testing with 2DS, 2CI, testing with 4CM; 2ER, testing with—etc., etc.

## MORE TRANS-PACIFIC TESTS.

Owing to the great success obtained by Australian and American experimenters in the recent Trans-Pacific Tests, the Victorian Division of the Wireless Institute of Australia has just completed arrangements for further tests to be carried out with the American amateurs next month, in which it is hoped the other State Divisions and all individual experimenters will give their hearty co-operation in order to get the greatest results possible.

The American end of the tests are being well organised and looked after by "Radio Journal," of Los


REDUCED PRICES

| | | |
|---|---|---|
| Valves : | Mullard | 25s. |
| | Ediswan | 25s. |
| | Cossor | 25s. |
| | Phillips | 25s. |
| | Marconi R | 25s. |
| | Annaka 2 filament | 30s. |
| | Cunningham 301a | 42s. 6d. |
| Holders : | English | 2s. 6d, |
| | American | 4s. & 5s. 6d. |

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42/6

Angeles, California, and the American Radio Relay League, who are backing the tests wholeheartedly, and have requested that these tests should be made a bi-annual affair. Enthusiasm is running very high in America, long articles appearing in the majority of the technical publications, entrance forms being published and distributed broadcast, and lists compiled of all those intending to transmit and receive.

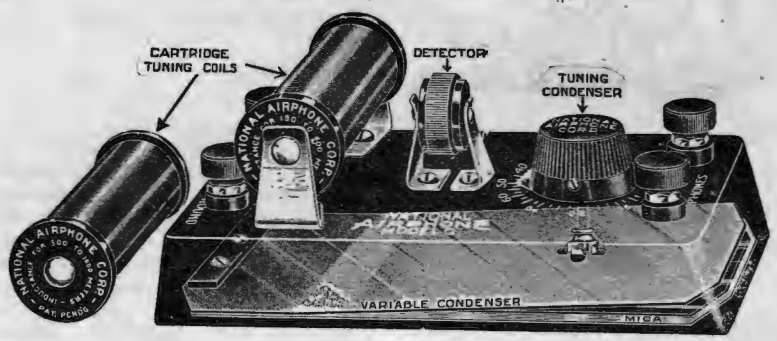
The messages sent by America will be on 200 metres wave, and it is requested that reports of all calls and messages received in Australia, whether doubtful or otherwise, should be immediately forwarded to our official station—3BM (H. K. Love, Esq., Ferncourt Avenue, East Malvern)—for the purpose of sifting and compiling a full report for early transmission to America. It is highly probable that the President of the U.S.A. will be asked to send a message to the Governor-General, also Congressmen and members of the U.S.A. Senate, and any Australian station picking up these messages is asked to immediately forward same to the General Secretary of the Victorian Division (G. W. Steane, Esq., Earl Street, Mont Albert), in order that they may be immediately forwarded on to the Government through the General Manager of Wireless.

The Americans are going to transmit from 5.45 p.m. to 8.45 p.m. (Melbourne time) each evening, from 15th October to 3rd November inclusive, and the Australian stations will work from 5th November to 13th inclusive, at the same times. In connection with this latter period a roster of transmitting stations is now being prepared, and any Australian experimenter who considers his set is capable of sending messages to America is earnestly requested to forward full particulars of such station before October 6th, for inclusion on such roster, and in this way obtain periods for transmission so as not to jamb other stations endeavouring to work America.

The experimenters in this State who were so successful in the recent tests give it in strong terms of recommendation that those who are taking part in these tests next month, and who desire to obtain maximum results, should use two stages of tuned radio amplification and detector.


60/- REDUCED! 60/-

"PUTS THE JOY IN RADIO"




National Airphone Crystal Set

Ideal for the Beginner

TUNES IN MUSIC AND MORSE

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Now then, experimenters, go ahead and give your best; pull together for the benefit of all, and make these tests 100 per cent. more successful than the last.

The Honorary General Organising Secretary is Mr. B. Jermyn Masters, Victorian Division of the Wireless Institute of Australia.

## VICTORIAN WIRELESS INSTITUTE.

A meeting of the Malvern District Section of the Victorian Division of the Wireless Institute, was held on Tuesday, 11th instant., in the A.N.A. Hall, High Street, Prahran, and those present had a treat in listening to a very interesting address by H. K. Love, Esq., President of the Victorian Division, on "An Efficient Experimental Station." This section meets on the second Tuesday in each month, and as there is still room for a few more members, those interested should come along to the next meeting or communicate with the Secretary, B. J. Masters, 16 Sutherland Road, Armadale.

A. C. Tripp confidently whispers in our ear that by moving a half pound tin of tobacco around on the top of his receiving set he can obtain an admirable vernier regeneration control. In fact, he is so pleased with the result that he is going right out and buy a five pound tin.

* * *

Ham explained radio to his beloved: "You see when I turn this knob, it changes the wave from that of one station to another." She: "Really? And does that turn the big wheel at the top of the pole outside?" How does that strike your cage antenna?

* * *

Get a wave meter—don't trust the word of your neighbour. He is less truthful than an antenna ammeter.

* * *

Now, look what they've went and done. Since they've changed wave lengths to cycles we'll have to throw away our wave meter and get a cyclometer.

FOR QUICK SALE.—Single Valve Set, accum. aerial, etc., 60V B battery, also odd experimental gear. First reasonable offer. Marsden, 5 Collins Street, Annandale.

One more expired, leaving but two.
Two little bottles, carrying on,
Out goes another, leaving but one.
One little bottle, oscillating alone,
Whatin'ell will happen when IT is gone?

A good storage battery test: Connect a wire from one battery terminal to the handle of your best pocket knife. Open the large blade and run it quickly across the other terminal of the battery. If the knife becomes a saw, the battery is a good one.

* * *

When laying out the winding form for a spiderweb coil, it is always a problem to divide the form into the odd number of slots that are required for winding the coil. Here's a good simple way to do it: Lay your watch on the centre of the card and make a pencil dot at each four minutes from 12 o'clock right round the dial. As each minute division represents six degrees, you have thus divided the card into fifteen divisions, each 24 degrees apart.

## "PARADISE."

'Tis three o'clock in the morning,
I've listened the whole night thru',
The sun will soon be shining,
And I haven't heard a CQ.

Scene: A radio store, with radio expert (?) in background. Enter a radio fan.

Fan: "Could you tell me why I hear a lot on one night, and hardly anything on the next night?"

Radio Expert: "Surely, you have a powerful receiving set near you which draws in all the radio waves around it, and then you get them after it uses them."

'Twas ever thus, that the innocent-fan should be the victim for the ignorant expert.

* * *

Someone had started the wild theory that every time another tube is added to a sending set the antenna current should rise about one-third. This is bunk. If the efficiency remains the same, and there is no change in wave or input voltages, the antenna power (watts) will be increased in proportion to the number of tubes.

The antenna current is increased in proportion to the square root of the number of tubes. Here is the simple rule that apples: The antenna current to be expected is equal to the old antenna current times the square root of the new number of tubes. If you have a good ammeter, figure this out. If it does not follow in your case, either the plate or filament voltage is pulled down or the set needs readjustment.

* * *

Rado: "Who was the first radio engineer?"

Wireless: "Adam, because the first loud speaker was made out of his spare parts."

Ooo-oh!!

## OUR SUMMER FRIEND.

Summer is coming again, says the Nature lover, as he sees the leaves beginning to sprout and listens to the lively chirping of the birds.

Summer is coming again, says the wireles man, as he listens to the deafening bursts of static in his ear-phones.

During the last few evenings we have been forcibly notified of the coming summer by having very heavy static, making it very difficult to read signals and absolutely spoiling the reception of music.

There is a fortune awaiting some inventor who can produce a gadget to eliminate static.

## ARTARMON CLUB.

This club commenced about three months ago under the presidency of Mr. Percy Verey. The other office bearers are: Vice-presidents, Messrs. E. T. Lovett and A. S. Nichols; secretary, Mr. Chas. H. Smith. Meetings are held second Tuesday in the Boy Scouts' Hall, Artarmon. The club has already almost completed a three-valve set, which it is building under the guidance of Messrs. Harold Newman and G. Josephs. Two 60ft. masts are in the course of erection, and the present membership is 35.

## WHAT AERIAL WIRE? STRANDED WIRE.

Stranded wire of any kind has higher resistance than solid wire when worked at radio frequencies. The wire rapidly gets very much worse when it corrodes. Solid wires are cheaper, easier to handle, stronger, and have lower resistance. (Note.—This applies to stranded bronze, copper, and aluminum, whether as a 7-strand cable or in the shape of some of the fancy braids now sold.—Editor.)

## WAVERLEY RADIO CLUB.

It was mentioned at the meeting of the Waverley Radio Club, held on the 20th September, that no answer had been received from the Wentworth, Manly, or Metropolitan Clubs with regard to arrangement for debates. It was therefore decided to let them lapse for the present, and endeavour to arrange debates with the North Shore and Croydon Clubs.

The Committee reported satisfactory progress on the transmitting set, which is costing in all about £14. A comunication was received from the Radio Inspector stating that the Club's wave length would probably be 245 metres.

The election of officers for the ensuing six months was then held. Mr. M. Perry was elected President, unopposed. The committee elected now consists of: Messrs. E. Bowman, R. Howell, J. Marsland, G. Thomson, T. Nott, G. Tatham, which will elect Vice-presidents, Secretary and Treasurer from its numbers at an early date.

Technical discussion followed after which the meeting closed.

## SUNDAY NIGHT'S TRANSMISSIONS.

2GR started at 7 p.m., and put over some first-class music.

2CM was next; there is no need to say that this test was excellent. The strength was remarkable, and is by far the loudest and strongest transmission of music that has been given so far. Mr. Maclurcan was in good form, and his renderings of "The Vamp," "The Hero," etc., to say nothing of his last remark when closing down were most entertaining.

2JM played quite a number of new records. There is no doubt the three-coil transmitter is O.K.

Amateur transmitters were asked to close down last Friday evening for one hour. Sir John Monash and Mr. J. Malone (Chief Manager, Telegraph and Wireless) were transmitting from Mr. Culliver's station, Melbourne. We do not know what power was used, but it was very difficult to hear, especially through the continual interference on the low wave length by VIS.

## LEICHHARDT AND DISTRICTS RADIO CLUB.

The Leichhardt and Districts Radio Society gave a very interesting demonstration of wireless telephony reception, at the Salvation Army Hall, at Dulwich Hill, on Saturday, 22nd. A charge was made for admission, the proceeds being in aid of the relief fund.

Mr. Frederick Thompson (representing the club), delivered a short lecture on the "Wonders of Wireless," and assisted by Mr. E. J. Fox gave a practical demonstration of the reception of music and Morse, the musical programme being kindly supplied by Mr. E. B. Crocker (2BB). The receiving set consisted of a four valve set and a Western Electric loud speaker, the whole apparatus and aerial was erected within ten minutes of arrival at the hall. Owing to the excellence of music reviewed "per radio," the rest of the programme (vocal) was omitted. As usual, the set had to be taken to pieces to convince a few sceptical people that there was no gramophone hidden inside it. The demonstration closed with a hearty vote of thanks to the lecturer and assistant.

The same society's forty-eighth general meeting was held in the club room, 176 Johnston Street, Annandale, on Tuesday, September 18th, when a very interesting lecture was delivered by Mr. F. Lett, one of the Society's most popular as well as most active members.

Several subjects were dealt with briefly but effectively, and members were given many valuable hints on the construction of aerial systems, the use of condensers in different parts of receiving circuits, as well as the best types of inductances for use on different wave lengths.

Mr. Lett described the construction and action of the loose coupler and variometer and vario coupler, and was accorded a very hearty vote of thanks by acclamation at the conclusion of his talk.

Considerable interest centres around the Society's first annual general meeting, which has been fixed for Monday, September 8th, and an excellent report of the year's progress is anticipated.

Although the Society's membership now stands at 52, there is still ample room for expansion, and the Hon. Secretary, Mr. W. J. Zech, of 145 Booth Street, Annandale, will be pleased to hear from local enthusiasts with a view to enrolment.

The next meeting will be held on Tuesday next, when all interested are invited to be present.

## NEW TELEGRAPH CODE HAS BEEN DEVELOPED.

A new telegraph alphabet for use in radio, telegraph and cable, in all languages, has just been given to the world by Major Gen. George O. Squirer, Chief Signal Officer of the Army and one of America's most prolific electrical communication inventors. With his new code system a speed 2.65 times the present transmitting rate can be achieved, and it is easier to "tune to."

The first presentation of this new "universal" code was made recently by the General in a speech before the National Academy of Science in Washington. It now appears that the code used for almost eighty years will be superseded throughout the world, with a gain of over 150 yer cent. in speed.

The system has been studied by radio experts of the Army and Navy, who see in it added efficiency, and decreased interference. It is the plan of the inventor to submit the system to the next International Technical Conference on Telegraphy with a suggestion for unification of all codes, radio, wire and cable, using the same system of modulation for the signals.

—"New York Export World and Herald."

## HOW SWEDEN PROPOSES TO REGULATE BROADCASTING.

Sweden will interpose no such handicaps upon its radio fans as have some other European countries, if the proposed law for regulating radio-telephony goes into effect. It will permit amateurs to build their own sets, requiring only that these shall be constructed in accordance with certain regulations. The Telegraph Department does not contemplate limiting within narrow margins the wave lengths on which amateurs may receive. The government proposes to erect the broadcasting stations and rent them to the Radio-telephone Company, which in turn will receive a rental from receiving stations.

No mention is made in the law regarding sending apparatus. The Telegraph Department will control receiving sets and supply them with a certain control mark, whereas the Radio-telephone Company will give permission to use such against payment of a license fee, 10 per cent. of which reverts to the State for the control privilege.

# 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.

All experimenters interested in the work of the League are requested to communicate with the Hon. Secretary, c/o. Box 378 G.P.O., Sydney, and he will supply detailed information.

## Application 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 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 license
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.

## A PAPER THAT DEPENDS UPON RADIO FOR ITS NEWS.

A newspaper that depends upon radio for its editorial matter is a unique venture recently undertaken in Alaska.

The Federal Government has recently decided to instal a radio station at the Mayo silver camp in the Yukon district, thus establishing direct communication with the outside world. With such connections established, permitting the receiving of important news without a corps of reporters, it has been made possible for a publishing firm to ship a complete newspaper and job printing plant to Mayo City.

## RADIO MESSAGES FROM ATOMS

Radio messages from the inside of atoms are our only hope, the scientists say, to find out what the ultimate structure of matter is like. Each atom sends out, especially when it is excited by a strong electric field, a set of ether waves of absolutely definite wave length. The tuning, radio fans would say, is perfect. These waves are what appear as the 'lines' of the spectrum, both the ordinary spectrum of light and the analogous spectrum of X-rays, which rays are the same as light, or, for that matter, as radio waves of any kind, except that their wave lengths are shorter. These ether waves that come out from the atom correspond, the scientists believe, to features of its internal structure and will enable us, in time, to discover what this structure is.

## DO OUR EARS VARY IN SENSITIVITY FROM DAY TO DAY?

When you cannot pick up distant stations as well as usual the trouble may be due not to any fault of the radio transmission or with the functioning of your own set, but to changes in your own ear. A German experimenter, Professor Martin Gildemeister, has discovered, according to the "Journal of the American Medical Association, that the acuteness of human hearing varies from day to day according to the health of the hearer.

Published by W. J. Maclardy, of 58 Murdoch St., Cremorne, for the Proprietors, at the offices of Publicity Press Ltd., 33/37 Regent St., Sydney.

# *Amateur Receiving Stations.*

### NEW SOUTH WALES.

The following licences for experimental purposes have been issued:—

| Nature of Licence. | Name. | Address. |
|---|---|---|
| V | Henry, W. M. | Cropley Street, Rhodes. R. |
| V | Milgrove, W. B. | Malvern Avenue, Croydon. R. |
| V | Drury, F. M. | 246 Glebe Road, Glebe Point. R. |
| C | Tucker, L. G. | 21 Central Avenue, Marrickville. R. |
| C | Caddell, M. F. | Strickland Aveune, Roseville. R. |
| V | Farmer, P. H. | Beecroft Road, Beecroft. R. |
| C | Greenwell, H. R. | Locksley Street, Killara. R. |
| C | Levi, A. C. R. | 239 Cleveland Street, Redfern. R. |
| C | Groom, R. | Beresford Road, Wentworthville. R. |
| V | Lindsay, J. G. | Forsyth Street, Willoughby. R. |
| C | Smith, J. C. | 23 Col. Braund's Cresent, Ducyville. R. |
| V | Hole, K. C. | Horton Street, Port Macquarie. R. |
| C | Hanscombe, S. T. | 5 Handaff Street, Waverley. R. |
| C | Smith, Geo. | 203 Darling Street, Balmain. R. |
| C | Read, F. | Clanwilliam Street, Eastwood. R. |
| C | Grace, S. A. | 16 Mosman Street, Mosman. R. |
| C | Willetts, R. | Marrickville Avenue, Marrickville. R. |
| C | Hobbs, J. P. | 1 Avenue Road, Mosmon. R. |
| C | Commons, J. P. | Adelaide Street, Belmore. R. |
| C | Ewing, J. D. | 11 Darley Street, North Sydney. R. |
| V | Tester, F. | 54 Epping Road, Double Bay. R. |
| V | Bevan, F. G. | Violet Street, Waverley. R. |
| V | Hill, C. A. | The Avenue, Lorn, West Maitland. R. |
| C | Harris, L. C. | 22 Cambridge Street, Enmore. R. |
| C | Lannen, J. D. | 42 Oxford Street, Newtown. R. |
| C | Lockhart, G. G. | 10 Moore Street, Rozelle. R. |
| C | Armitage, H. C. | 19 Oxford Street, Newtown. R. |
| C | Turner, S. W. | 83 View Street, Annandale. R. |
| C | Gray, J. J. | Rose Street, Petersham. R. |
| C | Wels, W. A. | 82 James Street, Hamilton. R. |
| C | Wood, J. H. C. | 110 Bacon Street, Grafton. R. |
| C | Connolly, R. H. | Northcote Road, Lindfield. R. |
| C | Collins, H. J. | 56 Percival Road, Stanmore. R. |
| V | East Maitland High School (Pillars) | Boys' High School, East Maitland. R. |
| C | Middleton, J. D. | 11 Alma Street, Ashfield. R. |
| V | Walters, H. H. | 186 Bridge Stree,t Drummoyne. R. |
| C | Higlnbotham, E. A. | Fairweather Street, Bellevue Hill. R. |
| C | MacGibbon, J. G. | Wycombe Road, Neutral Bay. R. |
| C | Wherrett, R. E. | Marrickville Road, Marrickville. R. |
| V | Bro. C. P. Grimes | Holy Cross College, Ryde. R. |
| V | Bainton, J. R. | 177 Clarence Street, Sydney. R. |
| C | Smith, A. J. | 17 Challis Avenue, Marrickville. R. |
| V | International Correspond. Schools | George Street, Sydney. R. |
| V | Goodwin, H. | Wynne Avenue, Burwood. R. |
| V | Hosking, S. N. | "Elouera," Chatswood. R. |
| C | Henderson, S. H. | "Warrawee," Lyons Road, Drummoyne. R. |
| C | Eminson, E. C. | 34 Cammeray Avenue, North Sydney. R. |
| C | Walker, Fred. J. | "Wandabyne," Dutton Street, Bankstown. R. |
| V | Cocks, Sir Arthur | Cross Street, Mosman. R. |
| C | Gibbin, P. | "Baylen," Loftus Crescent, Homebush. R. |
| V | Wade, J. B. | 141 Bedford Street, Newtown. R. |
| C | Shaw, Robert | 54 Albermarle Street, Newtown. R. |
| C | Phillips, R. C. | "Dolores," Bouvardia Street, Punchbowl. R. |
| V | Thom, F. W. P. | Bancroft Avenue, Roseville. R. |
| C | Hickey, H. F. | 156 Cowper Street, Goulburn. R. |
| V | Methan, A. H. R. | 85 Railway Lane, Wickham. R. |
| C | Henderson, F. A. | "San Talmo," Tavistock St., Drummoyne. R. |

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| Marconi "R" | 1 | 5 | 0 |
| Expanse "B" | 1 | 10 | 0 |
| Radiotron 200 | 1 | 15 | 0 |
| Cunningham 300 | 1 | 15 | 0 |
| Radiotron 201a | 2 | 2 | 6 |
| Cunningham 301a | 2 | 2 | 6 |
| Radiotron W.D. 11 and 12 | 2 | 2 | 6 |
| De Forest, D.V. 6a | 2 | 2 | 6 |
| Cunningham and Radiotron, 5 watt power | 2 | 10 | 0 |

'PHONES.

| | | | |
|---|---|---|---|
| Murdoch's 2000w. | 1 | 10 | 0 |
| Murdoch's 3000w. | 1 | 12 | 6 |
| Trimm 2400w. | 1 | 12 | 6 |
| Trimm 3000w. | 1 | 19 | 6 |
| Bestone 2400w | 1 | 12 | 6 |
| N.S.T. 4000 and 8000w | 2 | 0 | 0 |
| W. E. 4000w | 2 | 2 | 0 |
| W.E. 8000w. | 2 | 5 | 0 |
| Brandes 2400w. | 2 | 5 | 0 |
| Baldwin Mica Diaphragm 3000w. | 4 | 18 | 0 |
| Brown's Adjustable Diaphragm 2000w. | 5 | 5 | 0 |

TRANSFORMERS.

| | | | |
|---|---|---|---|
| Air-way Audio Transformers, cased | 1 | 7 | 6 |
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| Jefferson Audio Transformers | 2 | 0 | 0 |

RHEOSTATS.

| | |
|---|---|
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