Here at Last!

The New Regulations and
A Perfect Loud Speaker

Manufactured by the MURDOCH TELEPHONE COMPANY who have been making phones for 20 years.

Adjustable Diaphragm

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Special Price

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Post Free
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RED LABEL 6 to 1 RATIO ... 45/-
The Ideal Transformer for Crystal and the first stage of Amplification.

Of Special Interest to
North Sydney Wireless Amateurs

Call and inspect the latest in Wireless. Complete Sets & full stocks of Radio parts to build your own.

The Universal Electric Co., 244 Pitt Street, Sydney

"Where your Money goes the farthest"

WRITE FOR REVISED PRICE LIST FREE

MAIN FEATURE
Radio and Acoustic Engineers claim that Murdoch Loud Speaker give a perfect reproduction due to the Fibre Horn, and which does away with Huskiness.

Branch N. 2: 40 Pitt Street
Open Friday Nights
BROADCASTING LICENSE.

A very erroneous opinion is held by a number of people that they will be unable to obtain a Broadcast (Transmitting) License without first applying to Messrs. Amalgamated Wireless (Aust.) Ltd. Possibly this is on account of the Government holding £501,600 of shares in this company. In fact, as strongly has this opinion been impressed in some quarters that it will take some time for the following statement to be accepted.

We are pleased to inform our readers that Broadcast (Transmitting) Licenses are obtainable only from the Postmaster-General's Department, Melbourne, provided the necessary guarantees, etc., are given, as laid down in Statutory Rules 37, 1923. Extracts of the Rules appear in this issue on page 3.

BROADCAST COMPANIES.

Broadcast Companies have been formed in several of the States, and from reports received the public will not have long to wait for daily wireless entertainment.

There is no doubt that when things are in full swing some interesting patent questions will arise, just as they did in United States of America.

Wireless, since it was discovered has caused more patent litigation than any other scientific discovery of recent years.

Roster for Week ending 15th August, 1923

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Vacant times may be booked by Transmitters by ringing Red. 732 between 9 a.m. and 5.30 p.m. daily.
APPLICATION FOR LICENSE.
An application for a Broadcasting Station License will be in writing as follows:— Name and address, technical qualifications, registered title of the company, location, type of transmitter and modulation, power, type of aerial, wave length required, service to be given and hours, diagrams of transmitter and receiver.

TERM OF LICENSE AND FEES.
A broadcasting license shall be for five years, and the fee for such license shall be fifteen pounds, payable in advance.
A license will only be granted to persons who satisfy the authorities of their financial and technical qualifications to carry on a reliable service.
A guarantee of £1,000 will be required during the five years the license is in operation.

POWER TO BE USED.
The power that must be used for broadcasting shall be between 500 and 5000 watts.

TRANSMITTING APPARATUS.
The transmitting apparatus shall have a tuned circuit coupled to the aerial, and shall not have more than one per cent. variation above or below the licensed wave length.

WAVE LENGTH.
Each license will be issued for use on a particular wave length between 250 and 3500 metres.
Only a certain number of wave lengths shall be allowed in each centre.

HOURS OF BROADCASTING.
The Minister holds the right to curtail the hours of broadcasting if necessary.

Certain items of general interest must be broadcasted and at such times as instructed by the Minister.
All matter broadcasted shall be subject to censorship.
CERTIFIED OPERATOR.
The broadcasting station shall be operated by a certified operator.

RE-RECOGNISING.
Re-broadcasting shall be permitted under certain conditions.

TELEPHONE.
Every broadcasting station shall be connected by public telephone.

BROADCASTING (RECOGNISING) STATIONS.

BROADCASTING LICENSE.
A broadcasting receiving license may be issued to anyone on payment of 100s. per annum together with the annual subscription payable to the broadcasting station.
The license shall not be transferable.

RECEIVING SETS.
Only apparatus that will not cause the aerial to oscillate may be used.
Sets shall be sealed.

BROADCASTING receiver sets shall be so made as to respond to a certain wave length, and a ten per cent. variation only will be allowed.

Sets shall be stamped indicating the type, number and wave length.

Only those sets or units of approved pattern shall be used.

AERIALS.
No standard aerial is laid down, but tests to comply with the foregoing shall be made on an elevated aerial one hundred feet high.

ASSEMBLING OWN SETS.
Those persons who assemble their own receivers shall arrange them as stated under “receiving sets.”
The tuning elements shall be enclosed suitably for effective sealing and shall be submitted to an authorised officer who will test them to see that they conform to the regulations.

A charge of 25s. will be made for this test, and if in compliance with the regulations the set will be sealed and shall not be broken except by the authorised officer.

MORE THAN ONE BROADCASTING STATION.
Sets may be made to receive more than one broadcasting station, and may be used if the subscriptions be paid to each broadcasting station that the set will receive together with the Government license fee of one pound.

REMOVAL OF LICENSE.
When the holder of a broadcast receiving license wishes to move his set to a new address not more than 20 miles from his original address permission shall be obtained from the broadcasting station to use the set at the new address.

INSPECTION.
All licensees shall allow authorized officers or approved employees of a broadcasting station to whose service they subscribe to inspect at any reasonable time in the day time their installation.

No broadcast receiving license can operate his set for profit without permission of the broadcasting station.
WIRELESS WEEKLY

SALE OF

LICENSES.

A dealer's license will be one pound and shall not be transferable.

TO WHOM SETS MAY BE SOLD.

No set may be sold or hired nor certain apparatus sold unless the seller is satisfied that the purchaser holds a broadcasting receiving license or an experimental license.

LICENSES.

To whom sets may be sold.

The following regulations have been selected from the Broadcasting Regulations as those most likely to be of interest to our readers.

Complete copies of the Regulations may be had from the Sub-Treasurer, Commonwealth Bank Buildings, Martin Place, for the sum of 1/-.

Wireless Regulations Explained.

Mr. J. Malone, Chief Manager Telegraphs and Wireless, has in the interest of all written the following article explaining the Regulations.

In reading his article all interested in Wireless, the general public, the Experimenter and the Broadcaster, will see clearly how to obtain a license, how to hold it, and how all can work harmoniously together for the development of Wireless in Australia.

The Regulations comprising Wireless Acts No. 97 of 1922, govern the licensing of all classes of Wireless Stations under the authority of the Wireless Telegraphy Act. This means that any person operating wireless activities in Australia and Territories, as no station can be legally erected or operated unless it is licensed as set out in these Regulations.

2. The Regulations are divided into Part 1 to 9; Parts 1-2 and 6 contain classes of a general nature referring to all classes of licenses, while Part 4 deals with broadcasting only. Persons concerned with broadcasting, therefore, should not refer only to Part 4, as there are some important classes in the other Parts which being of general application will refer to broadcasting as well.

3. The classes of licenses of more particular interest to the general public are experimental licenses and broadcasting licenses. The conditions with regard to experimental licenses have not been altered to any great extent. Regulating, a deal with them; sub-Regulation 9 (3) being of particular importance.

4. Applicats for experimental licenses will be required to notify the Chief Manager of their purpose and to conduct experiments scientifically and to indicate the nature and object of the experiments which they desire to conduct. In short, the Chief Manager will be required to determine whether the applicant is or is not an experimentalist; if not an experimentalist, the applicant cannot be given an experimental license, but will, of course, have the opportunity of becoming so as to be granted any broadcasting license to his or her station.

5. Radio Clubs, Wireless Institutes, and each organized body of experimenters working under a constitution or rules which meet with the approval of the Chief Manager will be recognized and encouraged by the authorities. It is realized that such interest and discipline are necessary to the interests of all concerned, and consequently it will be the desire of the authorities to see such institutes...

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National Library of Australia
I t will, of course, be necessary to look for certain conditions before recognizing officially such clubs so that the broadcasting business may not be jeopardized by membership of clubs who will be considered to be people generally interested in the science of radio.

6. At present a number of amateur broadcasting demonstrations are given in various States and these demonstrations appear to be much appreciated by other experimenters and amateurs. It is the intention of the authorities to permit such amateur broadcasting to continue unless and until it can be shown that interference is being caused with other stations or businesses.

7. With regard to broadcasting as set out in Part 4 of the Regulations, it is explained that these Regulations are based on the proposals of the Conference held in Melbourne on 24/3/23 at the invitation of the P.M.A., comprising all interests concerned in broadcasting. The conference selected a committee which drafted proposals for Regulations and this committee subsequently discussed in detail draft Regulations prepared by the authorities. The final amended draft has been put into legal phraseology by the Crown Law authority. It will be seen, therefore, that the conference is mainly responsible for the Regulations and will it is hoped, take its share of responsibility in endeavouring to obtain harmonious and efficient working conditions which will make for the development of successful broadcasting.

8. It will be seen that it is not an easy matter to obtain a broadcasting licence. Applicants must satisfy the Postmaster-General as to their technical and financial ability to provide an efficient service and to maintain it for a period of 5 years. A financial guarantee of £1000 will be required to support their initial fees. This guarantee is demanded in order to protect the public so that it will not be possible unless at considerable financial loss for any broadcaster to obtain a licence and get in the first or second year's revenue and then desert his clients. Every broadcasting station will have an exclusive wave length and the power of the transmitter (connected in the High Frequency Chassis Circuit) will be between 500 and 5000 watts. Conduct circuits will be demanded and radiations must be maintained reasonably constant with a permissible variation of the authorized wave lengths of 3 per cent. above or below. No restriction will be placed on the class of programme broadcast, or the times of broadcasting. Therefore, it will be possible for a licensee to broadcast any advertisements. It will be necessary, however, for him to broadcast such items of public interest which the Minister may determine, comprising weather reports, market reports, etc., such special items shall not exceed the maximum of 20 minutes during each 12 hours.

9. The Regulations dealing with licensed receivers are one which has already called for considerable comment and criticism. This condition of sealing the receiver so that it will respond to the wave length of the station to which the licence is submittting is probably the most important Regulation of all as the loss of the Regulations is prohibitive for a competitive broadcasting business. Therefore each broadcaster will obtain as many clients as he can and in order to hold those clients it will be necessary for him to provide a good program and ultimately only the broadcasters who provide first-class programmes will remain in the field. It will be possible for any holder of a broadcasting (receiving) licence to sell or arrange that his receiver will in addition be labeled so that his receiver will be labeled to pick up any wave length as the case may be. If the additional subscribers to the broadcasters whose programmes he picks up, it will be possible for any person to make or assemble his own receiver, the only condition imposed by the Regulations being that the receiver when assembled in a box
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shall be capable of being sealed so that it will respond only to the selected wave length and the receiver will be so fixed as not to be capable of causing the aerial to oscillate. The maker of such a receiver is required to take the box containing the tuning elements to a Radio Inspector who will test it to ascertain its conformity with the Regulations dealing with receiving and wave length. If satisfactory he will issue a certificate accordingly, and a fee of 2/6 will be charged for each such test.

11. Special Regulations concerning radio dealers who will all be required to be licensed and to display signs, "Licensed Radio Dealer." These dealers will not be able to sell or hire any apparatus to any person unless the latter is in possession of either an experimental licence or a broadcasting (receiving) licence. In the latter case the various broadcasting stations will arrange so that the dealers will have available approved receivers capable of picking up their respective stations. Also for the dealer to collect the broadcasting subscription fee—the latter being handed over to the Post Office authorising together with a form which will comprise both the licence and a receipt for the licence fee and the subscription fee—this work the public will not be required, as in England, to go to the Post Office for a licence and then to the dealer or broadcaster to make arrangements for subscription—the dealer will be enabled to make arrangements and pay both fees to the dealer.

12. Manufacturers of receivers must arrange with the Radio Inspectors for a specimen type of their receivers to be tested for approval. If it complies with the conditions relative to resistance and variations of wave length it will be given a type number and a stamped impression containing partible of such type number and the wave length by which it will be re-regulated. This stamped impression must be placed on all similar receivers made to that type. All such receivers must bear the approved type mark and seal. No conditions are laid down as to the method of sealing; this must be capable of having the tuning elements sealed—the method of sealing being a matter for adjustment between the manufacturers and authorities.

13. The Department is anxious,

as it has always been, to encourage the development of wireless in every legitimate way and hopes for the cooperation of all assistants to maintain harmony in their various spheres. The new Regulations dealing with broadcasting are a distinct departure from practice in other parts of the world and it behoves all concerned to give the Regulations a fair trial before indulging in criticism. While it is recognised that the various interests have ideals almost irreconcilable, a constant cooperation and co-ordination of activities is not only advisable, but necessary if we are to find wireless developing happily and efficiently. The experiment must be encouraged; he is mainly responsible for the introduction of broadcasting and he will will be able, in his proper places, to do useful work for Australian radio. The dealer, who will have to listen to public criticism, has a special duty to himself and the public in effecting the prospective "listenership"; the broadcaster will naturally see to it that he "delivers the goods," and does not interfere with other people's goods or the satisfaction of his own and other broadcasters' clients. While the manufacturer will be in a happy position of certainty by having a big responsibility in recommending designing and manufacturing such equipment as will lead to efficient service to all. With these various interests working harmoniously and satisfactorily for the common end flourishing and efficient wireless services the authorities whose only interest is the care for all—will have peaceable nights even if they live laborious days.

SOUTH AMERICANS LISTEN IN

ON A NEW YORK STATION.

New York was joined to Argentina by radio for the first time in history when round by round radio reports of the Hippodrome prize fight were transmitted from the high power radio station at Beekly Park, L. I., and were picked up in Argentina. The reports were sent out on a long wave length; for the benefit of local fans, after they were received they were immediately sent out again on a short wave length by an American broadcasting station.

A sharp wave means that the transmitting station radiates a large proportion of energy in the form of horizontal waves of uniform length, and only a small proportion of energy in the form of wave lengths which vary from this.

Telephone Head Sets

... of Proven Quality.

Baldwin’s (Mica Diaphragm), £1/8/6.
Brandes’ (Superior), £2/15/6.
Western Electric (5000 ohms), £2/2/6.
Western Electric (8000 ohms), £2/9/6.
Truma Phonos (5000 ohms), £8/10/6.
Bestone Phonos (2500 ohms), £8/12/6.
Marshall’s (2500 ohms), £1/10/6.
ALL OUR PHONES ARE GUARANTEED.

The Colville Moore

Wireless Supplies

10 Rowe St., Sydney, Tel. 8261.

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THE REGULATIONS
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WIRELESS WEEKLY

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SYDNEY
Phone Red. 732

The wireless weekly : the hundred per cent Australian radio journal
MAKE YOUR OWN

A Measurement Chart for Determining the Capacity of your Antenna.

One of the most important, but extremely uncertain, of calculations in radio engineering and design is the determination of the constants of the antenna system.

Under the term "antenna system" we understand the total construction outside of the set, con

necting it to the receiver to transmit to or receive signals from a distant radio station. These include the antenna proper, grounds, grounds, fences, buildings, or any other system attached to radiate or collect energy.

In the first article of this series we showed that for a certain wave length we require a certain amount of capacity, and a certain amount of inductance. To use the charts in the first article, however, we were required to know the amount of capacity incorporated in the design of our antenna, in order to calculate the correct coil to use with our antenna for a given wave length.

In this article, then, we are introducing a chart that gives us the capacity of our antenna, with the requisite amount of inductance to calculate the proper inductance for the coil to use with it.

To take advantage of simplicity, without deviating from accuracy—and the practical radio engineer always welcomes simplicity—we will neglect the inductance of the antenna, as it is small in comparison with the inductance of the coil to be used with it. This will not materially affect our calculations.

The chart (shown with this article), for calculating the capacity and fundamental wave length of our antenna system is derived from data obtained from many experimental tests and laboratory experiments on vertical and horizontal antennas.

We will readily see by trying a few calculations on imaginary antennas (with the aid of the chart) that the longer and wider (or the more wires used) our antenna is constructed, the more capacity it will have, and the higher up it is suspended the less capacity it will have.

The chart has five scales. Scale No. 1 indicates the effective length of the antenna (figuring the full length of the horizontal part and half the length of the vertical part).
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Scale No. 2 contains the width of the antenna; (it also indicates the imaginary width to use for the single wire antenna). When more than one wire is used, the width will be the distance between the outer wires. The wires should be spaced not closer than two feet and not further apart than four feet in order to be effective.

Scale No. 3 indicates the value of the effective height from the ground.

Scale No. 4 gives the resultant output in decibels.

Scale No. 5 gives the approximate natural fundamental wave-length of the antenna, which corresponds to the value on the Scale No. 1, and is in accordance with the standard formula:

\[ a = 1.38 l \]

wherein \( a \) is the natural wave-length of the antenna in metres, and \( l \) is the length of the antenna in feet.

Let us work out the following example in order to understand clearly how to use the chart:

We have an antenna with a 45 foot horizontal, single-wire stretch, a 10 foot vertical lead-in, and a 10 foot ground connection.

Taking the full amount for the horizontal wire (45 feet) and half the amount for the vertical part

\[ (45 + 25) = 70 \text{ feet} \]

we will have an effective length of

\[ \frac{40}{2} = 25 \text{ feet} \]

Connecting 70 on scale No. 1 with the mark ‘single wire’ on Scale No. 2, and then connecting the point of intersection (of this line we have drawn with the reference lines) with the effective height of the antenna (40 plus 10) equals 50 feet, on Scale No. 3, we may read the resulting capacity of the antenna on Scale No. 4.

The approximate natural wave-length of this antenna would be about 67 metres.

HOW TO USE THE CHART FOR DETERMINING THE CAPACITY OF YOUR ANTENNA.

With a ruler, connect the effective length of your antenna (scale No. 2) with the width of the antenna (scale No. 1), and then connect the effective height of the antenna (scale No. 3) with the intersection of the first line and the reference line. Carry the line out ever scale No. 4—which will indicate the capacity of the antenna.

ELECTRIC LIGHT SHADE SERVES AS HORN FOR LOUDSPEAKER.

All that is necessary to make a very cheap yet neat looking loudspeaker is a 1500-ohm telephone receiver, a common tin electric light shade, a brass shade holder, and a bell wire and card to be found in almost any house workshop.

On a wooden base 7 1/2 by 4 by 5 in., screw a support made from a brass strip 3/8 by 1 by 5 in., drilled with a 3/16 in. hole 1 1/2 in. from each end, and bend as shown, 1 in. from one end. Prepare a cylindrical black tin, 5 diameter and 1/2 in. long with a 3/16 in. hole through the centre and clamp it to the adjustable ring of the shade holder.

The parts of the lampshade loudspeaker in the order in which they are put together, with wooden bracket.

Fus ten the black and shade holder to the top of the standard with a 1/2 in. bolt. It will be found that the set screw end of the shade holder will fit over the top of the telephone, the set screws holding it fast.

Place a rubber washer between the face of the telephone cup and the small end of the shade, slip a wide rubber band over the lens, and fasten the shade firmly by raising it to the shoulder of the shade holder. Elastic bands from the telephone are brought down to binding posts on the base.—George Frederick, Washington, D.C.

FOR YOUR SET

These neat little names—plains add greatly to the appearance of any W.T. set. They are made of Brass, and have Pin Hol- es for Fixing. All of the following additional ones can be had:

- Stamps, Orders of the Year, Ciphers, Primary, Secondary, Tickers, Primary Course, Second Course, All One Price 4d. each.

- Insulators ($0.75)

This is the correct type for insulating the aerial; two or more in series will improve the insulation.

Price 3d. Postage Ltd.

100 Pages. 300 Illustrations.

You Need This Book.

Its profusely illustrated pages are crowded with instructive and fascinating information only.

Wireless, Electricity, Model Engineering, Telephones, Model Aeroplanes, Fireworks, Electrical and Mechanical Toys, Novelties and all Popular Hobbies.

Send 7d. in Stamps.

HOME CRAFTS

FOR YOUR SET
R.F. Amplification Without Distortion or Reradiation.

Many beginners have been intrigued by the claims made for various r.f. amplifiers. For the novice, radio frequency is complicated, and its use does not always result in a greater range. You will do well to attempt r.f. amplification only after you have mastered a regenerative receiver and A.F. amplifiers. This is especially true since the change in the broadcasting wave length has been in effect, because few transformers will cover satisfactorily a range from 250 to 350 metres.

Today the question of radio-frequency amplification is uppermost in the minds of both the amateur and the broadcast listener. Volume has been written on radio-frequency amplification, in which proponents of particular methods have been eager to convince readers of the merits of their choice circuits. Yet, many of those who have attempted to construct their own radio-frequency amplifiers for short wave-length work have been disappointed in the results. This is due to an inadequate knowledge of the functioning of the units employed, and the natural tendency to judge one’s “best” circuit from the high-sounding names and blessed with good price agents.

Many so-called radio-frequency amplifying transformers, or amplifying devices, which have been advertised for the shorter wave-lengths, have proved to be poor. In fact, the writer has found that in some so-called short wave-length radio-frequency amplifying devices have been more hurt than good. It seems only fitting that since radio broadcasting has reached a point where many wave-lengths must be used in order to utilise all wave-lengths available, and since there wave-lengths must be “value,” the broadcast public should have a general idea, at least, as to why there is likely to be difficulty in applying only general ideas of radio-frequency amplification to circuits which they have already constructed or which they propose to construct, in order that these difficulties may be avoided.

Technical analysis has shown that R.F. amplification is more effective than A.F. in bringing in distant signals. Of course, if a signal is too weak, no matter how good the receiving set may be, the signal will not come in. In other words, there must be a slight disturbance, at least, in the neighborhood of the antenna or loop, in order that the receiving apparatus may be affected. The antenna is capable of grasping more of the energy sent out in the form of waves than is the loop. As a consequence, much more amplification is necessary where a loop is used. In either case, where a single tube is used, and whose signals are not coming in strong, or where distant signals cannot be heard, one is confronted with the problem of introducing some sort of amplification. One can arise in radio-frequency—a common practice in radio-frequency, A.F. Frequency has, of course, become very popular, and many receiving sets are now equipped with a stage or two of such amplification. Two stages of radio-frequency amplification, a regenerative tube, and a detector tube, make the most popular combination. If a loud speaker is used, the amount of energy delivered by the two stages of amplification is not always sufficient to operate, especially in large, open places, so that in some cases an additional amplifier, usually of three tubes, is used to furnish sufficient energy to operate the loud speaker.
August 10, 1923.

The design of radio-frequency amplifying circuits for the longer wave lengths is a comparatively simple matter. The long wave lengths correspond to the lower frequencies, and it is much easier to build circuits to behave properly at low frequencies than it is to build them to behave properly at high frequencies.

Various radio-frequency amplifiers were discussed in two articles by Mr. Arthur H. Lynch, in the March and April issues of "Radio Broadcasters".

Ordinarily, tremendous amplification is obtained by regeneration; thing but enjoyable. Regeneration can be used in conjunction with radio-frequency amplification, however, so as to prevent regeneration.

The greatest difficulty in radio-frequency amplification is to obtain this amplification without regeneration. Many of the coupled radio-frequency amplifiers for short wave lengths operate as regenerative circuits, so that after all, the amplification in this ease is determined by regeneration and not by what we would ordinarily term direct tube amplification—due to the amplification factor of the tube itself. An example of a tuned radio-frequency amplifying circuit is shown in Fig. 3. Note that the B battery feeds the plate of the R.F. tube through a choke coil.

and even greater amplification can be obtained by super-regeneration, but, at the same time, regeneration introduces distortion, and produces regeneration. Improperly adjusted regenerative sets may make a particular locality untenable for others who are attempting to receive, for the latter, in making their own adjustments, will be greeted with a series of variable howls and squeals which are any

amplifier, as produced by a commercial company at the present time, is shown in Fig. 1. This amplifier is constructed with a set of four output coils, so that it operates at from 150 to 2000 meters. The radio-frequency amplifier is coupled to the detector tube. The grid bias voltage is obtained by means of the stabilizer shown in the figure. This stabilizer makes it possible to

(Continued on Page 12)
Dry Cells and UV-199.

A Comparison between the Filament of a UV-199 and the HUMAN HAIR.

The UV-199 vacuum tube is the latest and smallest member of the Radiotron family. The men responsible for its development, realizing the handicap of the storage battery for radio receiving, have made it a dry cell tube. And while the voltage required to operate this tube is higher than for other dry-cell tubes, it is no stronger of current that under certain circumstances it is entirely possible to operate it from a battery made up of flashlight cells!

This remarkable decrease in filament energy, compared with storage battery tubes, has not been accomplished at a sacrifice of other desirable features. As a matter of fact, the electron emission from the tiny UV-199 filament is greater than from the hasty filament used in the UV-gt, which requires 3 amperes at 5 volts for normal operation. This gives the UV-199 somewhat better characteristics as an amplifier, because with greater electron emission, larger B battery energy is much available for the operation of the telephone microphones.

Prior to the introduction of the UV-199, about the only dry-cell vacuum tube available to the public was WD-11. This was really the first tube put out which gave successful results on dry cells. The phenomenal popularity of the WD-11 is due to its ability to use dry cells, with advantages of low cost, reliability, freedom from attention, and ease of removal. It is not surprising, therefore, that the WD-11 should prove to be the forerunner of the dry-cell class of tubes.

The filament of the UV-199 differs somewhat from that of the WD-11 in its electrical characteristics, in that the UV-199 is what...
Battery made up of two cells connected in series will have an open circuit voltage of 3 volts, the moment each battery begins delivering current to one or more of the tubes, it is advisable to regulate the voltage to something under 3 volts, which is less than the battery rating, by means of a rheostat. This method of control will also result in prolonging the life of the batteries. Just how close the user control these factors! Take the cut-off voltage. This, in connection with the UV-106 tube, is determined by the number of cells, connected in series, used to operate the tube. For example, the tube voltage is 5.5 volts. If two cells are used, the cut-off for the two cells is 3.0 volts, or 1.5 volts per cell. With three cells, the cut-off becomes 1.6 volt per cell, and with four cells it is 1.0 volt per cell. In general, the lower the cut-off voltage, the greater the capacity of the cell, but in this case it is advisable to reduce the cut-off of 1/2 of a volt by using four cells, for two reasons. First, the cost of a fourth cell is a dollar per cent, increase over the cost of three cells, while the extra amount of service obtained by using four cells is less 25 per cent, lower than from three cells. In other words, the present condition of the 106 tube, which is a storage battery. An amperage-hour is the amount of electricity taken from a battery when a current of 1 ampere flows for one hour, or 1 ampere for one hour, or ½ ampere for four hours, etc. It is always obtained by multiplying the time in hours by the current in amperes. It is impossible to state the capacity of a dry cell, unless the conditions under which the cell will work are known. The question, "What is the capacity of a dry cell?" is quite similar to that old one, "How high is up?" It is as easy to answer one as the other.

There are three major factors, each having an important bearing on the capacity of a dry cell, and all three are under the control of the user. They are: the cut-off voltage, the current drain, and the average number of hours the cells are used daily.

### Get Your Wireless Gear at Electricity House

**287 George Street (op. Strand).** Tel. 2961 City.

- Condenser Plates, 1/6 per doz.; Condenser Phallos, 2/9 per doz.; Condenser Blades, 1/2 per doz.; Honeycomb Mountings, 3/ each; Filament Resistances, 7/6 each.
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- Murdoch's Phones, 35/-; Myers' Valves, 35/-.

- Catalogues, 9d. each, including wiring and other diagrams. All makes of Telephones and Valves.

- Crystal Ovens, 1/-; Detectors, 5/-; Spark Plugs, 40/.

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**General Manager:** J. B. Marks.

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just before the first click occurs. If a radio-frequency amplifier is oscillating at a radio frequency, this fact can be detected by touching the finger to the grid of the tube. If oscillations are present, they will be stopped by this act so that a distinct click will be heard in the telephone. This is not the proper state of a radio-frequency amplifier.

Fig. 2 shows a simple type of radio-frequency amplifier involving an air core coupling transformer. The operation of such a circuit is very difficult at short wavelengths because the tubes are almost bound to oscillate unless the potentiometers shown are so adjusted that the grids of the tubes are negative. When the grids are positive, the possibility of oscillation, and therefore of regeneration, is reduced, but it will usually be found that under those conditions the ordinary radio-frequency amplifier is not of much use. In other words, if the grid is made positive and then slowly made negative, in the act of tuning, it will be found that the operation of the circuit will depend upon a critical adjustment of the potentiometers. This means that the circuit is operating on the border of oscillation; that is, it is acting as a regenerative circuit. This can be definitely determined by having the circuit in operation under such conditions and by sliding the potentiometer grid in such a position that the grid is as negative as possible (that is, by sliding the potentiometer to the extreme left in the figure). Under these conditions, if the amplifier is oscillating, a distinct click will be heard on touching the grid connection of the other tube.

The action of radio-frequency circuits may be understood more clearly by considering some of the ratios which make them up. For instance, a coil of wire in an electric circuit offers no more opposition to the flow of direct current (that is, current flowing in one direction only and interchanging its value) when the wire is in this form than it does when the wire is uncoiled. For currents which alternate in direction, the situation is different. The higher the frequency, the more opposition the coil offers to the flow of current.

Further, an electric condenser is made up of two adjacent conducting surfaces separated by an insulating material. It does not allow any direct current to pass through it, yet, if an alternating voltage is impressed on a circuit containing a condenser, the current which flows depends upon the frequency. The higher the frequency of the alternation of the impressed electric force or voltage, the greater the current. Short wavelengths correspond to higher frequencies. For example, a wavelength of 300 metres represents a frequency of one million cycles a second. A wave length of 100 metres represents a frequency of three million cycles a second. Keeping these facts in mind, the result can be illustrated by means of the circuit shown in Fig. 3, where there is an alternating current generator capable of producing an electric force or voltage of any desired frequency. If the frequency is very low, all the current will flow through the coil L, for the lower the frequency the less will be the opposition which the coil offers to the flow of current through it. At high frequencies, the tendency of the current will be to flow through the condenser C, for the higher the frequency the greater will be the opposition which the condenser offers to the flow of current through it. It is possible, then, to have a frequency so high that much of the current
will be passed by the condensers C1. When the frequency is such that the inductance offered by the condenser is practically the same as the opposition offered by the inductance, then the circuit is said to be in resonance. Such is the case, for example, when the parallel circuit of Fig. 1, made up of the condenser and inductance, is properly tuned to a particular wave.

A very small capacity may have a very marked effect at high frequencies. In the case of radio-frequency amplification, the little condensers in the vacuum tubes themselves cause much mischief. Small condensers are formed by the grid and filament, and by the plate and grid, so that if we were to represent these little condensers as the outside of a vacuum tube, we would have a picture much like that shown in Fig. 1. These little condensers are capable of causing oscillations at high frequencies, for if a pressure exists between the points AB, it will not only send a current through the little condensers represented by the plate and filament, but it will also send a current from B to C through the little condensers represented by the plate and grid, and by the grid and filament, respectively. The current flowing through the condenser offered by the plate and filament causes the proper kind of voltage to be impressed on the grid of a tube to produce a sustaining current in the plate circuit, if the plate circuit supplies a small amount of inductance, as shown. Usually the grid circuit also is tuned by an inductance, as shown by the dotted line. This aggravates the tendency for the tube to oscillate. Therefore one may construct a radio-frequency amplifier with apparently no condensers, and yet the amplifier may oscillate and give no results whatever.

Tuning the transformers of a radio-frequency amplifier has the effect of building up parallel circuits of capacitance and inductance eager to oscillate, but in the receiver illustrated in Fig. 3, this tendency is curbed as shown in Fig. 4. The tuning element consists of a series variable condenser C3 in series with a tumbler V. The first tube is used as a radio-frequency amplifier, and is coupled to the detector tube by means of a tuned primary radio-frequency transformer which is prevented from oscillating by the central condenser C2. This little condenser is a variable of about 0.002 μf. capacity. The primary of the radio-frequency transformer is tuned by the condenser C3, which has a maximum capacity of 0.001 μf. The secondary of the radio-frequency transformer is not tuned in any way, but it is connected directly to the grid of the detector tube, as shown. The control condenser in the plate circuit makes it necessary to furnish the B battery voltages to the plate through the radio-frequency choke shown. This is an iron-cored coil. No grid bias is used in this set and there is no stabilizing device such as a potentialmeter. It is interesting to observe that the detector tube contains an grid base or grid condenser. The designating nomenclature for this company has found that the insertion of the grid base and grid condenser in the set actually hindered its operation.

The detector tube works with two stages of radio-frequency amplification, as shown. These are the usual form. The dialed marked "One Control" (Fig. 5) operates the condenser C2 (Fig. 6). The dial marked "Tuning Inductor" operates the variable V, and the dial marked "Radio-frequency Control" operates the condenser C3. These three are so arranged that they operate at all times with a microammeter adjustment, that in the knob makes several revolutions in order to advance the dial through its full scale. The condensers C2 and C3 are clamped to the shaft supporting the movable globe. The control condenser, which is always farthest from the plate side of the condenser, is so located that it is always at the potential nearest that of the filament. In this way, both capacity effects are nearly eliminated.

A variation of this circuit is shown in Fig. 7. In this a loop is used in conjunction with a small tuning condenser C3. The center condenser is shown as C2, and the transformer tuning condenser as C3. The radio-frequency transformer may be made up of circular tubes. wholesalers appear to do no work as well under ordinary conditions. The two windings may be placed one inside the other as shown in Fig. 8. If two windings may be used as the primary and the outer winding as the secondary. Both coils should be wound in the same direction. They can be made up with ordinary cotton-covered or enamelled wire.
WIRELESS WEEKLY

ROUNDTHE CLUBS

WATERLEY AMATEUR RADIO CLUB

At the meeting of the Waterley Amateur Radio Club, held on the 25th July, with Mr. M. Perry in the chair, it was decided to arrange for a debate with the Bundi Club, the Metropolitan Club, and the Railway Institute Club, which is just forming. Two subjects would be suggested: "Balanced sets versus unbalanced sets" and "Home-made versus bought apparatus." Four speakers would represent each club.

A short impromptu debate was then held, Mr. Perry adjudicating. The question of the "balanced" sets was discussed. The case for the balanced apparatus was fought by Messrs. Bowman, Talham, Burrowes and Plumb, while Messrs. Thomson, Howell, Anderson, and Nott spoke favorably for the isolated set.

In summing up, Mr. Perry said that although he was personally convinced that the balanced set was the better, on the arguments put forward he must award the verdict to the "unbalanced" advocates. The chairman then thanked all those present by name, after which the meeting closed.

CROYDON RADIO CLUB

At the last meeting, held at the club rooms, "Backleigh," Lang Street, Croydon, on Saturday, July 25th, a large number of members welcomed the President of the club, the Rev. W. E. Mathy.

Club members were now available to members of meetings, or upon application to the Secretary.

More practice was given to members.

Mr. Fry (KU) was present, and gave a very interesting talk to all present upon technical questions, and those upon his transmitting experiences.

The club hopes to start building a half receiver shortly, so that members may be able to see the construction of each unit.

The Hon. Secretary will be pleased to hear from anyone willing to become a member of the club. Address, "Croywell," Highfield Street, Croydon.

LEICHARDT AND DISTRICT RADIO SOCIETY

One of the more successful meetings of the Leichhardt and District Radio Society was held on Tuesday, July 15th, when numbers rallied in force to entertain members of the Leichhardt and Annandale Municipal Councils, at the session at the club rooms, 176 Johnston Street, Annandale. The gathering was a large one, and those present were treated to the reception of music, speech and Morse signals from several stations. By means of a Magnavox loud-speaker, kindly loaned for the occasion by Messrs. Gulliver-Moore, the signals were amplified to a considerable extent.

Later in the evening a number of musical items were rendered by the Society's orchestra, and refreshments were provided.

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Send Stamp for our new Price List

RADIO HOUSE
618 GEORGE STREET

THE QUALITY RADIO HOUSE
Before dispersing, a number of appreciative speeches were made by both members and their guests, the latter especially expressing pleasure with the night’s arrangement and its spirit.

The next meeting is to be held on Tuesday next, when all interested are invited to be present. All communications should be addressed to the Hon. Secretary, Mr. W. E. Zuck, 163 Booth Street, Armadale.

**NEW RADIO CLUB AT NEUTRAL BAY**

On Wednesday evening, August 1st, wireless experimenters of Neutral Bay were brought together and a club known as the Neutral Bay Radio Club was formed.

Preliminary business only was dealt with, but about twenty members were enrolled, and in order to obtain the actual formal procedure of the Club’s formation, an other meeting is being held next Thursday, August 9th, at 8 p.m., at “Bella Vue,” 190 Kurrajong Road. All experimenters are especially invited to attend.

Communications relative to the Club should be addressed to the Hon. Secretary, Neutral Bay Radio Club, at the above mentioned address.

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**To the Editor**

Melbourne, 1st August, 1923.

The Editor,

“Wireless Weekly,”

Sydney.

Dear Sir,

With reference to “2X”’s letter in your paper, about the question “Why don’t S.W.W. experimenters listen to?”

“2X” appears to have a very distorted and biased idea of wireless phenomena, particularly with regard to the absorption powers of mountains. He should realize first that the regulations regarding power held good in Sydney as well as in Melbourne, and that even though some of the power inputs of Victorian stations are not as high as those in Sydney, the useful outputs compare very favorably both in isolation per H.W.A., and according to reports received.

At least one Melbourne experimenter has been heard on one tube at Chatterton Tower, Queensland, and is术 to reply to recent reports of malfunctions.
even though the signals had to go over the very same serrated mountains to which "WX" refers, whilst wireless experts of phone reception on one or two times from the northern parts of New South Wales—and in fact a few of the more efficient Sydney stations—are numerous.

With regard to the New Zealand tests, "WX" seems to think this is "creek" work. The Victorian two way tests extended over a period of seven nights, and on every night the question C.W. communication was maintained without defect. To me, our stations were able to work Mr. Bell, of New Zealand, with phone, using 5 watts input. Is this "creek" work? Naturally communication could not be maintained on a commercial basis, but what 10 watt C.W. station could work 1500 miles continuously? The statement regarding the poorness of experimental stations is absolutely ridiculous, and the absence of the hearing valve auscultation would appear to be due to the more skilful handling of receivers in this State.

After carefully considering "WX"'s letter, I still maintain that the fact that we cannot work New South Wales is due to the receiving sets in operation there, in spite of the suggestion of "WX" that the intervening mountainous system is a remoter or a collateral conductor of ether waves favoring transmission from New South Wales. If, however, this suggestion is correct, I wish to protest against this unjustified discrimination, and I hope our geologists will see that the use of the mountains is made a Federal matter, and that their absorbing qualities be made to affect all States equally. Yours etc., "WX".

The Editor,
"Wireless Weekly,"

Dear Sir,

I mention in your last note that Mr. P. Ramsden, the Chairman of the New South Wales Radio Association has been fit to make some typical statements regarding the Victorian Division of the Institute.

The Victorian Division has not expired, in fact, it is rather lively at present, its membership being over 150. To say that things are unsettled in this State is wishful. And let me tell Mr. Ramsden that this Division has never washed its dirty
of price, nor do our leading experimenters criticise one another in derogatory terms in public.

The council of Sydney S.W. Division in sending a member of the wireless staff to represent the whole of the Institute in Australia at the Broadmead Conference left Victorian speechless. No other divisions were consulted in this regard, and the Department had told S.W. that Victoria would represent them in this instance as before. West Australia, South Australia and Tasmania were content to leave the matter to this Division. There has been no proper courteous consultation from S.W. since Mr. Malcolm Prowse ceased to act as Secretary. Mr. Prowse enjoyed the fullest respect of all the others of this Division, and I may state that Mr. Bexton must emphatically disavow. This Division does not take orders from New South Wales any more than that Division takes orders from us. Again, we see an experimental body, not an offshoot of a junior anthropomorphic business concern. We are not governed by profit-making bodies, but by purely disinterested persons.

Mr. Bexton felt aggrieved that the Wireless Club handled the Trans-Pacific Test for New South Wales. We have had very satisfactory relations with that body, and are on excellent terms with its officials. But Mr. Bexton thinks that the Test was in great haste, and might be better for the better for the better for the better for the better for the better.

As Mr. Bexton himself says, the Wireless Club in New South Wales rest on his shoulders, and it was natural for him to feel aggrieved. He declared that the Wireless Club in New South Wales—linked with New South Wales—was a body not to be trifled with. A most successful meeting of the Wireless Institute of Australia, Victoria Division, was held in the Rialto, on Tuesday, the 11th July. Over 60 members were present, and they taxed the increased accommodation to the utmost. The features of the evening were an address by Mr. Malone, and the presentation of the new experimental regulations and a description and exhibition of his new receiving apparatus by Mr. M. Howden, the Commonwealth winner of the Trans-Pacific Test. Mr. Malone spoke of the value of the new experimental regulations, and explained the working of each section, and announced he would proceed to answer questions. He said that persons to the effect that experimenters would be adversely affected by broadcasting were not correct, and that experimenters would actually be in a better position than before. The more lengths allotted to experimenters would be between 500 and 2,000 metres, though provision had been made to allow waves not more than 300 metres in length. The main points of the regulations were illustrated by Mr. M. Howden, and it was generally agreed that the regulations would be satisfactory to all experimenters.

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Important Request to Radio Clubs.

Mr. Charles Macfarlane has received the following letter from the American Radio Relay League, and requests all Radio Clubs to discuss the proposal contained therein at their next council meeting. He would like them to notify him of their views on the subject not later than August 31st, so that he will be able to convey their ideas to the A.R.R.L. The American Radio Relay League Executive Headquarters, Hartford, Connecticut, June 30, 1923.

Mr. Charles Macfarlane,
16 Brisbane St., Sydney, Australia.

Dear Mr. Macfarlane,

I am writing to you as one interested in amateur radio and hope you will give the subject matter of this letter your earnest consideration and let me have your best judgment on the matter. I would suggest that it be referred to your amateur organisations in Australia so as to get a consensus of opinion.

During and subsequent to the last Transcontinental tests the question came up of the best way of distinguishing or differentiating the nationalities of various amateur stations, especially when there is intercommunication between those of different countries. Various suggestions have been made, all with more or less merit, and I would like to present for your consideration the one which seems to have found the most favour and is the simplest.

While our present arrangement between Canadian and U.S. amateurs of designating the nationality by the separation signs "FL" and "T" instead of "CA" is satisfactory, when applied to communications between British, French, Australian, South American, Mexican, Cuban and other amateurs, you can readily see that in each case it would mean an individual separation sign of some sort or combination of letters, and if these combinations were simple arbitrary and did not mean anything, we would be required to learn practically a whole new alphabet in order to know who was being called and who was doing the calling.

It therefore is apparent that a simpler method of identification is in order and we believe that by making the initial of the country to which the station belongs as the separation sign will solve this difficulty. To illustrate, if Canadian BAL is called by U.S. IAW, he would call as follows: "BAL en IAW"; the letters "en" designating the nationality of the station called and the station calling. As another example, if British 2BN call French 9AB, he would use this procedure "2BN to 9AB", British "2BN"; French "9AB"; Canadian "A"; United States "IAW".

This arrangement is the same order as that now existing between Canadian and U.S. amateurs, except that instead of using the arbitrary letters as separators we use the initials of the countries in question; this makes identification easy and sure, requires no additional explaining of the intermediate or separative sign by the amateurs and does not increase the length of call as the other systems suggested would do. I have had the matter of the legality of this arrangement up with our Department of Commerce, who advise that while it is not strictly in accordance with international regulations, yet at the same time they do not think it would give rise to any international or governmental complications, and if the amateurs of the various countries were to adopt it, they could present their recommendation or request for its official recognition at the next international radio-telegraphic congress.

I wish you would think the matter over carefully, and if you have objections, let me hear from you in the near future, or if you see no objections will you tell it over with your own amateurs, and if it meets with their favour, give it what publicity you can in order that we may know whether Australian amateurs as a whole endorse this plan or not. We would like to have their endorsement, in order that a uniform arrangement may be used and that we can present a uniform plan at the next Congress. Please let me hear from you at your earliest convenience.

Yours sincerely,

C. E. Service, Jr. Assistant Secretary.

South Australian Experimental Transmitting Stations.

A. G. V. W. R. Cook 27 John's Road, Prospect.
A. D. A. R. W. B. 239 Harris St., St. Peters.
A. J. M. Hanner Alpha Road, Prospect.
A. W. J. E. Blind Butler Terrace, Alberton.
A. C. T. Ettinger 25 Dequetteville Terrace, Kent Town.
A. C. E. Manse (Wireless Institute, S. A. Division), 25 Orange Beach, Hindmarsh.
A. M. W. Adelaide University 271 North Terrace, Adelaide.
A. D. P. E. Karly Fifth Avenue, St. Peters.
A. D. School of Mines North Terrace, Adelaide.
B. B. South Australian Experimental Transmitting Stations.
B. N. H. R. Austin 7 PARADE, Norwood.
B. S. W. C. Jones Carlisle Rd., Westbourne Park.
D. M. B. R. Holden 33 Hughes St., North Plympton.
D. P. J. S. Pyramine St. Andrew's St., M. Walfordville.
Continued from Page 11

words, it is not economical. Secondly, there is no filament rheostat generally available having sufficient resistance to absorb the extra voltage of the additional cell. As far as the UV-100 is concerned, therefore, the cut-off becomes established at 1.5 volt per cell.

The effect of different current drains on the capacity of a dry cell is somewhat involved. In general, the smaller the current, the greater the capacity; but this is true only within certain limits. If the current taken from the cell is too small, the time required to exhaust it is so great that the factor of natural depression becomes small, thereby reducing the capacity. If the current is too great, the capacity is again reduced, due to the lowered battery voltage. So, in selecting a current drain for dry cells, one must be taken which is somewhere between these two extremes. It is necessary to choose between a heavy current, which discharges the cell rapidly, but reduces its capacity, and a very light drain which prolongs the time of service but also reduces the capacity. On radio loads, where current is drawn from the cell for an average of two or more hours per day, this happy medium occurs somewhere in the neighborhood of 1 ampere.

In both cases, maximum capacity is obtained at a current drain of about one-eighth (12%) amperes. At smaller drains than this, the capacity falls off, due to the natural depression of the cell, and, as is to be expected, the decrease in capacity is greater for the cells which were not used for two hours per day, because the length of time required to exhaust them was so much greater. Thus, at a current drain of 1 ampere (the current taken by our UV-100) the capacity at 2 hours per day was 21 amper-hours, which means that the number of hours' service obtained was 250. Since the cells were discharged only two hours per day, it required 173 days, or approximately six months, to complete the load. In the case of the 4 hour per day cells, the capacity was 26.4 amper-hours, which was 405 hours of service. But since these cells were in use 4 hours per day, the test only lasted 116 days, or about 2.51 months instead of six, and it is this shorter time which explains the increase in capacity. Although it is in the power of the user of a radio set to regulate the number of hours of service each day, it is unreasonable to expect him to do it. Under certain conditions, greater capacity will be obtained from dry cells by reducing the number of hours they are in use daily, but one can imagine a radio enthusiast shortening his set at 8.30 p.m. right in the middle of a good programme, merely because to do so he will be adding a possible 5 per cent, or 10 per cent, to the life of his A battery! It is too laughable.

The number of hours the average set is used daily is a moot question. At one time it was generally felt that two hours a day was fairly representative of average performance. But of late, loudspeakers are coming into more general use, and because of this, the amount of time put in by the average set has gone up considerably. Recently, of course, all receiving sets will employ loudspeakers. A receiving set without a loud speaker will have its day be as much of a curiosity and vanishingly much comment as an automobile without a top. Because of the tendency toward universal loudspeaker operation, it is felt that the time the average set is used daily is closer to four hours than two. There are some individual cases known where the set is used an average of eight hours a day!

The most economical current drain on the dry cells used as an A battery can be obtained by connecting the proper number of cells in multiple, when this is done total drain is equally divided between the cells, so that each one delivers only a fraction of the total. In connection with UV-100's, however, the situation is somewhat complicated, because of the necessity of using three cells connected in series to obtain the correct voltage.
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- Radios, U.V., 261A, Amplifying
- B.T.H., English, Detecting
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It may interest the novice to know that the ordinary vacuum tube used for receiving is rated at a power of approximately one watt, yet about one-fifth of the power that is used to light the ordinary electric-light bulb.

**The Col-mo Variable Condensers**

A strip of sheet brass about 1-1/2 in. thick is bent at one corner to form the frame, and a slot is provided for the slider, as well as holes for the screws to attach the strip for the contact points. The slider itself is made of fibre, and the contact spring is a light gauge of spring brass.

A brass rod is mounted on the frame by means of terminal nuts to act as a guide for the slider, which is kept from turning by the guide slot in the frame.

The slider is manipulated by means of a brass screw with a knurled edge. This knob is provided with a pointer held in position with locknuts.

Graduations engraved on both sides of the panel slot and filled with white paint give the finishing touch to this novel switch.

-A.C.C.

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**Radio Company**

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Listen-in to New Zealand Broadcasting. Radio

F Req. Transformer 150-450M … … 3/6

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COUNTRY ORDERS ARE OUR SPECIALITY

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**Wireless Weekly**

August 10, 1923.

WIRELESS WEEKLY

Radio Saves a Life at Sea.

John H. Stood of the U.S. Light-house Service, saved his life in radio. He was an duty on the Pen- wicket Island light-ship, thirty miles north-west of Cape May, when he was taken suddenly with an acute attack of appendicitis; immediately a radio call for help was sent out, and to Coast Guard cutter, in spite of a storm that was raging, made its way out to the lightship. The cutter was transferred to the cutter, and rushed ashore in time for an operation that saved his life.

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A transmitting machine that sends 80 words a minute.

In tests recently conducted between the Majestic and a short station a speed of 80 words a minute was attained by the use of sending and receiving machines, and was shown to be practicable for commercial use. Neat idea of what this means may be gained from the fact that it is virtually impossible to maintain a speed higher than 25 words a minute when messages are transmitted and received by hand.

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Experimental Wireless Licenses.

VICTORIA.

Wireless Licenses for experimental purposes have been issued during the month of May, 1923, in the following:

RECEIVING ONLY.

Call Sign. Name. Address.

3 X T Geelong High School Radio Club (J. W. Brown)
3 X Y Bryan, E.
3 X W Callinan, C. A.
3 X X Belfar, M. J.
3 X Y Dobson, R. R.
3 X Z Jackson, C. W.
3 Y A Geelong Wireless Club (S. H. Mills)
3 Y B Collins, B. E.
3 Y C Smith, J. P.
3 Y D Weidemann, W. S.
3 Y E Hertlein, N. M.
3 Y F Harvey, I. E.
3 Y G Mackinder, W.
3 Y H Wakenham, E. J.
3 Y J Doig, C. E.
3 Y J Lowe, T. E.
3 Y K Shirley, W.
3 Y L Alder, W. L. V.
3 Y M Mackay, D. A.
3 Y N Harkness, D. J.
3 Y O Sleight, H. E.
3 Y P White, W. P.
3 Y Q Wells, A. B.
3 Y R Bird, G. H.
3 Y S Philo, D.
3 Y T Arnold, R. Y.
3 Y U Gilchrist, G.
3 Y V McEvoy, J. T. V.
3 Y W Parish, L. G.
3 Y X Gross, J. G.
3 Y Y Cheers, M. A.
3 Y Z Rose, H.

Nature of License.

C Butler, C. E.
C Pizzuti, J. A.
C Sly, L. J.
C Love, M. R.
C Abbott, H. H.
C Beckett, F. J.
C O’Reilly, P.
C Keils, A. C. W.
C Weimer, T. K. P.
C Mulhall, W. G.
C Moir, A. L.
C Mervin, W.
C Boinon, A. A.

Notes:

"Cotes", Mountain Rd, Monmouth, N.
57 Pratley Rd, St. Kilda, B.
320 Street St, Coogee, N.
14 Albert St, Cecilia, R.
112 Beulah St, Armadale, R.
79 Pearson St, Brunswick West, R.
98 Thames St, Bent Hill, R.

Published by W. J. MacLardy, of 46 Meredith St, Frankston, for the Proprietors, at the office of the Post-Reply Press Ltd., 33/27 Regent St, Sydney.
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Price: 6.000, 15/-

CASES—Drawn from hard Alu. sheets, 1 mm. thick.
BARRELS—Made of genuine Etha line, and shaped to fit the ears.
DIAPHRAGMS—Stable.
MAGNETS—Best quality Tanyges Steel.
CORDS—Moisture Proof, Standard lift, with Metal Tips.
Weight: ONLY 53 oz.

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"IT'S THE INSIDE THAT COUNTS"

"GECophone" Head Sets are very light and comfortable to use. An important feature is the single head band which is enclosed in leather, and is easily adjusted to fit any head. It entirely overcomes the disadvantages of the cramped metal head band. The ear connecting cord is attached to one ear piece, and therefore does not get in the operator's way. Connection to the other ear piece is made by two flexible cords passing through the leather band.

British General Electric Co. Ltd.

"Magnet House," 154-6 Clarence St., Sydney

Price: 6.000, 15/-