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OFFICIAL ORGAN OF THE AUSTRALASIAN RADIO RELAY LEAGUE.

Vol. 3.

November 10, 1923.

No. 6

## What Broadcasting Means to Australia

Quite a new life will shortly be opened up to the man in the country. This land of magnificent distances will be covered daily by Broadcasting. Next week those who have wireless sets, even though they may live in the most north-western part of this State, will be able to listen to the latest news and reports, to music and talks.

The telephone has brought the country much closer to the city—Broadcasting will bring it right into the City.

It takes at least four days for information and newspapers, etc., to reach some of our country towns. Wireless will reach the same distance in a less number of seconds.

The simplicity in the design, installation, and working of a set to receive wireless Broad-

casting has made it possible for anyone, without the slightest technical knowledge to operate it.

### THE SEALED SET.

There still seems to be a hold up in regard to the sealing of wireless (receiving) sets. As to who is to blame for the long hold-up we are at present unable to say, but it is certainly a most disgraceful state of affairs. Manufacturers are still held up, unable to continue manufacturing; dealers cannot get supplies to sell, and the public cannot buy.

Broadcasting is just about to commence, and it will be necessary for the Wireless Department to quickly make up its mind as to how the 10 per cent. variation in wave length laid down in the regulations is to be measured.

### Roster for Week ending 21st November, 1923

	7.30 to 8.0	8.0 to 8.30	8.30 to 9.0	9 to 9.30	9.30 to 10
Thur, Nov. 15	2 GR		2 FA	2 ZG	
Friday, .....16		2 JM			
Saturday, 17..	2 GR	2 JM	2 FA	2 ZG	
	7 to 7.45		7.45 to 9.15		9.15 to 10
Sunday, 18....	2 GR		2 CM		2 JM
Mon., 19.....		2 GR	2 FA	2 ZG	
Tuesday, 20..		2 GR	2 FA	2 GY	
Wednes., 21...	2 GR		2 FA	2 ZG	

Very few stations are on the Roster this week owing to Trans Pacific Tests.



## Mr. George A. Taylor Explains.

Mr. George A. Taylor, President of The Association for Developing Wireless in Australia, New Zealand

and Fiji, has handed the following information to the press, after a meeting of the Association's Exe-

cutive, when he was asked to issue a public statement setting out the facts as clearly as possible:—

“Under the regulations, stated Mr. Taylor, all wireless apparatus which is sold for the purpose of receiving broadcasting programmes must be sealed to the wave length of the broadcasting service which it is intended to secure. The sale or purchase of any other class of apparatus for the purpose of listening-in to broadcasting programmes is not permitted, and up to the present time no sets have been passed by the Commonwealth Government. The general public, therefore, is advised to make inquiries from reputable firms and broadcasting companies before purchasing any sets, and, in placing their orders for sets, to make sure that the set with which they are to be supplied is the sealed pattern and complies with the regulations. Beyond doubt, none of the reputable dealers will have any hesitation in giving assurance that the sets are in accordance with the regulations.

“It is also important to note that it is illegal under the regulations to purchase any apparatus for the purpose of receiving a broadcasting programme without first having taken out a Government licence for which a fee of 10/- per annum is payable. This licence can only be issued to persons after they have paid the subscription that may be payable to the broadcasting station licensee. Such licences are issued by the broadcasting station licensee or their authorised agents.

“The regulations also provide a penalty for any dealer who sells wireless apparatus to any person unless the dealer is satisfied that the purchaser holds a broadcasting receiving licence or a wireless experimental licence and that the set complies with the regulations, and in the case of the broadcast receiver, is sealed to the wave length of the broadcasting service for which it is sold.

“The Association has every confidence that the public will be provided with first-class broadcasting programmes and high-grade apparatus suitable for receiving these programmes under the best possible conditions.



Miss Daisy Richards, a young violinist, who will give a recital in conjunction with Miss Nellie McCartney, pianiste, at King's Hall on Tuesday, November 13th. Miss Richards was a member of the late State Orchestra.



November 16, 1923.

## WIRELESS WEEKLY



Mr. Herbert Cosgrove, baritone soloist of St. Mary's Cathedral, and pupil of Mr. B. Richards, proved himself an accomplished musician with a beautifully balanced voice in songs by Rachmininoff and Kahy. He is also a composer of merit.

"The broadcasting regulations issued by the Commonwealth Government as a result of the conference held in Melbourne in May last, are the best that could be devised after investigations made in America, Great Britain and other European nations by certain members of the

Conference. By these the public is amply protected, inasmuch as continuity of service over a period of five years is guaranteed.

"The Australian idea of the sealed set, although it has been widely criticised, is, in the opinion of the Association, the best for the public.

"The average citizen will want simplicity of handling, in fact, will desire a receiving set as simple in its manipulation as the average table telephone. The sets that will be sold for receiving broadcasted programmes will be very simple to operate, and will require no technical knowledge.

"It may be mentioned that the public of Australia has not yet had what may be considered a fair example of commercial broadcasting. Specially equipped broadcasting stations are, however, now nearing completion, and before the end of this year the fascination of wireless should be realised by the general public."

### A TELEPHONE SWITCHING DEVICE.

It will be found that discriminating visitors often prefer the telephones to the loud speaker, especially when really good music is being broadcast. In order, however, to use several pairs conveniently, a suitable method of switching is a *sine qua non*. The usual method is to use a rotary multi-stud switch as a telephone distributor.

The switching arrangement shown in the diagrams has many advantages over this. As will be seen, it consists essentially of four ordinary switches, across each of which are connected the leads to one pair of 'phones. The connections are so arranged that when any one switch is open the corresponding phone is placed in series with the others; when closed, the phone is short circuited.

The advantages that may be claimed for this method are:—(1) Any one of the four phones or any combination of them can be instantly put in circuit. There are 15 possible different combinations in this case. (2) The apparatus can be enlarged indefinitely at any time to take any number of phones. (3) The cost of construction is small. Any type of switch will serve. Or in place of each switch two terminals might be arranged opposite each other, which could be shorted when required.

FOR SALE.—Pair Brown's 2,000 O.H.M. Adj. Diaphragm 'Phones, almost new; £4. 'Phone, J1660.



WIRELESS WEEKLY

November 16, 1933.

*Singers at Broadcasters (Sydney) Ltd's Studio.*



Miss Dulcie Blair, the Sydney violiniste, who will give a recital at the Conservatorium on Friday, November 16th. Miss Blair was a member of the late State Orchestra.



Mr. Frank Johnstone, Pianist



Miss Margaret Hurd

November 16, 1923.

WIRELESS WEEKLY

5

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# MAKE YOUR OWN

## A Crystal Receiver with Novel Points.

By STANLEY G. RATTEE.

ALTHOUGH NUMEROUS DESIGNS FOR CRYSTAL SETS HA  
PRESENT INSTRUMENT HAS SEVERAL DISTINCTLY NOVE  
FOR SIMPLICITY OF CONSTRUCTION AND

VE BEEN PUBLISHED, THE  
L FEATURES WHICH MAKE  
OPERATION.

The set described herein was made with the object of producing the best results from a crystal receiver with the minimum adjustment for tuning, yet at the same time permitting a variation in wave length. Since the apparatus would ultimately be operated by a small boy, strength and robust construction were two of the essential features.

A photograph of the complete instrument is given in Fig. 1, whilst that of Fig. 3 shows the interior of the containing box.

### THE CONTAINING BOX.

In the construction of a set of this type it is recommended that the containing box be the first component to receive attention, and for this purpose the reader should procure an ordinary wooden egg box, made from 3-ply board, or failing this a square foot of the unused material. The containing box forms for this set the foundation upon which to build, by reason of the fact that since there is no panel all the components are attached to the sides and base.

The top is fitted with a sliding lid to permit of access to the crystal deflector and wiring. Cut from the lid of the egg box a piece of  $3\frac{1}{2}$  in. by  $2\frac{1}{2}$  in. to form the base. Next cut two pieces having measurements of  $3\frac{1}{2}$  in. by 2 3-8 in., also one piece  $2\frac{1}{2}$  in. by  $2\frac{1}{2}$  in. and one piece  $2\frac{1}{2}$  in. by 2 3-8 in.

Place the base flat upon the table, and along its sides attach by means of small brads the two pieces measuring  $3\frac{1}{2}$  in. by 2 3-8 in., so placing them that 1-8 in. at each end extends beyond the base. Along the two remaining sides attach the end pieces measuring  $2\frac{1}{2}$  in. by 2

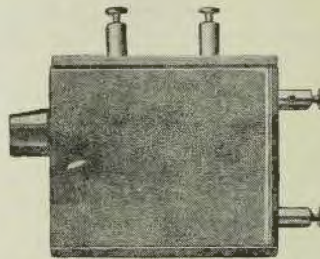


Fig. 1. The complete receiver, with case closed. The aerial and earth terminals are on the right.

3-8 in. and  $2\frac{1}{2}$  in. by  $2\frac{1}{2}$  in. respectively and secure, in addition to the base, all the sides to each other by means of further brads.

Make by means of a sharp chisel, along the tops of the two sides and the higher of the two end pieces, a groove 1-16 in. wide, 1-16 in. down from the edges of the wood. This groove is intended for the lid to slide in, and for this reason care must be taken to keep the chisel straight.

The lid for the box should next be prepared, the dimensions for this being 2 7-8 in. by 3 5-8 in. Along the two longer edges of the lid and also along one of the shorter sides are cut grooves 1-16 in. wide to the depth of half the thickness of the wood. This produces a tongue 1-16 in. by 1-16 in. round three sides of the lid in order that the latter will run freely in the box.

### THE INDUCTANCE.

The next item to receive consideration is the inductance. This is

wound with No. 26 S.W.G. enamelled copper wire for 150 turns. The former is made of wood measuring 3 in. by  $1\frac{1}{2}$  in. by  $\frac{1}{2}$  in. into the ends of which are driven  $\frac{1}{2}$  in. from the edges, and to a depth of  $\frac{1}{2}$  in. and opposite each other, two 1 in. nails with heads removed. At this point bore through the wooden former with the aid of a red-hot needle a hole 1-8 in. from one of the short edges through which is threaded one end of the wire for winding the inductance. If this end is bent so as to lie along the former parallel to the short edge near to it, it will be held sufficiently secure to enable one to commence the winding; care being taken to leave about 3 in. of free wire for subsequent connections. The winding is made by hand and 150 turns are placed side by side (since the wire is enamelled it is of no consequence if they touch) and drawn as tight as possible without breaking. The end, after the 150 turns have been wound, is secured by means of a few twists round a small screw

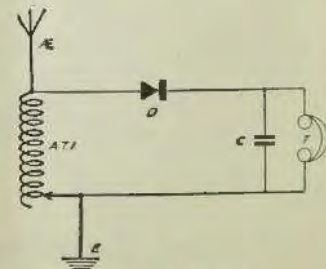
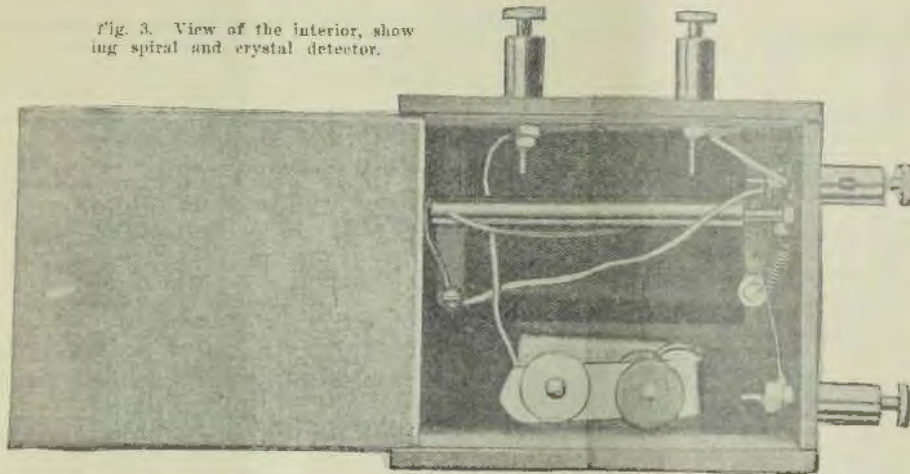


Fig. 2. The circuit used.



Fig. 3. View of the interior, showing spiral and crystal detector.



driven into the end of the former.

These operations complete our inductance, which is now ready for fitting in the box. The two 1 in. nails with heads removed are intended to serve as supports for the coil, and in order to eliminate the possibility of wear, these supports are secured in two brass bushes fitted in the two smaller and supporting sides of the box.

The brass tubing of a gas-burner by-pass forms an admirable material for making these bushes, and two pieces each of 1.8 in. in length should be cut by means of a hack-saw or file.

In the smaller sides of the box, and immediately opposite each other, are made holes (one hole in each side) by means of a small bradawl at distances of 1 in. from the edges of the base and sides. Into these are forced the two brass bushes.

With these in place the former may now be secured in the box by pushing the nail at one end into the bush far enough to allow the other nail to pass free of the top edge of the box and so slip into its own bushing. It can now be set so that the inductance should be "hinged" as it were, and free to move with an upward circular movement.

#### THE ADJUSTING ARM.

Whereas the most solenoid or cylindrical inductances are varied by means of sliders or tappings

with a switch, the arrangement embodied in the set under description is what is best explained as a "spiral" movement, and may be seen in Fig. 3.

The spiral or rod is made up of a brass rod, 3 in. long and  $\frac{1}{4}$  in. in diameter, round which is bent (as seen in Fig. 3) 4 in. of No. 6 bare copper wire and soldered to the brass rod.

This feat is best performed by first bending the copper wire round a long pencil so as to get a twist in the metal and then hammering it into its final shape on brass rod.

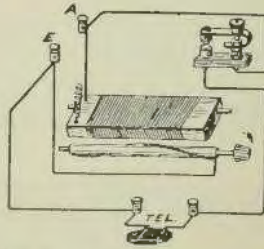


Fig. 4. Pictorial arrangement of circuit.

By this means the wire can be made to grip the brass rod sufficiently hard, to permit of soldering with a small iron.

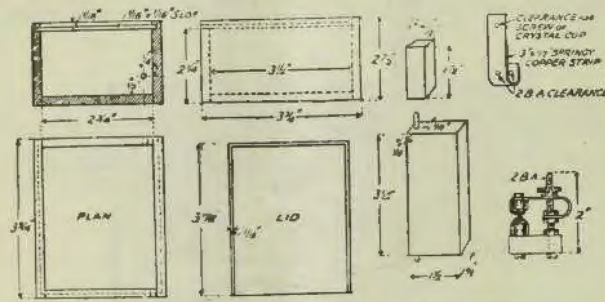
In one end of the rod is drilled a hole 1.8 in. in diameter to  $\frac{1}{4}$  in. depth, and at the other end is drilled

to the same depth a hole big enough to take a 1 in. nail. Into the 1.8 in. drill-hole is fitted a short length of  $\frac{1}{8}$  brass rod, say 1 in. in length, and then soldered. Now drill in the containing box a 1.8 in. hole 1 in. from the base and  $1\frac{1}{2}$  in. from the edge of the sides, immediately above the inductance, through which is fitted the 1.8 in. brass rod of the "spiral." On the other side of the containing box and immediately opposite the hole just drilled, make a hole with a small bradawl 1 in. from the base and  $1\frac{1}{2}$  in. from the side into which is forced a piece of the gas-burner "by-pass" tubing 1.8 in. long. Remove the head from a 1 in. nail and insert the spike through the bush into the brass "spiral" rod and then solder the nail to the rod.

In this position the spiral is free to turn, though not yet is it making contact with the inductance. The projection of the 1.8 in. brass rod through the containing box should now be fitted with an ebonite or fibre knob in order that it may be more easily turned, and further so that it may be insulated from the hand when the set is being operated.

In order that good contact may be made between the coil and the adjusting or "spiral" rod it is necessary (1) to scrape from the upper side of the inductance all traces of enamel; (2) to arrange a lifting device whereby contact is made at all times between the rod and bar.





Details of the box, inductance former and crystal detector.

ed windings. This latter is accomplished by means of a spring which served at one time as a part of a bicycle brake. One end is screwed to the wooden former and the other, after having been pulled to give a good hard tension, is screwed to the containing box as seen in Fig. 3. This spring lifts the coil on to the spiral and gives consistent pressure when the first-named is turned for adjusting.

THE DETECTOR.

The detector employed is a "perikon" combination and is made from a piece of wood 1 1/2 in. long by 1/2 in. wide by 1/2 in. deep, screwed to the base of the containing box. At one end of the block is screwed into the wood a crystal cup (purchased) containing zincite, whilst at the other end is drilled a hole to take a conveniently small B.A. rod (2 B.A.) countersunk to take its corresponding nuts, on the underside of the wood; the length of the rod is 2 in. Next procure 3 in. of springy, copper strip 1/2 in. wide and bend at one end to form a U; through the two sides of the U drill holes, slightly bigger than the diameter of the rod, and at the other end of the strip drill a hole large enough to take the screw of a crystal cup. Place the two holes at the bent end, over the rod, securing the spring in position by means of a nut situated above the underside of the bend. Fit an ebony knob with corresponding thread to the 2 B.A. rod which is projecting beyond the copper spring, so that the knob acts as an adjusting handle for the position and tension of the spring. To the other end of spring is attached another crystal cup (with bornite as its cry-

stal) held in its place by means of a nut on the upper side of the spring.

WIRING UP.

Four terminals are fitted to the containing box, one for the "aerial," one for the "earth," and two for the "telephones"; the size and positions of these terminals are not of much consequence and may be left to the reader's judgment, though the smaller they are the neater will look the instrument. Across the terminals to be used as telephone terminals is connected a fixed condenser made up with 13 strips of tin foil, 7 one side and 6 the other, separated by mica strips.

The general wiring of the set is shown in Figs. 2 and 4, wherein are illustrated both pictorial and theoretical arrangements. With such a set as the one described it is possible to hear broadcasting over distances of about 20 miles when aerial conditions are good, and though the set was made for the purpose of tuning in broadcasting and nothing more, so long as good crystals are used, ships may also be heard.

MAKING THE UNDERWORLD SAFE.

Washington reports the nomination of a special officer by the Bureau of Mines to make further experiments at Bruceston mine in connection with life-saving. The Department of Commerce have promised their aid, and their radio supervisor will co-operate whenever necessary. The experiments at

Bruceston consisted of sending and receiving messages from one part of the mine to another at various depths. Signals from outside were also heard, but on the whole the experiment was only partially successful. It was proved that radio waves could be sent through the solid strata of coal mines, but that the short wave lengths used rapidly lost their intensity with distance. The present consideration is to find a practical method of radio communication underground, so that all sections of a mine may be in constant touch.

A GOOD DAY'S WORK.

Germany put in a good record when she sent forth 51,139 words in one day recently. Of this, 35,420 words went to America, the rest were divided amongst Italy, Russia, Spain and Egypt. It was almost entirely handled by two stations, those at Nauern and Eilvese. Nauern is still undergoing many improvements, for a new Buenos Aires service will be opened in a month's time. The station will operate in liaison with Monte Grande, near Buenos Aires, and the service is to be operated under the auspices of a combine—composed of English, German, American and French companies. Separate antennae have been constructed for the various services, Asia, Africa, Europe and America now owning one each.

NOT GUILTY.

Radio has often been unjustly accused of attracting lightning. At Medford, Mass., U.S.A., when a very severe local storm raged, and lightning struck the Amrad Broadcasting Station, the blame was at once attributed to the radio apparatus. But a thorough investigation showed that the electric light wires were the culprits. The lightning demolished them entirely, and all service was at a standstill in the town. The broadcasting apparatus, a very powerful one, was untouched, likewise the three-hundred-and-twenty-foot antenna tower, which facts allow radio to stand up before the universe without a stain on its character.



November 16, 1923.

WIRELESS WEEKLY

9

## Weather and Wireless.

By G. H. DALY.

WIRELESS IS USUALLY DESCRIBED AS BEING "INDEPENDENT OF WEATHER CONDITIONS," FOR ALL PRACTICAL PURPOSES IT IS; ACTUALLY IT IS NOT.

Australian amateurs who have been able to pick up concerts from stations in other States will have found almost invariably that the signals come in much louder when the weather is damp and cloudy than when it is fine and dry.

This points to the fact that, although wireless waves are waves in ether and not in air, the weather conditions exercise considerable effect on the propagation of these waves.

### CLOUDS.

As far back as 1913, Professor A. H. Taylor proved conclusively by actual experiment that clouds helped wireless transmission enormously. From readings taken at the wireless station of North Dakota, which is situated almost in the middle of the North American continent, Professor Taylor found it was possible to forecast the condition of wireless signals by studying the weather forecast issued by meteorological stations.

For instance, if the weather forecast issued by some particular meteorological station indicated that the sky would become overcast and cloudy twenty-four hours hence, it would be reasonably certain that good wireless reception could also be expected twenty-four hours hence.

Another interesting fact which Professor Taylor established was, that a cloudy day was invariably followed by a night of exceptionally high transmissivity.

The actual reason why cloudy weather affects the transmission of wireless waves beneficently is not known, but it is presumed that clouds deaden certain of the sun's rays which ionise the atmosphere and cause the latter to absorb wireless waves. Therefore it follows that wireless waves will be propagated more freely when the clouds are present and preventing the sun's rays from ionising the atmosphere.

### RAIN.

It might appear that falling rain, being a conductor of electricity,



Mr. Palmer Kent, the young Sydney composer pianist, with already over 70 compositions to his credit, has given Australian wireless audiences an opportunity of hearing some of them. A new composition for violin and piano was conceived and written on a recent Friday afternoon, completed at 7 o'clock, rehearsed at 7.30, and performed by the composer and Mr. Neils Anderson at 8.30, and was exceptionally well received. This is unique in wireless history.

would act as a screen to wireless waves, somewhat similarly to a sheet of metal or other conductor. Yet while this may be the case to a very slight extent, experience shows that wet weather usually means good transmission.

This is explained by the fact that rain forms a layer of moisture on the surface of the ground, and as moisture is an electrical conductor it prevents the wireless waves from being absorbed by the ground. Consequently on a wet day wireless

waves will be propagated further and more easily than on a dry day.

This is also very clearly illustrated in the case of waves transmitted over the sea, for it is well known that wireless transmission over the sea is far superior to wireless transmission over land. This is because wireless waves are not absorbed by the sea water to the extent to which they are absorbed by land, owing to the fact that sea water is an electrical conductor and reflects wireless waves. Thus when a layer of moisture is formed on dry land by rain a somewhat similar action takes place.

In addition to this, rain will also assist transmission by reducing the resistance to earth. This can be demonstrated by throwing a few buckets of water over the earth where the earthing plate is buried. For the moistening of the earth in this way will often cause a very appreciable increase in the strength of signals, especially after dry weather.

It may be argued, however, that rain will render the insulation of the aerial at the transmitting end slightly defective owing to the film of moisture which will be formed over the various aerial insulators, and thus a certain amount of energy will go straight to earth and be lost.

From observation made by the writer at various transmitting stations this (leakage) would appear to be general, and occasionally sparking from the aerial lead-in insulator can be seen taking place to the roof of the wireless room on dark, wet nights. Such leakage should not be confused with the brush discharge due to ionisation, which takes the form of a bluish glow around the aerial wires.

Briefly, therefore, the effect of rainy weather on wireless transmission does not appear to be absolutely consistent, for although rain generally results in increased signal strength despite leakage, on some occasions wet weather has caused a decided decrease in signal strength. Nevertheless, as mentioned above,



it will usually be found that rain means an increase in the strength of wireless signals.

**SNOW.**

In the case of snow, which is merely water crystals, the leakage to earth via the aerial lead-in insulator is greatly accentuated, more especially if the lead-in insulator happens to be erected parallel to the ground, thus giving the snow a chance to collect thereon. On the other hand, where the aerial lead-in insulator is mounted vertically the snow does not get the opportunity of collecting upon it and the leakage to earth is not so pronounced. Generally speaking, the action of snow upon wireless transmission is very similar to the effect of rain.

**FROST.**

Occasionally frost will set and freeze the snow or rain and a coating of ice will be formed not only on the various aerial insulators, but also on the aerial wires. Naturally, this results in a serious loss of energy.

On some of the high-power stations in America the cylinder of ice formed on the aerial is sometimes

heavy enough to break the aerial wires, and it has been found necessary to instal a special apparatus to heat up the wires. This is done by running a current through the wires and thus melting the ice cylinder. The operation can be accomplished in the space of seven minutes, and therefore does not interfere seriously with the working of the station. Fortunately in this country the weather is rarely severe enough to warrant this procedure.

**SUNLIGHT.**

The effect of sunlight on wireless transmission has been studied by a great many scientists, and while some are of the opinion that the actual sun's rays have very little effect on wireless waves, the majority maintain that the more powerful the sun's rays the greater the absorption and consequent weakening of wireless waves. In the tropics wireless waves are usually at their minimum strength round about mid-day.

Hot sunny weather also increases atmospheric disturbances, which are at their maximum during the summer and early autumn months.

From research work in this direction it would appear that atmospheric disturbances are due to the uneven potential of the static electricity in the atmosphere which is caused by the dryness of the air in hot weather.

Although atmospherics are undoubtedly the greatest drawback which wireless communication has to contend with, it is a curious fact that when atmospherics are at their maximum the strength of the wireless signals also mysteriously increases, but why this should be is one of the many problems to be solved.

To sum up, weather conditions undoubtedly play an important part in wireless transmission, and therefore to a certain extent the condition of wireless signals can be anticipated for some time ahead by studying the weather forecasts which are sent out at regular intervals by the various British wireless stations. Thus if a wireless picnic is contemplated, the meteorological reports should be studied with a view to wireless, as well as weather conditions.



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and to those  
about to enter the  
field of Wireless*

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WHAT IS BROADCASTING WORTH TO YOU?

A man and his family sit on the porch of their home listening to the sounds of a talking machine at his neighbour's across the street. After enjoying a score of records there is a commotion on the porch of the first home, and eventually the head of the family yells across the street:

"Say, you! Get some new records if you expect us to listen again."

Such a situation is ludicrous, foolish. Yet it is the situation in radio to-day.

There are several hundreds broadcasting stations in action, several of which are certain to be in your locality. Every day you are privileged to listen to the programs. There is no monthly check, no hat passing. It is all free. No doubt you give your opinion on the quality of these broadcasts. You may be one of those who write letters to the broadcast stations suggesting that if they can't put on better programs they should "shut up shop." How unsound this whole business is! How artificial its foundation!

As the owner of a radio set costing perhaps 200 dollars, did you ever consider that if all these stations closed down to-night you would have no recourse? When you bought your receiver there was no implied agreement that broadcasting would be supplied you. The dealer assumed and you assumed that the programs would be available continually thereafter. Up to the present they have been, but what of the future?

A station like WGY or WJZ is an expensive proposition. The monthly cost may run as high as 10,000 dollars. In return for this outlay what do the proprietors receive?

Some of them are makers of sets, others of individual parts. But of the total machines made and the total parts produced the firms operating broadcasting stations can be credited with only a percentage, possibly less than 50 per cent. This means that the other 50 per cent. of firms are cashing in at the expense of the others.

Broadcasting is too big a thing and too essential to permit suspension, but some way must be found to finance it. As one of the and-



Miss Hilda E. Boyle, the charming young Sydney soprano, whose voice brought forth such lavish praise from Madame Lipkowska, and who leaves shortly on a tour with the world famous Kennedy family; has increased her reputation per medium of wireless broadcasting, and caused many to predict a brilliant future for her. Miss Boyle is from Mr. Roland Foster's Studio.

ience there is no reason why you should be privileged to listen to programs without charge. If the programs are worth listening to, they are worth paying for. If they are not worth listening to the industry is not worth supporting.

How much is broadcasting worth to you? A dollar a year? Five dollars a year? Or nothing?

E. L. B.

SUPPORT FROM MR. G. MAXWELL CUTTS.

To the Editor

Sir, I shall be pleased if you will publish the enclosed report of our last meeting.

I notice in reading this week's Wireless Weekly, an article on the poor attendance at Radio Clubs. I would like to support W.W. in this matter.

Being actively connected with radio clubs I see the good such organizations are doing for the amateur.

Failure on the part of members to attend regularly is detrimental to the organization and not in the interest of the experimenter.

One can learn more in one night at a radio club than by reading text books for weeks.

If a member complains of a meeting being dry, it is his own fault, as every member has a say in the running of a club and his absence will not assist in making meetings more interesting.

The genuine experimenter will welcome a radio club and stand by it as he realises it is for his own and his fellows' good.

I cannot urge experimenters too greatly to join a club if not a member, and if a member to stick by his club. Surely anyone really interested can spare one night a week.

Yours etc.,

G. Maxwell Cutts.

Wireless Apparatus

New or Second-hand,  
Bought, Sold or Exchanged.  
Howell's, 19 Barlow  
Street.



### A Crystal Set for Half-a-Crown.

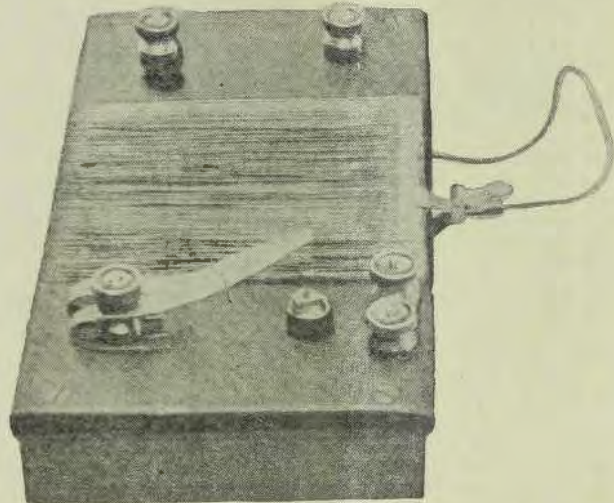
THIS IS ONE OF THE SIMPLEST AND MOST EFFICIENT CRYSTAL SETS FOR A BOY TO MAKE.

Here is a new type of crystal set which will give splendid results from your local broadcasting station and which can be made in an evening by any boy who likes to try. There are no cylinders to wind with even layers of wire no fidgeting with sliders to make them run easily, no worries in mounting the cardboard roll evenly between the two end pieces, no tiresome woodwork, and, in fact, nothing whatever to prevent you finishing the job quickly.

Look at the photograph and you will see that the set is very unusual in its appearance. Even if you have to buy everything new (and you will probably find several of the parts round the house) it will not cost you more than half-a-crown, and I guarantee that no boy will be able to hear better and louder signals on the most expensive crystal set. Make it and see!

These are the parts you want before starting the set:—

A strip of thin wood, 8 ins. by



A new use for a tie-clip! In this set the clip is used for tuning

### Announcing

the installation of

## A RADIO DEPARTMENT AT DAVID JONES'

Now open and under the control of Mr. Basil Cooke, F.R.A.S.

The Opening of a Radio Department, by David Jones' under the supervision of Mr. Basil Cooke, F.R.A.S., Vice-President of the Wireless Institute of Australia; Secretary, Wireless Section of the Pan-Pacific Congress—means that the advice and expert knowledge of this eminent scientist are now at the disposal of the public. Stocks in this department include complete ranges of accessories for amateur use, as well as Receiving Sets, which conform in every respect to Government Regulations.

Location: 22 York St., between Barrack & King Sts., Sydney



4 1/4 ins. (the top of a cigar box will suit excellently for this).

Two pieces of wood, about an inch square section and 4 1/4 ins. long.

Five ordinary brass terminals (almost any terminal will do provided one of them is not the kind in which a wire is pushed into a round hole).

Three ounces of No. 24 gauge enamelled copper wire.

One tie clip.

A piece of thin brass or tin, measuring about 4 ins. long. If you cannot find anything better you can cut this out of an old tin.

One small metal cap, such as the top of a tabloid bottle or similar small tube.

One piece of crystal, such as Hertzite or Galena.

Cut out the piece of thin wood to the size shown and with your pocket



How to cut the metal strip.

knife round the side edges very carefully. This rounding of the edges should be done for about 5 ins. down each side. Rub the wood over with the sandpaper to make it nice and smooth, and if you like, give it a coat of stain and varnish. When this has been done glue the two end strips of wood in place. (I should not try to nail them as the wood will split if you do this), and with a red-hot needle of fair thickness make a hole about 2 ins. from one end in the middle of the board. Now push one end of the enamelled wire through this and bend it so that it will not pull back again, and then wind on the wire as shown in the photograph. If you live near a broadcasting station which has a fairly short wave length, such as Broadcasters (Syd.) Ltd. you will not need to wind on more than about 120 turns to receive this local station quite satisfactorily with any ordinary aerial. Wind turns very carefully so that the adjacent wires touch, but do not overlap one another, and be sure to draw the wire tight as you go. When you have wound on the number of turns selected, secure the wire carefully in

place and make another hole at the end of the board through which you can push the finishing end of the wire. Leave about a foot of wire for subsequent connecting up. Next drill the holes for the five terminals shown (these holes can be made with a red-hot knitting needle if you have nothing else handy), and push the shanks of the terminals through the holes and secure them in place with their lock nuts.

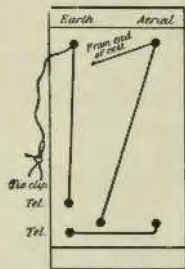
Now carefully scrape off the enamel on one side of the coil in the way shown, so that the tie clip will be able to grip the wire when it is closed. The small crystal cup, which will be made from the top of a phial, should be fastened to the baseboard with a screw through its centre, so that the screw holding it will project on the other side for connection.

The strip of brass or tin must

it is not necessary. When you have soldered the catwhisker in place and have cut this strip in the manner shown, bend it round and push one end of the kind of fork so made under the terminal which is to hold it; screw this tightly in place and undo the top milled nut of the terminal. You will now be able to bend the strip round, so that the divided portion comes over the shank of the terminal. Now put the milled nut back and you will see that by screwing it up and down it will give you a very nice variation of movement of the catwhisker.

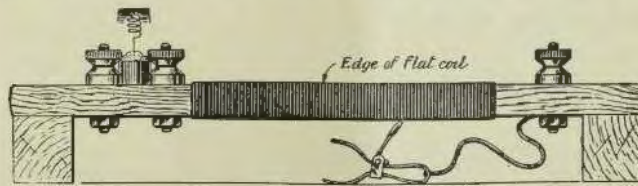
You are now ready to connect up the terminals and the ends of the coil as shown in the drawing. Then take a piece of flexible wire which you can cut from an odd length of electric lighting flex and solder it to the earth terminal as shown. The other end of this wire will need to be soldered to the tie clip handle.

The next step is to take your crystal very carefully and, without fingering its surface, fix it into the little metal cup by means of silver paper or any other tinfoil you can find. To do this first of all take the crystal in a pair of tweezers and wrap the silver paper carefully round the under side; then, still holding with the tweezers, force silver paper all round it in the cup until it is quite tight. This will make you the necessary good contact. A final bending of the brass strip and the catwhisker will be needed, when the set is ready for trial. When all is finished connect the aerial and earth to the two terminals shown and the telephones in place and carefully place the catwhisker on the crystal. Now undo the clip and rub it on the bared wire backwards and forwards slowly until you hear the best results.



How to join up the terminals, etc.

now be bent to the shape shown, and taking a small length of the spare wire scrape the enamel from it, wind it round a knitting needle or pencil, solder one end to the end of the brass strip and cut the other end off sharply, either by cutting the wire diagonally to give it a



An edge-on view of the receiver

kind of chisel point or else by rubbing it with a file to make a good sharp finish. If you care to buy a gold catwhisker for 4d. or 6d. this will give even better results, but

When you have come to the place where the signals are loudest, close the clip and leave it in position; the set will now be tuned for the broadcast station and can be left

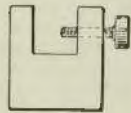


in this position as long as you desire to hear it. A slight adjustment of the crystal may be needed, and you will soon have your set going in fine style. On an ordinary aerial quite loud results are obtainable up to 10 miles, and I shall not be surprised if much greater distances are covered by it.

Note: The manufacture of this instrument commercially has been protected.

A FINGER PROTECTOR.

A very useful little gadget that protects the fingers from being pinched when using a round or square file, can be made, as shown in the drawing, from a small piece of scrap brass or other metal. A slot about 1/4 inch in depth is filed out and a 1/4 H.A. set screw is inserted into one of the arms.



The finished protector

The protector is placed on the blade of the file 1/4 inch or so from the handle. So long as the fingers are kept behind it there is no fear of their being pinched between the handle and the work.

The device can be readily adapted to quite a number of useful purposes. For example, when drilling a hole to a certain depth in an ebonite panel for tapping, it can be clamped to the drill at the right height, and will indicate with accuracy the point at which to stop.

R. W. H.

BOOKS ON WIRELESS

- Lessons in Wireless Telegraphy, by A. P. Morgan. Price 2/3 posted.
- Wireless Construction and Installation for Beginners, by A. P. Morgan. Price 2/3 posted.
- Experimental Wireless Telegraphy, by A. Morgan. Price 2/3 posted. 1/4
- Operation of Wireless Telegraph Apparatus, by A. Morgan. Price 2/3 posted.

N.S.W. Bookstall Co., Ltd  
76 George Street, City



LEICHHARDT AND DISTRICT RADIO SOCIETY.

The fourteenth monthly business meeting of members of the Leichhardt and District Radio Society was held in the Club Room, 176 Johnston Street, Annandale, on Tuesday, November 6th, when a considerable amount of important business was dealt with.

There will be no meeting at the Club Room, on Tuesday night next. Instead, members will assemble at the T.C.S. Rooms, 399-401 George Street City, for the purpose of hearing a lecture by Mr. Perrett, of that institution. Mr. Perrett has chosen, "Wireless Telegraphy" as the subject of his lecture, and as it is to be accompanied by practical demonstrations, members are looking forward to a very pleasant evening's instruction.

The Hon. Secretary of the Society, Mr. W. J. Zech, of 145 Booth Street, Annandale, will be pleased to receive inquiries from persons interested in the activities of the Society, which holds its meetings in the Club Room, 176 Johnston Street, Annandale, every Tuesday evening, commencing at 8 p.m. All interested are invited to be present at any of the same.

MOSMAN RADIO CLUB.

A further very successful meeting of the above club was held on Monday, 29th October, in the Club Rooms, there being present a large number of intending members.

The President, Mr. Young was in the chair.

Minutes of the last meeting were read by the Secretary, Mr. Nunn, and all matters previously considered during the formation of the Club were placed before those present for open discussion, a great deal of interest being displayed in the welfare of the new club.

The President's address, which followed, was neither lengthy nor uninteresting; he spoke briefly of the history of wireless, leading up to the present day conditions, and of vast sphere open for scientific re-

search and experiment, and he appealed to all present to start in all earnestness, to co-operate, and to attain a social atmosphere throughout their meetings and interests concerning radio. This being achieved, he said, the club will expand in every way, and time will not be far distant when the Mosman Radio Club will take its place in the front line of Wireless research and experiment.

President Young further spoke of the Club's apparatus, by which the first stage of experiment would be commenced; each member would share in the privilege of the making of parts, and the use of the set, and as time goes on the club will be the proud possessor of a first-class collection of radio instruments.

The address was greatly appreciated, and the Secretary and Treasurer at once got busy with enrolling members; every man present joining up and many paying their subscriptions in advance for the coming year.

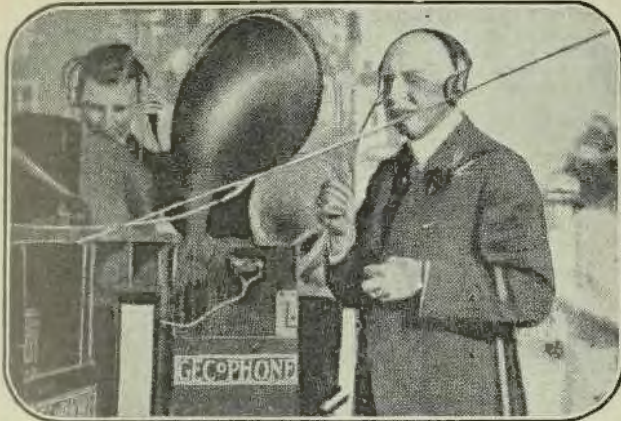
The next meeting, which will be the first general annual meeting, will be held at 8 p.m. on Monday, 5th November, at 104 Glover Street, Cremorne Junction; those interested and not already enrolled are requested to attend.

TO THE RADIO ENTHUSIASTS OF ASHFIELD AND DISTRICT.

There has been a radio club formed in this district for the benefit of those who are interested in radio telegraphy and telephony, and all members have the full use of the machinery and equipment for making transmitting and receiving sets, and also the use of a complete transmitting and receiving station under a fully qualified operator, and there is a great advantage gained by those who join a club of this description. We would like to see all who are interested in wireless telegraphy and telephony phenomena to come along and bring their friends, who are also interested. The above club hold its meetings Wednesday and Friday nights, at 7.30, at 7 Alma Street, Ashfield, and also a special construction class every Saturday afternoon, at 2 p.m.

Mr. E. Mason, who is Secretary, will be pleased to give any information desired to anyone interested in the Ashfield Radio Club.





H.R.H. The Duke of Connaught listening in at Bagshoi Park, his home in Surrey.

**CROYDON RADIO CLUB.**  
On Saturday, November 3rd, the Croydon Radio Club held its weekly meeting, at the Club Rooms,

"Roekleigh," Lang Street, Croydon, at 7.30 p.m. Members decided that the club subscribe to the "Radio News" and "Modern Wire-

less," as these publications were useful books, and rather too expensive for the average member to buy every month.

A competition is being held in the club among members. It was decided to purchase the necessary apparatus and commence experimental transmission.

The club is contemplating another lunch picnic, and if there is sufficient support from members another outing will be held in the near future.

The Secretary, G. Maxwell Catts, "Carwell," Highbury Street, Croydon, will be pleased to hear from persons desiring to join the club.

**CONCORD AMATEUR RADIO CLUB.**

At the usual meeting of the above club at the club-room, Wallace St., Concord, on Thursday, 1st November, it was decided to apply for a transmitter.

After the correspondence had been read and received the members had a talk on the construction of transmitters.

All the members are looking forward to the visit to 2CM on 19th November, which should enlighten

# To Get the Broadcasters



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Size	Number of Plates	Set of Parts	Assembled
.0002	5	7/6	8/6
.0003	9	8/6	10/-
.0006	17	11/-	12/6
.0008	25	13/6	15/6
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VERNIER ADJUSTMENT 7/6 EXTRA

## RADIO HOUSE

619 GEORGE STREET  
SYDNEY

TELEPHONE CITY 1487





Mr. Archie Boyle

a few of the members on the best side of wireless.

Buzzer practice was then carried out for an hour.

The meeting then adjourned.

All communications should be addressed to W. H. Barker, "Euripedes," Wallace St., Concord.

LEICHHARDT AND DISTRICT RADIO SOCIETY.

At the 54th general meeting of members of the Leiclihardt and District Radio Society held in the club-room, 176 Johnston St., Annandale, on Tuesday, October 30th, a very interesting and instructive lecture was delivered by Mr. G. Mann, who dealt with the subject of wave-meters. Mr. Mann went very thoroughly into his subject, and members were given many useful hints on the construction and use of this very useful piece of apparatus. At the conclusion of the lecture the visitor was accorded a very hearty vote of thanks by acclamation, and a promise was extracted from him whereby he agreed to lecture again at a not too distant date.

An invitation was received from the Railway and Tramway Radio Association to a lecture to be delivered by Mr. Joseph G. Reed, the well known Radio Engineer, and several members expressed their intention of being present.

It was announced that, at a meeting to be held on November 13th, a lecture would be delivered by Mr.

Perrett, of the I.C.S., and a good attendance of members is expected on that occasion.

Inquiries relative to the activities Secretary, Mr. W. J. Zech, 145 should be addressed to the Hon. of the Society are welcomed, and Booth Street, Annandale.

ONCE BIT

Even if Dr. Cook would like to repeat his famous Polar stunt, radio has made it impossible for him. Every Polar party which sets forth must now be equipped with the new radio compass, which at the Pole shows all the radio stations picked up as bearing dead South, whilst all radio stations in taking their communications their position would be due North. The great naval airship LR 1 carries radio, and if she does not reach the North Pole this summer, she will start early in the next spring.

If it is reached, proof positive will be forthcoming by means of the radio set and radio compass. Radio messages and weather reports have been received daily during the winter from Spitzbergen, latitude 78 North. Therefore, if radio will carry through the Aurora,

the whole of the world will hear of it when LR 1 reaches the Pole.

BROADCASTING ABROAD.

Two new broadcasting stations have just been opened in Chile, South America. They do not commence operations until the Buenos Aires stations have finished for the evening, and one belongs to a wealthy and ambitious amateur, who sends out a regular itemised programme. This one is at Vina del Mar, the other at Santiago de Chile.

There is a difference in time of an hour between the coast and the inland parts of Chile, hence the two new stations' tardy commencing time. Broadcasting in Italy, which, strange though it may appear in the country that produced Marconi, has previously taken rather a back seat, is now progressing very favourably.

The Government has hitherto rather cold-shouldered the idea of fostering new broadcasting stations; but the present Premier is keenly interested in radio, and great things are hoped for now that he has shown definite signs of taking steps to forward the science himself.

"VOLMAX" APPARATUS

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Airad	Ratio 4 to 1	30s.
Jefferson	" 5 to 1	37s. 6d.
Amertran	" 5 to 1	63s.
Amrad	" 5 to 1	42s.
United	" 5 to 1	36s.

Set of Neutrodyne Coils, Condensers and Neutralising Capacities in box with full instructions—Price £8



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Sydney Broadcasters Limited  
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Write for full particulars

We Pay Carriage  
Throughout

New South Wales

All Parts to Construct

:: Your Own Set ::

### W. HARRY WILES

Licensed Radio Dealer :: 60-62 Goulburn Street, Sydney

One Door From Pitt Street



ARTISTS WHO HAVE LATELY ENTERTAINED.

LISTENERS-IN TO 2SB EXPERIMENTAL STATION.

Miss Daisy Kelly.—A well-known Sydney amateur artist, and late pupil of Miss M. Donegan, of Sydney. Miss Kelly possesses a brilliant soprano voice, and has appeared in many amateur theatricals and charitable functions in Sydney.

Mr. Colvin Walters.—A well-known wireless experimenter, who has the added advantage of being an excellent pianist. In addition to performing in public he also gives his time to broadcasting his music, which has been heard in every State, also New Zealand and Tasmania. He is a late pupil of the Conservatorium.

Mr. C. Wallace Walters.—A well-known wireless experimenter, who possesses a rich baritone voice of first-class quality. Mr. Walters gives a lot of his time to broadcasting, and, in combination with his brother, Mr. Colvin Walters, who is his accompanist, his voice has been heard in every State and New Zealand and Tasmania, and his voice has been pronounced excellent.

People with radio apparatus, living in close proximity to a broadcasting station, and who have a hot and cold water service laid on to the building, may dispense with an aerial by connecting the aerial terminal to a hot water tap and the earth terminal to a cold water tap. In this way the network of hot water pipes in the building act as the aerial.

AN AMUSING INCIDENT.

During the recent experimental tests by Broadcasters' (Sydney), Ltd., a record was played called "Cohen, Listens In." This record gives an idea of the jamming by broadcasting stations, so prevalent in America a few months ago, at least three separate stations can be heard at the one time on the record.

A prominent wireless man, while testing the apparatus on a ship in the harbour, heard this record being transmitted, and not knowing it to be a record, endeavoured to tune-out two of the stations; being unable to do so he recommended that a new and more selective receiver be installed on the ship.



Miss Thelma Druett

"RUBBING DOWN" EBONITE PANELS.

All makers of their own sets know the difficulty in rubbing down the ebonite bought for panels to the necessary matt surface, as for some reason it is only to be bought in the polished state. The usual recommendation is to rub it down with emery or crocus powder, but the result is usually a scratched piece of ebonite that looks ugly. The private individual cannot get hold of the machinery that makers have for the purpose, but a really fine matt surface can be gained by getting a small piece of the cream grit that monumental masons use for rubbing down lead lettered inscriptions, and using that instead of the emery or crocus powder.

VARIATIONS IN DAY AND NIGHT WIRELESS.

Now the question is, why can wireless stations transmit further during the night than during the

day time? asks a writer in "The Broadcaster."

Although no absolute proof exists, scientists have come to the conclusion that the difference between day and night transmission is due to two factors: Firstly, the ionisation of the atmosphere during the day; and secondly, the action of the Heaviside layer.

IONISATION.

What is meant by ionisation of the atmosphere and why should it affect wireless waves?

Ion is the Greek word for traveller, and in this case, broadly speaking, ionisation implies the breaking up of the gases of our atmosphere into travelling atoms carrying positive and negative charges of electricity. The ionisation of the atmosphere is caused by the ultra-violet light which comes from the sun in the daytime, but is not present at night when the sun's rays are withdrawn. Consequently the day at-



mosphere is highly ionised, whereas the night atmosphere is comparatively free from ions.

Now it is an established fact that wireless waves can be propagated far more freely through a non-ionised atmosphere, such as the night atmosphere, than through the ionised atmosphere which exists in the daytime.

This is because the ionised atmosphere is, more or less, a conductor of electricity to a certain extent, and any conductor of electricity is a bad conductor of wireless waves.

For instance, a sheet of copper, which metal is one of the best conductors of the ordinary electric current, will not permit wireless waves to pass through it, but reflects them back in the direction of their transmitter. Thus in the same way the highly-ionised daylight atmosphere tends to hinder the propagation of wireless waves, while the night atmosphere, which is not ionised, freely permits the passage of wireless waves, and so wireless waves are propagated further at night than in the day time.

It will of course be understood that the atmosphere is always a poor conductor of electricity—even after being ionised in the daytime by the ultra-violet light. Yet although the ultra-violet light does not turn the atmosphere into an electrical conductor to any appreciable extent, it ionises the atmosphere sufficiently to affect the wireless waves very considerably.

**THE HEAVISIDE LAYER.**

The second factor which is said to cause the difference between day and night wireless is the Heaviside layer.

This layer is presumed to be a cloud of ionised gas suspended at a height of about sixty miles above the earth's surface. The general opinion is that at night wireless waves on striking the surface of this layer are reflected back to earth again. Because this layer must be highly ionised, and therefore a fairly good conductor of electricity, it acts as a reflector to wireless waves in the same way as the sheet of copper referred to previously.

At night time, therefore, this reflection from the layer will greatly accentuate the wireless waves and enable them to be propagated further—just as reflection from the reflector in the motor-car lamp will greatly strengthen the light from the lamp.

On the other hand, during the day time wireless waves are not reflected from the surface of the Heaviside layer for two reasons:—

In the first place, with the advent of daylight, the ultra-violet light will ionise the lower atmosphere, and this ionisation will tend to prevent the wireless waves from reaching the Heaviside layer, for, as mentioned above, an ionised atmosphere retards the progress of wireless waves.

Secondly, it is extremely doubtful whether the surface of the Heaviside layer is sufficiently smooth to act as a reflector in the day time, even if the waves penetrated to this distance, for heat currents from the earth in the day time are bound to upset the evenness of the reflective surface.

To sum up, at night the wireless waves, owing to reflection from the surface of the Heaviside layer and the absence of ions in the atmosphere, are propagated much further than during the day time, when there is no reflection and the atmosphere is highly charged with ions which retard the progress of the waves.

A very interesting point about this Heaviside layer is the theory put forward by Dr. Fleming, to the effect that the agent which is most likely to ionise this layer, and consequently make it into a reflector of wireless waves, is dust thrown off by the sun and carried forward through space to the earth's atmosphere by the force of light waves.

## Amateur Wireless Licenses

Victoria

RECEIVING ONLY.

Nature of Licence.	Name.	Address.
3 U A	Lay, R. A.	111 Nelson Road, South Melbourne. R.
3 V B	Shortell, R. C.	421 Inkerman Road, East St. Kilda.
3 V C	Hurst, L. H.	429 Mount Alexander Road, Moonee Ponds. R.
3 V D	Moate, G. F.	48 Ivanhoe Parade, Ivanhoe. R.
3 V E	Cansick, N. P.	C.81 Southey Street, St. Kilda.
3 V F	Carter, C. J. H.	31 Hutton Street, Thornbury. R.
3 V G	Obbinson, T. P.	8 Glyndon Avenue, Brighton. R.
3 V H	Irvine, C. J.	9 Park Street, Ivanhoe. R.
3 V I	Joy, C. C.	3 Rose Street, Ivanhoe. R.
3 V J	Rucker, W. A.	F.C/r. Walmer and Young Streets, Kew. R.
3 V K	Smith, E. G.	"Rob Roy," Robertson Street, Northcote. R.
3 V L	Lee, H. J.	"St. Lauveur," Dalston Road, Oakleigh. R.
3 V M	Monteath, F.	32 Point Nepean Road, Elsternwick. R.
3 V N	Oliver, C. E.	The Avenue, Mt. Dandenong South. R.
3 V O	Hoskin, C. H.	9 Creswick Street, Deepdene. R.
3 V P	Baker, C. W.	191 Williamson Street, Bendigo. R.
3 V Q	Burge, H. W.	81 Bay View Street, East Prahran. R.
3 V T	Forge, K. C. G.	22 Paisley Street, Footscray. R.
3 V U	Sutton, W. H. C.	1 High Street, Mulvern. R.
3 V V	Spowart, E.	Mincha West. R.
3 V W	Elsam, L. W.	25 Thames Street, Box Hill. R.
3 V X	Webster, I.	11 Meadow Street, East St. Kilda. R.
3 V Y	Webster, G. J.	15 Marshall Street, Flemington. R.
3 V Z	Freeman, A. W.	14 Western Beach, Geelong. R.
3 W A	Swindells, Miss	475 Neerim Road, Murrumbidgee. R.
3 W B	Roberts, A. O.	56 Stirling Street, Footscray. R.
3 W C	MacIntosh, H. D.	5 Murray Street, Armadale. R.
3 S M	Gay, A. H.	Warragul. T.
3 U X	Steane, G. W.	Earle Street, Mont Albert. T.
3 U Y	Oliver J. Nilsen (N. J. Boyd)	90 Ryrie Street, Geelong. T.
3 U Z	Oliver J. Nilsen (N. J. Boyd)	332 Flinders Street, Melbourne. T.
3 U I	Dalton, R. M.	San Mateo Avenue, Mildura. T.
3 V B	Abbott, R. N.	St. Elmo Avenue, Alphington. T.
3 V S	Philpott, O. J.	26 Lumsden Road, Caulfield. T.
3 D B	Hobart-Duff, W. V.	27 Westgarth Street, East Malvern. T.



Amateur Wireless Licenses (Continued)

3 D X	Van Cooth, J. R.	Wattle-tree Road, East Mulvern.	T.
3 D L	Falls, L. C.	North Road, Caulfield.	T.
The following has been cancelled:—			
3 A K	Watson, H. S.	158 High Street, Kew.	R.
C	Kent, A. E.	28 Bath Street, St. Kilda.	R.
C	Denny, C. M.	32 Francis Street, Ascot Vale.	R.
C	Howell, T. R.	Brown Street, Heidelberg.	R.
C	Robinson, M.	14 Grenville Street, Hampton.	R.
C	Jessop, E. S.	Seville.	R.
C	Berry, N. W.	64 Barkers Road, Hawthorn.	R.
C	Le Plastrier, F. F.	17 Kipling Street, St. Kilda.	R.
C	Wilson, R. D.	16 North Street, Ascot Vale.	R.
C	Seward, G. B.	22 Kintore Street, Camberwell.	R.
C	Leavens, G. W.	57 Bromby Street, South Yarra.	R.
C	Rigby, G. O.	40 Daisy Street, Essendon.	R.
C	Radden, C. S.	49 Hobart Road, Murrumbidgee.	R.
C	Breden, W. S.	26 Jolimont Terrace, East Melbourne.	R.
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C	Dermody, M. A.	Post Office, Heathcote.	R.
C	Whiteley, W. H.	240 Queensbury St., North Melbourne.	R.
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C	Skelton, T. H.	Raglan Street, Preston.	R.
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C	Mackintosh, W.	28 Cobden Street, South Melbourne.	R.
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C	Mackay, A. I.	45 Mason Avenue, St. Kilda.	R.
C	Parkins, L.	130 St. George's Road, Northcote.	R.
C	Moffat, W. C.	58 Munro Street, West Brunswick.	R.
C	Heath, W. P.	Stradbroke Avenue, Heidelberg.	R.
C	Hughes, W. G.	181 Barkley Street, North Fitzroy.	R.
3 F M	Doudney, H. W.	H. Trinity Vicarage, Dickens St., Balaclava.	T.
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- ELECTRICITY HOUSE, 387 George Street.
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