

WIRELESS WEEKLY

November 9, 1923.

*Announcing the*  
**"AUDIOLA" Line of**  
**Radio Receiving Sets**

**T**HE "AUDIOLA" Line of Radio Receiving Sets, ranging from simple models to beautifully decorated mahogany and oak finish Cabinets. Constructed to enclose both batteries and accessories, will occupy its rightful place in all discriminating homes during the forthcoming "Broadcasting Season." Scientifically Constructed, Technically Perfect, Made throughout of the Best and Most Expensive Materials, Original in Design, 100 p.c. Efficiency and Simple in Operation. We invite comparison

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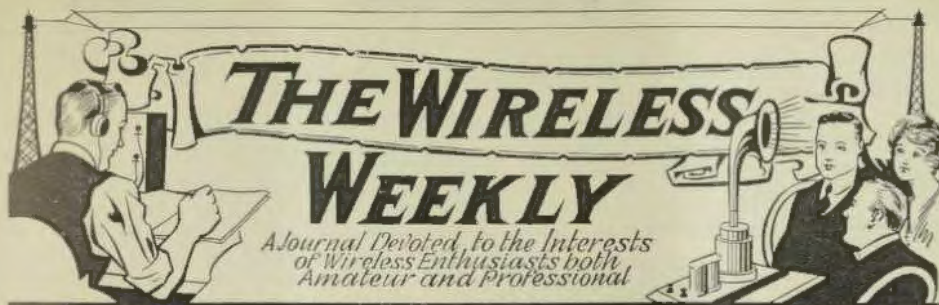
The attention of responsible dealers is called to the fact that our Showrooms at 28 Clarence Street, Sydney, are open to them. Country Dealers, you especially know the value of Radio in the "outback." Write us. Better still come in and see us. Get our Discounts, which are liberal. Our prices are right. Be early in the field with a guaranteed line

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OFFICIAL ORGAN OF THE AUSTRALASIAN RADIO RELAY LEAGUE.

Vol. 3.

November 9, 1923.

No. 5

## Experimental Broadcasting Will Not Be Stopped

Where some of our contemporaries get their information we do not know, nor do we want to know.

There is not the slightest need for the experimenter who is transmitting speech or music to worry as long as he keeps within his allotted wave length and uses not more than the regulation 10 watts of power.

There are one or two who have been using a good deal of power and a wave length above the allotted 250 meters. Unless this is immediately stopped there is no saying what may happen, and in fairness to their brother experimenters we ask them "to play the game."

Australia's first Broadcasting Station has a wave length of 350 metres which will

most probably be the lowest wave length allotted to a commercial broadcast station, and nearest to the Amateur Band. This Company has no objection, but strongly favours properly regulated experimental broadcasting on low power.

Broadcasting would not be possible either in Australia, or elsewhere, had we not had experimenters and furthermore, the low power station at Broadcasters (Sydney) Ltd., which has given such remarkable results of late, was built by those who for years have been amateur experimenters in this country.

We have persistently warned experimenters in these columns to put their house in order. There is not much time left now before commercial broadcasting commences.

### Roster for Week ending 14th 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. 8	2 DS	2 GR	2 DS		
Friday, ....	2 RA		2 DS		
Saturday, 10..	2 GR	2 RA			
	7 to 7.45		7.45 to 9.15	9.15 to 10	
Sunday, 11....		2 GR	2 CM	2 F A	
Mon., 12.....	2 RA	2 GR			
Tuesday, 13..	2 RA	2 GR			
Wednes., 14..	2 RA	2 GR			

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

Broadcasters (Sydney) Limited will be carrying out Tests each day between 3 and 5 and 7.30 and 10 p.m.

### *Incorrect Statements in a Sunday Paper*

*Broadcasters (Sydney) Limited*

It would be better if the Sunday Times Newspaper, who has lately started what might possibly be called a Radio Column, went to the fountain head for its particulars, it might then be able to give its readers authentic information. It is necessary that some of the er-

roneous statements published should be corrected, and we request the Sunday Times to do so. 2HP is NOT Broadcasters (Sydney) Ltd., but the private experimental station of Mr. W. J. Maclardy.

Broadcasters (Sydney) Ltd., who have been carrying out low power tests during the past week, have had remarkable results. Distance they knew they could obtain, so modulation was particularly looked to and results have proved that this station has obtained more perfect modulation than any other station that has yet operated in Australia.

A number of persons who have lately listened to both American and British Broadcasting Stations say that the experiments carried out by Broadcasters (Sydney) Ltd. equal and surpass in many cases anything they have heard.

A telegram received from Hobart, Tasmania, gave in its report the telephone number of Broadcasters (Sydney) Ltd., viz., B7111.

This clearly shows how perfect the modulation must be.

It is stated that the country wireless dealer will have to sell a £2 service for the above company, also that the members of the company are located in the city.

Neither of these statements are true, and like many statements lately made regarding Australian wireless are malicious. Many country agents are being appointed by Broadcasters (Sydney) Ltd., who will sell a FREE service from the company. All that a purchaser of a set for this service is asked to pay is the Government License fee of 10/- per annum, and 10/- demanded as a royalty on patents by Amalgamated Wireless (Aust.) Ltd.



Miss Elsa Harvey, one of the artists, singing with the Broadcasters, Phillip Street, is the possessor of a fine mezzo voice, and is from the studio of Mr. George Grimm. Miss Harvey has not appeared before Sydney audiences for some time; but we wish her every success in the near future.

#### **SALE OF WIRELESS SETS**

Tenders are invited up till 2 p.m. Friday, 16th November, 1923, for the purchase from the Repatriation Commission of:

2 Wireless sets complete, comprising aerial transmitting and receiving units.

Tenderers may tend for one or both of the complete sets or ANY portion thereof.

Located for inspection at Repatriation Show Room, Jolimont.

Forms and particulars obtainable at showroom or at Repatriation Contracts Office, 54 Market Street, Melbourne.

### My First Impressions on Hearing a Broadcast Programme.



MR. NORMAN WRIGHT

Sydney's musical circles will be delighted to learn that Mr. Norman Wright will be again singing in Sydney in the very near future. Mr. Wright studied under Mrs. Cyril Towsey, one of New Zealand's leading sopranos and musicians, and has an enviable collection of very beautiful ballads, song-cycles, and several oratorio works of which he has sung the tenor solos with several musical societies while in New Zealand. Mr. Wright's tenor voice lends itself admirably for wireless transmission; in fact listeners to Broadcasters Ltd., state that it is one of the best voices they have heard.

When asked to listen to a Broadcast programme I accepted the invitation with many misgivings. I knew my friend who had issued the invitation was a keen experimenter and I pictured sitting in a stuffy little room all the evening with a pair of telephones clamped over my ears and not being able to say a word, just as I had seen "sparks" in his little cabin aboard ship.

What really happened was as follows:

We entered the living room of my friend and I immediately noticed on a small table a box about 2 feet square, and beside it a horn similar to the old style gramophone horn. My host turned a knob on the box and pushed in a small black plug and simultaneously there issued forth from the horn in rich, mellow tones the voice of the announcer of Station 2SB, stating the correct observatory time to be 6 p. m. Immediately following came children's bedtime stories, just as these finished we commenced our dinner to the strains of a delightful string orchestra. At 7 o'clock my host said, "We will switch off now till the concert commences at 8, unless you would like to hear the market reports, weather, etc., which is principally of interest to those in the country, though I generally listen to them myself as there is always some interesting news item, and occasionally a first class lecture."

On the tick of 8 o'clock the announcer at 2SB read out the first item on the evening's programme, and from then on till 10.45 p.m. we sat with delight and listened to excellent music and first-class vocalists with an occasional scrap of cable news that I would not otherwise have known until I read the next morning's paper.

During one or two short intervals my host explained to me how the week before he had been unable to go out to see the "Cup" run, owing to a bad cold but had sat at home and listened to such a realistic description of the race given from the course that he could hardly believe he was not there watching it. How that Saturday evenings they had a little dance at home using the music that came from 2SB station.



Mr. Colvin A. Walters, of Rutledge St., Eastwood, who has successfully sung to an unseen audience at 2SB experimental station.

BROADCASTING REALISTIC PIANO MUSIC.

This has long been a real problem for the radio engineer. The difficulty is similar to that which has confronted the maker of phonograph records. The blows of the hammers on a piano are distinguishable, but the singing quality and the overtones which are relatively weak, have not been properly reproduced through loud-speakers and telephones in the past. Engineers connected with WGY studio at Schenectady have devoted a good deal of time to the solution of the problem, and they have now developed a device which will make the piano solo a real feature of the broadcasting programme. The device, in brief, consists of a magnetic system between the poles of which has pivoted a suitable coil system. The magnet is firmly fastened to the frame of the piano and the coil is anchored to the sound board. By means of this pick-up device all tones in the piano are faithfully converted into corresponding electric currents which control the radio transmitter. When heard on the loud speaker the piano

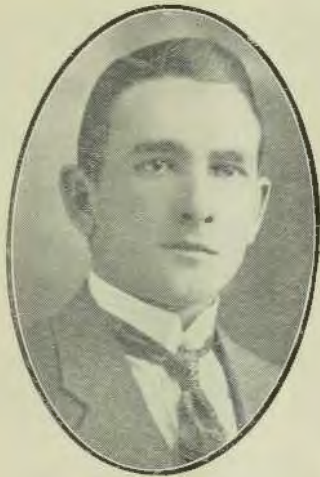
is no longer a tinkling sound. The listener gets all the characteristics of this percussive type of instrument, such as the blow of the hammer, the singing tone and the overtones. The piano pick-up is free from the familiar hiss of the carbon microphone as well as the objectionable blasting that takes place when an artist plays too loudly for the microphone. When the carbon or condenser microphone is used to pick up a vocal solo with piano accompaniment the problem is to place the microphone in such a position that it picks up both voice and instrument in their proper ratio. The position of the microphone must be changed for each artist. The radio listener has probably no-

ted that as the singer increases the volume the accompaniment fades out; in other words, the soloist "paralyses" the microphone. When the piano magneto-microphone is used the intensity of the piano may be adjusted electrically in the control room, even while the selection is being rendered, as the voice is recorded on the customary carbon or condenser microphone. In the grand piano at WGY there are three of these devices: one in the extreme treble, one in the middle register, and one in the base. The three outputs can be readily balanced in the control room for the best results on receiving sets without tampering in any way with the instrument.

DON'T GET BATTERY ACID ON GOOD CLOTHING. INJURIOUS TO CLOTHING.



Artists you have heard from 2 SB Experimental Station but not seen

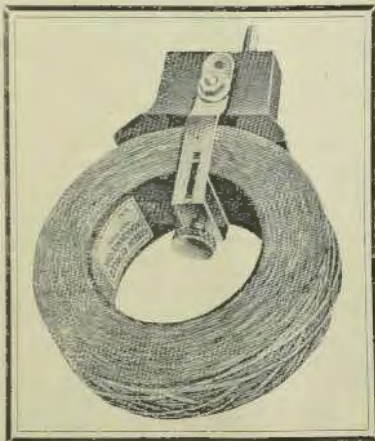


Mr. C. Wallace Walker



Miss Daisy Kelly

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# MAKE YOUR OWN

## How to Make a Two-Stage Audio Frequency Amplifier.

THIS INSTRUMENT MAY BE ADDED TO ANY SET TO STRENGTHEN THE RECEIVED SIGNALS SO THAT THEY WILL OPERATE A LOUD-SPEAKER.

In the design of an amplifier for use with a detector and tuning unit, to strengthen the currents which actuate the telephone receivers, there should be four main objects aimed at. These are:—

A—Maximum amplification with a specified number of tubes.

B—Minimum noticeable distortion of signal currents.

C—Amplifier should work well on all types of tubes.

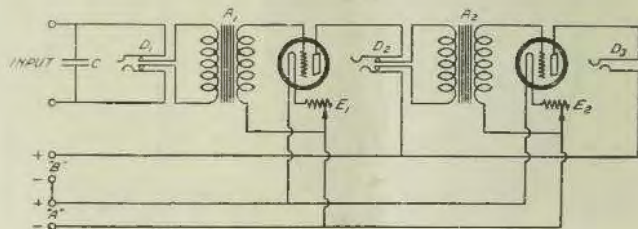
D—Simplicity in construction and operation, says Laurence M. Coekday, R.E., in "Radio Broadcast."

Due to the fact that music and voice signals have such a wide range of frequencies, it is important that the transformers have a wide range also. This means that the amplifier should have a flat curve of response and that the curve should be as high in amplitude as possible. (The curve under consideration refers to "audibility amplification" plotted against "frequency.")

Here we see that the amplifier must have A, at all frequencies within the audible range and so insure B; if the amplifier possessed A, at one particular frequency or band of frequencies, this frequency would be brought out and amplified more than the others and distortion would surely follow.

In the amplifier described all these points have been incorporated by Mr. A. J. Haynes, the designer; the radio fan should be able to make a first-class amplifier from these directions, with little trouble.

The amplifier was designed especially to go with the single-tube Haynes circuit receiver described in the September number of "Popular Radio," which it matches in size and general design as is shown in the photograph on this page. In this picture the cabinet at the left contains the tuning and detector unit and the cabinet at the right contains the amplifier unit.



THE CIRCUIT DIAGRAM

FIGURE 1: This gives the exact electrical connections for the apparatus used in the amplifier. The parts are designated by letters which correspond to those used in the text and in the other diagrams and illustrations.

The amplifier may be used however with any type of detector and with any tuning circuit that you have on hand. It will operate on the same "A" and "B" batteries that you use on your present tuning and vacuum-tube detector unit. For loudest results, however, an additional 45-volt "B" battery should be used on the amplifier.

The electrical circuit diagram is shown in Figure 1.

### THE PARTS USED IN BUILDING SET.

In all the diagrams in this article each part bears a designating letter. In this way the prospective builder of a receiver may easily determine how to mount the instruments in the correct places and connect them properly in the electrical circuit. The same designating letters are used in the text and the list of parts below.

The list of parts here given includes the exact instruments used in the set from which these specifications were made up; however, there are many other reliable makes of instruments which may be used in the set with equally good results.

If instruments other than the ones listed are used it will necessi-

tate only the use of different spacing of the holes drilled in the panel for mounting them.

- A—Ford Mica amplifying transformers.
- B—Fada panel mounting tube socket;
- C—Dubilier mica fixed condenser, .002 mfd.;
- D—Federal jacks, two double circuit and one single circuit;
- E—Fada rheostats, 6 ohms;
- F—Haynes-Griffin binding posts;
- G—Composition panel;
- H—Cabinet;
- Connecting wire;
- Varnished cambric tubing (spaghetti);
- Connecting tabs.

### HOW TO CONSTRUCT THE AMPLIFIER.

After procuring all the instruments for building the receiver, the amateur should set about preparing the panel G (shown in Figures 2, 3, 4 and 5).

First of all the panel should be cut to the correct size (7 by 10 inches); then the edges should be squared up smoothly with a file. The centre for boring the holes (which are necessary for mounting



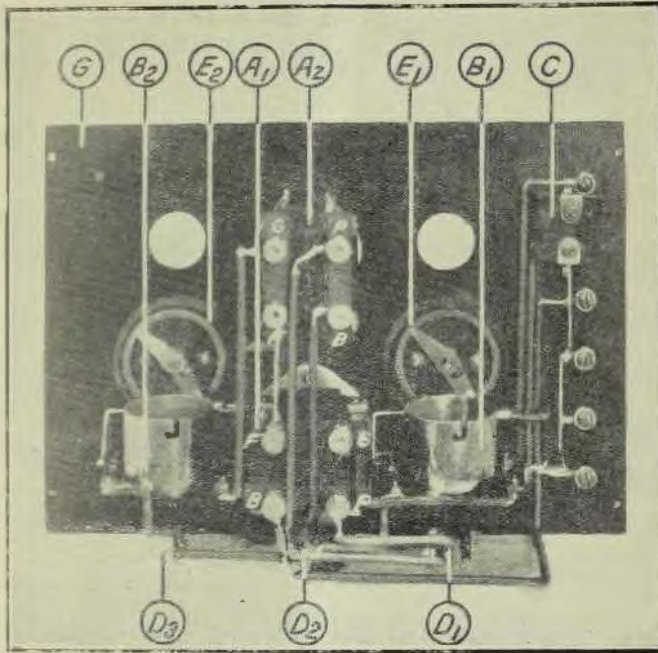


Figure 2: This picture shows the interior arrangement of the apparatus, together with the general locations for the sockets, rheostats, transformers, jacks, condenser and the binding posts.

the instruments) should be laid out on the panel as shown in Figure 4.

The holes outlined here with a double circle should be countersunk so that the flat-head machine screws used for fastening the instruments will be flush with the panel. All the rest of the holes in this panel are straight drill holes. Sizes for the diameter of these holes have not been given, but the builder will readily decide what size hole is necessary by measuring the size of the screws and shafts of instruments that have to go through the holes.

When the panel is drilled, it may be given a dull finish by rubbing lengthwise with smooth sandpaper until the surface is smooth, then the same process should be repeated except that light machine oil should be applied during the rubbing. The panel should then be rubbed dry with a piece of cheesecloth, and a dull permanent finish will be the result. Or the panel

may be left with its original shiny-black finish, if care is exercised so that it is not scratched during drilling.

Next the two transformers A,

should be mounted as shown in Figures 2, 3 and 5, so that the letters beside the connection posts correspond to those of the photograph in Figure 2. The transformers are fastened to the panel G, by two screws to each transformer. The screws are inserted through the holes in the panel and through the brackets on the bottom of the transformers and fastened with hexagon nuts.

Three telephone jacks are used, which allow the phones or loud-speaker to be plugged in on either the detector, first or second stage of amplification as desired.

It will be noted that two of the jacks D1 and D2, are double circuit; that is, with four spring leaves and connection points, while third, D3, is a single circuit jack with only 2 connections on it. The latter is for use in the last stage of the amplifier, while the former are used for the detector and first step.

These should be fastened to the panel G, in their respective positions as shown in Figures 2 and 5. It will be noticed that they are mounted sideways instead of in the regular up and down position. This is necessary so that they will not interfere with the cabinet.

Now mount the two rheostats E, using two screws to each rheostat, as shown in Figures 3 and 5, and adjust the spring levers with the correct tension so that they run smoothly.

Then fasten the two tube sockets B, to the panel with the flat-head screws as indicated in Figures 2, 3 and 5, and the construction work on the set will be complete.

The condenser C, is supported by

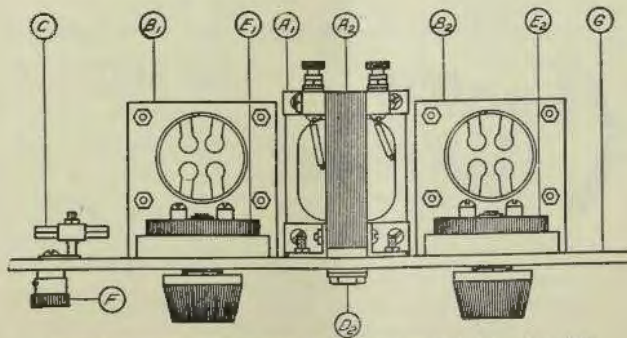
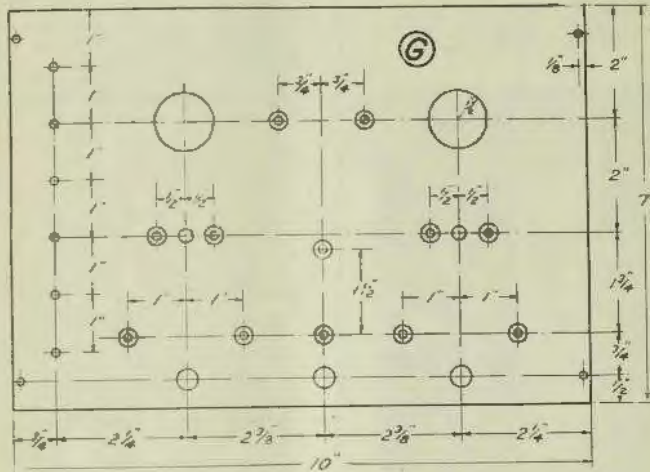


Figure 3: A constructional drawing of the amplifier, showing the layout from above. Notice that the transformers are mounted at right angles to each other.



HOW TO DRILL AND CUT THE PANEL

FIGURE 4. This diagram gives the correct locations for the holes for the instruments and the binding posts. The holes outlined here with a double circle should be counterbored; the rest of the holes are straight drill holes.

the wiring and may be left until that job is in process.

**HOW TO WIRE THE AMPLIFIER.**

The constructional design of this piece of apparatus is such that the circuit wiring may be made as short as possible. This will be evident from an inspection of the photograph in Figure 2.

With the wiring diagram in Figure 1 before you, start wiring up the primary circuit of the first transformer, including the two top input binding posts, the condenser

C, the terminals of the jack D1, and the two terminals of the transformer which are marked "B" and "P."

Then wire the filament circuit of the two tubes, including the rheostats, the two terminals of the sockets marked "F," the terminals of the transformers marked "E," and the two lower binding posts, the lowest of which is the negative "A" battery connection and the other is the positive "A."

The third binding post from the

bottom is for the negative "B" and it should be connected to the same wire as the second binding post from the bottom, the positive "A."

Now connect the post "G" on the first transformer to the grid terminal of the first tube.

Then connect up the third binding post from the top, the positive "B" battery post, with the jacks D2 and D3, and wire the plate circuit of the first tube which includes the terminals on the jack D2 and the terminals on the second transformer "B" and "P."

Finish up by connecting the terminal "G" on the last transformer to the grid terminal of the last tube, and by connecting the plate terminal of the last tube to the jack D3, as shown.

**OPERATING DATA.**

The operation of this amplifier is extremely simple. It is connected to the receiver merely by bridging the binding posts straight across from the tuner and detector panel to the amplifier with the exception of the two "B" battery posts.

**BOOKS ON WIRELESS**

**Experimental Wireless Construction.**—By A. Morgan. Price, 12/3 posted.

**Simple Valve Receiving Sets; How to Make Them.**—Price, 2/3 posted.

**Lessons in Wireless Telegraphy.**—By A. Morgan. Price, 2/3 posted.

**A.B.C. of Wireless.**—A Popular Explanation by P. Harris. Price, 11d. posted.

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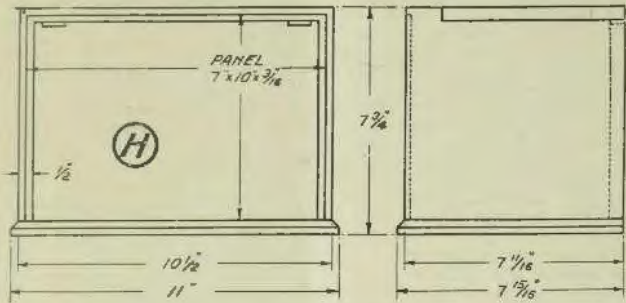
2/6

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THE DIMENSIONS OF THE CABINET

*This may be made by the builder himself, or the plan may be turned over to a cabinet-maker. The woodwork may be done in any kind of hardwood that conforms to the owner's taste.*

When the same "A" and "B" batteries are used for both sets, as is almost invariably done, the "B" negative post of the amplifier is left disconnected altogether. The 45-volt "B" battery should be added to the 22½-volt "B" battery already in use for the detector, the negative post of the 45-volt battery being connected to the positive 22½-volt post of the smaller battery and the positive 45-volt post on the large battery is connected directly to the "B" positive post on the amplifier panel. The original connections from the 22½-volt "B" battery to

the detector being left exactly as previously connected.

This arrangement allows the small battery to be used with the detector while the full voltage of both batteries, 67½ volts, is applied to the amplifier tubes.

To put the amplifier into operation place the telephone plug into the first, second or third jack, depending on whether you wish to listen in on the detector alone, the first or the second stage of amplification and turn up the rheostats to the proper value.

The tubes should be burned as low as possible without impairing the signal strength or quality. Turning on the rheostats beyond this maximum point will only shorten the life of the tube.

If the receiver is tuned to a signal, the amplifier should immediately begin to work and produce a strong signal that will operate a loudspeaker successfully on the second stage.

RADIO IN MINE RESCUE WORK.

In the near future radio telephony will probably play an important part in the work of colliery rescue parties. As the rescuers carry out their duties, constant communication will be kept up with those directing operations from a base. That is the object underlying a series of experiments being conducted at Ashington Colliery in England. A considerable measure of success has already attended their efforts, and quite recently speech and music were successfully received underground. A party equipped with a three-tube receiving set descended the shaft of the

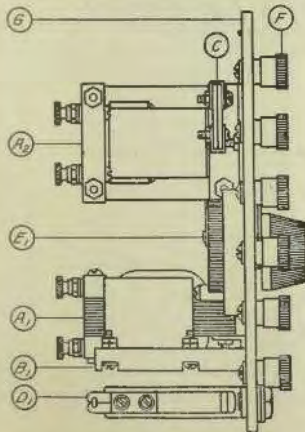
Carl Pitt, and fixed a 20 foot aerial on the baulks supporting the roof. Only one head 'phone was used, but so clear was the reception that the five men composing the party all heard distinctly. Experiments have already been carried out to depths of 300 yards, and it is expected to test reception at depths of 1000 yards.

SUBMARINE CABLE REPLACES RADIO LINK.

The only commercial radio telephone link in the world, which for the past three years has been handling telephone business between Catalina Island, 30 miles off the coast of California, and the wire lines of the Bell system, has been replaced by a submarine cable. The licence of the radio "talk bridge" expired on August 1, and the Department of Commerce had requested that its operation be discontinued, making its wave lengths available for broadcasting. The capacity of the other for radio messages is distinctly limited, and when such services as broadcasting, ship-to-shore telegraphy and telephony, radio compasses, etc., which can be handled only by radio, have been accommodated, the available wave lengths of the other are about exhausted. Consequently, the change from radio to cable, in a case like Catalina Island, where the cable is not only feasible but more economical than radio, is for the good of the service.

REDUCING GUESSWORK IN TUNING.

The chief of the radio section of the Bureau of Standards has published in the July issue of "Radio Broadcast" an article entitled, "Reducing the Guesswork in Tuning," which gives a general statement of the methods employed in establishing frequency standards and making them available to the public. The Second National Radio Conference recommended that radio broadcasting and other transmitting stations operate accurately on the frequencies to which they were assigned. The attainment of the necessary accuracy is made possible by improvements which have been carried out during recent months at the Bureau of Standards in its frequency measurements. Standards of frequency can now be furnished which permit the setting of transmitting stations on the correct number of kilocycles. The



THE WORKING DRAWING OF THE SIDE ELEVATION

*Figure 5: The jacks are mounted on the lower part of the panel with the two transformers taking up the center section. The binding post are arranged in a vertical line at the left edge of the panel.*

fundamental frequency basis has been established by four independent methods of primary standardisation. The frequency standards are furnished through the transmission of standard frequency signals which have been described in recent issues of the "Bulletin" in the testing of wave meters, and in the measurement by the Bureau of frequency of various transmitting stations, the frequencies of which are known to be kept constant.

**RADIO IN FRANCE.**

Even in conservative France radio broadcasting has taken quite a hold. Any private person can now own and operate a radio receiving set, although an annual fee of ten francs is charged by the French postal authorities to all owners of radio receiving sets. Special licences are required for the operation of transmitting sets. Broadcasting is carried out in the Paris region by the Eiffel Tower, the Societe Francaise Radio Electrique, and the Superior School of the Postal Telegraph and Telephone Services of the Government. The length of wave used by the Eiffel Tower is

2600 metres, the principal items broadcasted being weather reports, stock exchange news, and a radio concert every evening, according to "Electrical World." The length of wave used by the Societe Francaise Electrique is 1780 metres, this company broadcasting an afternoon concert and an evening concert. The sale of receiving sets especially adapted to radio-phoné reception is said to remunerate the company for its broadcasting activities. The Superior School service, also free of charge, is carried out in the interests of education and experiment. The French military authorities are starting a trial system of broadcasting on a 45 metre wave.

**KILOCYCLES IN RADIO.**

The Second National Radio Conference, which met last March, introduced a method of designating radio waves which may not be familiar to all those interested in radio work. This is the use of frequency in kilocycles (abbreviated kc.) instead of wave length in metres. This practice has many ad-

vantages, and it is believed that it will eventually replace the other method of designation. The separation of the frequencies of transmitting stations to prevent interference is an important matter, and the necessary separation as expressed in frequency is the same no matter what the frequencies of the two stations may be, while it is variable, and quite misleading when expressed in metres. Thus, the frequency band existing between 150 to 200 metres (2000 to 15000 kc.) is enormously wider than the band from 1000 to 1050 metres (300 to 286 kc.). While it is possible to carry on 50 simultaneous radio telephone communications between 150 and 200 metres, only one could be carried on between 1000 and 1050 metres. It is very simple to obtain the approximate relation between kilocycles and metres. For example, knowing the wave length in metres, divide 300,000 by the number of kilocycles which will give the wave length in metres. A table which may be used for rapid and accurate conversion can be obtained from the radio laboratory of the Bureau of Standards.



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### Hints for Amateurs

In finishing a radio cabinet with an open grained wood such as chestnut, ash or oak, it is a comparatively easy job to give it an antique grey finish. This finish is permanent and has a good appearance.

Rub the wood down with a little linseed oil, and clean off with a cloth until the surface of the wood is dry. Then fill the grain of the wood with a filler made of white lead mixed with lampblack so that it is coloured a light grey.

When the filler has hardened in the grain the whole surface should be rubbed down again, with a fine sandpaper, until it is smooth and then a wax finish put on with a cloth.

Never run the antenna lead-in any long distance through the house. Make it as short as possible from the window where the wire is brought in. If the lead-in is long inside the house the walls and ceilings will absorb most of the radio-frequency energy that should be used in the set for producing signals; in other words the signals will be much reduced in strength.

Place the receiving apparatus near the window and run the ground wire to a waterpipe!

Gassy tubes such as used for detectors function at plate voltages between 16½ volts and 22½ volts; usually they function best at a plate potential of about 18 volts.

Hard tubes, when used as detectors, usually function best at plate potentials of about 45 volts and as amplifiers at plate potentials of 90 volts or more according to the type of tube used.

Do not paint any of your radio instruments or coils; leave them dry.

When a 100 foot antenna is specified for use with a certain receiving set, the 100 foot length refers to the length from the spot where the lead-in joins the horizontal wire to the furthest tip of the antenna.

To illustrate: In an antenna with a horizontal wire 100 feet long, if the lead-in were taken off at one end, the antenna would be referred to as a 100 foot antenna. If the

lead-in were taken off at the centre, the antenna would be only a 50 foot antenna. It would have about the same characteristics as a two-wire antenna 50 feet in length.

When using SCC copper wire to wind coils for receiving set, be sure that the insulating wrapping of cotton is not damaged, as this may cause two adjacent turns of wire to short circuit. If two turns do touch in this manner, the radio-frequency currents induced in the coil will induce a heavy secondary current in the short-circuited part which will drop the voltage across the whole coil so that the signal strength will be materially lowered. Do not damage the insulation when winding the coils.

It will assist in obtaining quiet reception, without any extraneous noises in a radio receiver, if a .5 mfd. fixed condenser is connected across the "A" and "B" batteries.

Be sure that you obtain a good grid condenser and reliable grid leak, as these two instruments, more than any others in the set, will determine the sensitivity of the receiver as a whole.

When trying out a receiver for the first time, try out one tube in each of the sockets, one socket at a time, with all the batteries connected. In this way, if you have made a wrong connection, you will burn out only one tube instead of all the tubes in the set; but first make sure that you have everything hooked up correctly.

Do not erect your antenna either over or underneath any sort of power wires, because the power wires may carry a dangerous voltage, and if they or the antenna fall while the set is being used the operator may receive a serious shock.

Never charge your battery without disconnecting it from the receiving set. If you leave it connected to the set, and turn on the charger, you may expect to blow out the line fuses, or the tubes. This is because one side of the lighting line is grounded, and as the filament circuits in most receiv-

ing sets are also at ground potential, you may expect to see or hear fireworks.

Do not oil the levers on the rheostats used in the set for making contact with the resistance unit. This will finally result in "frying" noises in the receivers, due to the varying resistance junction formed when the oil heats up and carbonises. The rheostats now on the market are correctly designed to work without any form of lubrication between the lever and the resistance wire.

A loop antenna cannot be used with any real success with a crystal detector or non-regenerative vacuum-tube circuit unless used in conjunction with radio-frequency amplifiers. A regenerative vacuum tube circuit will give only fair results with a loop, for local reception, unless it is used with audio-frequency amplifiers.

Don't try to make an amplifying transformer for audio-frequency amplification. In the end you will give yourself a lot of trouble and will be able to produce an instrument of only inferior quality. Buy one of the reliable standard makes and get a good instrument.

#### AMERICAN WOMEN'S LATEST STUNT.

American women are so crazy about radio sets that it is the proper thing now to have the apparatus installed beside the bed, or in a boudoir. That, in itself, isn't the point. The setting-up of the machine looks like a basinette all trimmed up with frills and ribbons and lace valances to match the room and even the voice horn is covered with quilted silk, and the upright rod disguised with hand-made roses and foliage.





"IS IT PITTSBURGH, MR. GALLAGHER?" "NO, CHICAGO, MR. SHEAN."  
Gallagher and Shean, the not unknown comedians, are here shown behind the scenes waiting for their act to go on, listening-in to some station, the exact location of which was not learned, owing to the fact that when the photographer left, they were still arguing as to whether it was Chicago or Pittsburgh.  
Often heard from our local stations.

#### BROADCASTING IN SWEDEN.

Broadcasting in Sweden is now receiving careful consideration, based on the experiences of other countries which may be drawn upon quite liberally at this late date. It is understood that a Swedish company has proposed a plan to the Swedish Government. This company seeks a joint monopoly with the Government in the matter of radio broadcasting. The plan provides for extensive co-operation with the Government, which is to erect transmitting stations successively. These stations will be at the disposal of the new operating company at least five hours a day for an annual fee corresponding to six per cent. of the cost of construction of each station. In addition, the company must pay for the power as well as for the tubes used. It is suggested that individual owners of receiving sets be

required to pay an annual licence fee of 20 krona, or about 5 dollars 40 cents, and that societies, places of entertainment and so on, pay a maximum licence fee of 1000 krona. Any make of receiving set may be used. The radio entertainment programme includes general news, economic reports, weather reports, lectures, music and so on. On Sundays religious programmes will be given. Regarding the broadcasting of advertising matter, the new company endorses the Government's recommendation that this be limited. It proposes that such material be of the type usually run in newspapers as reading notices. The danger of unfair competition with newspapers in the distribution of news will be avoided through co-operation with the Central Co-operative News Agency of the Swedish press, which will select and edit all the news. The Government

is to have full rights at all times to broadcast urgent reports even during the company's allotted period, without charge.

#### A NEW ANTENNA CABLE.

A new antenna cable recently developed has shown that by its use the audibility of signals can be increased by nearly 40 per cent. The conductor is composed of ten strands of No. 18 bare copper wire braided closely together on a special machine to give it a ribbon-like appearance, one-half inch wide by one-eighth inch thick. With an antenna 30 feet long of this type, strung in a basement at a level about one foot below the surface of the earth, better results were obtained than with an antenna of the usual type, of 100 feet length, strung between two poles out of doors at an elevation of about 40 feet.

**FARMER SELLS PRODUCE TO MUSICAL TUNES FROM RADIO. INVITES PURCHASERS TO BE GUESTS ON SHADY LAWN.**

R. J. Woodmansee is a farmer, but he is no rube. This man believes in doing business the most modern way, and has installed a large radio receiving set on his farm, at Highland, Ohio. Water-melons, corn, cucumbers, muskmelons and other edibles are offered for sale to the public who pass his place in automobiles, and to those he reaches through a cleverly prepared circular:—

"Free radio concerts for you. Just a nice ride to Woodmansee's melons, Highland, Ohio. Continuous radio concerts, lectures, market reports, bands, orchestras from Crosley Radio Station, WLW, Cincinnati, from 9 a.m. to 10 p.m. Monday to Saturday; Sunday, Sunday school lesson, 8.30 to 9.30, church services 9.45 to 11.30 a.m., 2 to 4 p.m., and 6 to 10 p.m., sacred concerts and services by radio. Come and visit all over the United States and enjoy the best musical talent of the country on Woodmansee's shady lawn."

On the reverse side of this interesting circular, Mr. Woodmansee has given a list of prices of his produce. On a recent Sunday there were over five thousand people visiting his farm and enjoying the programme as broadcast by radio. He says that he has the largest business he has ever had, and thinks that the radio concerts are the greatest means of bringing people to his farm that he has ever used. He claims that the radio may be used by any business to stimulate it, and advocates the purchasing of receiving sets that are of sufficient merit to be able to receive concerts from all over the world.

Of particular interest to Mr. Woodmansee are the market quotations as broadcast from the WLW station. These reports are sent out at 10.30 a.m., 1.30 and 3 p.m., and sometimes special announcements of produce reports at other hours.

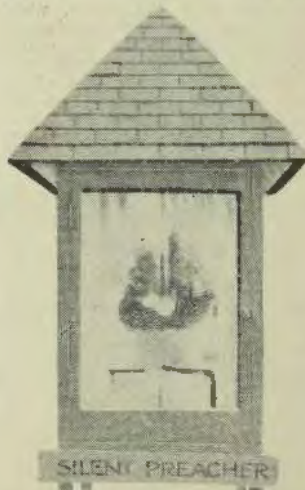
**THE UV-199 TUBE.**

The UV-199 tube is an extraordinary tube. It appears that the filament requires but .18 watt, or approximately 1/27th of the energy used in the usual UV-201 tube. Yet the characteristics of the new tube are slightly better. The filament of this tube runs at a tem-

perature about 400 degrees cooler than the old type of tube. It is interesting to note that 14 different chemical elements are utilised in this tube besides traces of several others. The filament wire is extremely small, being but one-fourth of the diameter of an ordinary hair; yet the fact is that this wire has the strength of the best steel piano wire. The filament is not a coated one, but it has the high efficiency of electron production of the coated filament and the uniformity of operation and the ruggedness of the tungsten filament. If the filament is operated at too high a temperature the electronic emission falls off and the tube becomes inoperative. However, by operation at rated voltage with the plate voltage off for a period of time normal electronic emission can be regained. Thus improper filament operation does not spoil the tube beyond recovery. Three cells of dry battery, even the small flash-lamp type, furnish the necessary current for the filament.

**"SILENT MINISTER" ON STREET BROADCASTS DAILY SERMON.**

As a supplementary to his regular Sunday sermons, a U.S.A. pastor has erected on the principal



"Silent Preacher" at Busy Street Intersection, giving out its daily Sermon to hurrying crowds.

street intersection of his city, a structure termed the "silent preacher," which gives daily scrip-

ture lessons to passers-by. The building is a small, glass-enclosed kiosk, containing a Bible and fresh-cut flowers to catch the eyes of pedestrians. Each day the Bible is opened to a new page. Protected from the wind and weather, it broadcasts its message to passers-by without interruption. In this way the minister reaches more persons than would be possible through his Sunday services alone.

**Important Notice**

On Page 20 of our last issue (Vol. 3, No. 4) the address of Radio Co. should have read 15 Loftus St., instead of 20 Loftus St. Also Ohman and Nicoll should have read O'Brien and Nicoll.

**MOTOR IGNITION AND AIR-CRAFT RECEIVING SETS.**

From a recent issue of "Elektrotechnische Zeitschrift" we learn something regarding the interference caused by the usual ignition system of an aircraft engine with the reception of radio signals aboard such aircraft. This interference is especially marked when several stages of amplification are employed, and is most troublesome at short wave lengths. The German author states that a complete metallic shielding of the engine, including all high voltage and low-voltage connections, gives in most cases a satisfactory solution, although such practice complicates the engines and makes them less accessible. A new system is mentioned, by means of which the amount of emitted electromagnetic energy is completely compensated, resulting in what is claimed to be absolute relief in all cases. However, details of this new system are being kept secret for the present.

**FOR SALE.**—Twenty Yard Aerial, complete with fifteen feet Masts and Telephone Head Set. Apply, Frank Smith, Box 2234 G.P.O., or City 9148.

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



**KURUNG-GAI DISTRICT RADIO SOCIETY.**

The society had a very successful meeting on 16th inst. Mr. Renshaw delivered an excellent lecture on various valve circuits and also expressed his views as to the cause of static and fading signals, which was followed by a general discussion on the subject.

The next meeting will be held on Tuesday, 30th inst., at 8.15 p.m., when subjects of general interest will be discussed. Buzzer practice will commence at 7.30 p.m.

**CONCORD AMATEUR RADIO CLUB.**

The usual weekly meeting of the above club was held at the club room, Wallace Street, Concord, on Thursday, the 25th October, at 7.30 p.m.

After the usual business had been finished and the correspondence read, the members had a talk on "Practical Reception."

A discussion then took place as to the advisability of building a transmitting set. Various members took the opportunity to go deeply into the matter, as it was considered a wise step, and one which would greatly increase the activity of the members.

Various donations towards the attainment of this object were made.

The club then listened in till 9 p.m.

After buzzer practice was carried out, the meeting adjourned.

A visit by this club will be made to 2CM, Charles D. MacLurean, Agnes Street, Strathfield, on the 19th November, at 8 p.m. All members are requested to attend.

Concord and district experimenters should roll up and make the Concord Amateur Radio Club a strong force of amateur wireless in this suburb.

All communications should be addressed to Hon. Sec., W. H. Barker, Wallace Street, Concord.

**NEWCASTLE DISTRICT RADIO CLUB.**

By permission of the Postmaster-General, Mr. N. P. Olsen, of Waratah, Newcastle (2ZX), gave a wireless demonstration in the vestibule of the Union Picturos Theatre, Hamilton, on Thursday, Friday and Saturday nights, 25th, 26th and 27th, to raise funds for the purpose of completing the Newcastle District Radio Club's transmitting set.

The transmitting was done from Mr. Olsen's station at Waratah, and was received at the theatre by Mr. A. Metham, with a three-valve set and amplion, with excellent results, the music being clearly audible to persons standing on the other side of the street. There was an enormous crowd listening to the demonstration, and it was necessary for the management to erect an iron railing to give the operator elbow room, judging by the weight of the collection boxes the club did very well out of the demonstration.

The first annual meeting of the Newcastle District Radio Club was held on Wednesday, the 24th inst., every member being present. The secretary read the report, which was accepted as very satisfactory, particular note being made that the whole of the activities were confined to the latter part of the year, that is, since the club was re-organised in June.

Special mention was made to Mr. Denny's generosity in donating the club room free of rent for six months to allow the club to use their finance in purchasing apparatus.

Letters were received from the president and secretary of the Western Suburbs Radio Club, congratulating the Newcastle Club on their transmissions which were received by them in Sydney.

For services rendered to the club, Messrs. Swain, Philmer and Denny were made honorary members.

At the election of officers, the whole of the existing office bearers were re-elected for the ensuing year as follows: President, Mr. G. Seaward; secretary, Mr. L. T. Swain; assistant secretary, Mr. L. Jones; treasurer, Mr. J. Shaw; publicity officer, Mr. N. P. Olsen.

The club look forward to a prosperous year, as all present mem-

bers are genuine experimenters, the club having been successful in weeding out all the "talkie-talkies," and half-hearted amateurs.

**BROADCASTS.**

Broadcasters' (Sydney) Ltd. commenced carrying out experimental tests on Saturday last, on a wave length of about 350 metres. The reports on their transmission on low power were excellent.

Occasional interference was caused by amateur stations using the same wave length instead of being on their own band, which is below 250 metres.

Many experimenters report having logged American amateur stations. The results of the present Trans-Pacific Tests should break all records.

It has been said that broadcasting will decrease the sale of gramophones and records. In America this has been proved not to be so, but since broadcasting commenced there has been an increase of sales.

**AUSTRALASIAN RADIO RELAY LEAGUE.**

A meeting of the League Committee will be held on November 9th, at 7.30 p.m., at Wentworth Hotel.

**WIRELESS INSTITUTE OF AUSTRALIA, N.S.W. DIVISION.**

A general meeting of N.S.W. Division will be held at the Royal Society's Rooms, Elizabeth Street, Sydney, on Thursday, 15th November, commencing at 7.45 p.m.

**CROYDON RADIO CLUB.**

Mr. Malcolm Perry, of New System Telephones Pty. Ltd., was present at the meeting of the Croydon Radio Club on Saturday, October 27, held at Rockleigh, Lang St., Croydon, at 7.30 p.m.

Mr. Perry gave a very interesting lecture and demonstration of loud speakers.

A TMC (tune music) loud speaker was used for the demonstration and very clear music was produced from it. The transmission used for it was from 2HP, Phillip Street. The music was loud and clear.

Mr. Perry mentioned the death of Carl Steinmütz, the founder of the earth wave theory, and members stood in silence for one minute in respect to this great scientist who had been called from his work.



Mr. Perry was thanked for his lecture, and buzzer practice and general questions followed.

On Saturday, November 10th, Mr. R. C. Marsden, 2JM, will lecture to members, and it is hoped that a full quota will be present. All experimenters and persons interested in wireless are cordially invited to attend.

All communications should be addressed to the Hon. Secretary, G. Maxwell (Citta, "Carwell," Highbury St., Croydon.

**PRINCE ALFRED COLLEGE FAIR.**

To help raise funds for the building a new wing at the College, a fair was opened on Friday evening (October 26th) and continued on Saturday afternoon and evening.

A feature of the fair which proved an immense attraction was a number of demonstrations of wireless telephony given during each of the three sessions.

In a room set apart was installed a two valve receiving set, working with a loop aerial, a two valve power amplifier, and a magnavox, the

receiving set being in charge of Mr. L. C. Jones.

A charge of sixpence admitted one to a demonstration of 15 minutes' duration.

Some excellent programmes of music both by gramophone and local artists were transmitted from the station of Mr. Fred Williamson, of Kent Town, 5AH, who is noted for the excellent class of music which he broadcasts.

The demonstrations which were given by kind permission of the Chief Manager of Telegraphs and Wireless were well patronised and helped to swell the funds in no mean manner.

The demonstrations were organised by Mr. Lawrence, who deserves great credit for the manner in which everything was carried out.

Such demonstrations as these should prove a good advertisement for broadcasting which is expected to be in operation in Adelaide shortly.

**KURUNG-GAI DISTRICT RADIO SOCIETY.**

The Society will hold its next meeting on Tuesday, 13th instant,

when Mr. L. J. Stuart will deliver a lantern lecture on C.W. work, of which he has had considerable experience in Europe and America.

Also it desired to arrange a field day which it is hoped may be held shortly.

All members and intending members are requested to be present that this matter may receive full consideration.

The meeting will be held in Almond's, c/r, Victoria Av. and Anderson St., commencing at 8.15 p.m.

**WAVERLEY RADIO CLUB.**

Little business was done at the meeting of the Waverley Radio Club, held on 1st November, Mr. E. Bowman being in the chair.

Letters were received from the Railway Institute Club; Continental Radio Co., and the Radio Exhibition Committee. The Railway Institute's letter consisted of a kind invitation to a lecture, but it was unfortunately received between meetings, making it too late to accept when the letter was read. The Continental Co's. communication stated the advantages of subscribing to one of its publications—which

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You want a **Variable Condenser**



**New Reduced Prices**

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
.001	35	16/-	18/6

VERNIER ADJUSTMENT 7/6 EXTRA

**RADIO HOUSE**

619 GEORGE STREET  
SYDNEY

TELEPHONE CITY 1487

the Club decided to do—and the exhibition committee's letter gave the slogan to be used for its advertisement of the forthcoming event. Arrangements were made for the purchase of three Cunningham valves for the club's new receiving set. The Treasurer (Mr. Marsland) presented his quarterly interim report, which disclosed that within that period over £20 had been spent in general improvements to the club. A motion was passed that the Secretary (Mr. Howell) make arrangements with the objects of visiting the Amalgamated Wireless transmitting station.

The club's new receiving set, constructed by Messrs. Bowman and Thomson, was on view for the first time, and will be connected up work, consisting of a panel about 3½ ft. by 1 ft. mounted in a walnut case. Three valves are used—one being a radio frequency detector. It is a radio frequency regenerative set, not, however, oscillating on the aerial. The regeneration is effected by coupling back on to the radio frequency transformer, and the set responds to all wave lengths by the use of suitable honeycomb coils and radio frequency transformers. Altogether, it is an asset the club may be proud of, and reflects great credit on those who made it.

The club-room has been remodelled, which is also an added attraction to members. Mr. Marsland, with other willing workers, is the leading spirit in this part of the Club's activities.

**CENTRALISATION OF GERMAN LONG-DISTANCE RADIO.**

In order to facilitate overseas traffic, a receiving station has been installed at Geltow, about 30 kilometres in a southerly direction from Nauen. A similar arrangement has been adopted at Eilwese, the receiving station for which is now at Hagen. It is intended to use the new stations for communicating with a distant station from Berlin, using Nauen for transmission and Geltow for reception, land lines connecting each of the latter with Berlin, and for communicating with New York, using the station at Rocky Point for transmission and that at Riverhead for reception.

**BROADCASTING**

commences

**November 15th**

**Get in Early — Avoid Disappointment and Order Your Receivers NOW**

**PRICES**

Sets complete, ready for operation, with all requirements and instructions, £7/10/6, £17/10/6, £21, £30, £35, £47/10/6, £50, £75.

These are all sets of guaranteed performance, and are quite simple to operate.

Let us know your location and we will advise you of the most suitable set.

No Home Complete Without One



Makes Country Life Congenial

**"There's Music in the Air"**

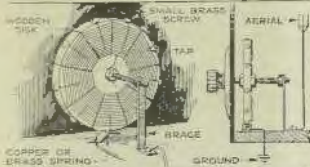
**Wireless Supplies Ltd.**

21 Royal Arcade, Sydney

**"BUY FROM THE BROADCASTERS!"**

**NOVEL MOUNTING FOR SPIDER-WEB COIL.**

A simple and effective method of the tapping a spider-web coil is shown in the drawing. The coil is

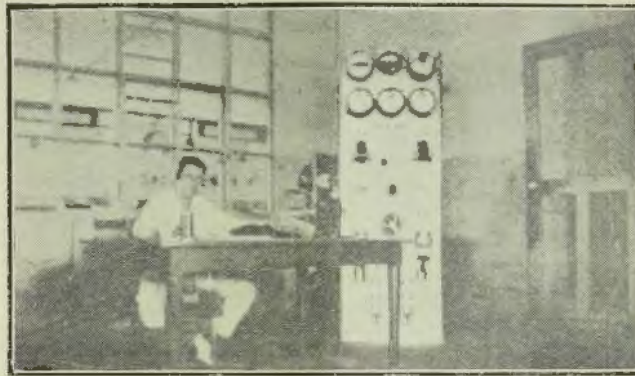


Rotating Spider-Web Coil That Permits the Use of a Greater Number of Taps than Usual.

wound on a wooden or fibre disk, 1 in. thick. Each section is tapped as usual, and the taps are connected to small round head brass screws, driven into holes, drilled and tapped in the edge of the disk. The coil is then mounted on a long screw, to which is attached the knob and dial used for revolving the coil. A nut is run on to the screw, on each side of the disk, to hold it securely in place, and the end is filed down to fit a bearing made of sheet brass. The aerial

end of the coil is fastened under one of the nuts and the lead-in wire from the aerial is connected to the bearing. A flat copper or brass spring, connected to the ground, is fastened underneath the

disk, so that the brass screws all come in contact with it in turn as the coil is revolved. This arrangement permits the use of a greater number of switch points than with the usual spider-web coil. (C. Wright Riehel, Columbus, Ohio.)



The Receiving Room at Station VMG

# Quality Radio Supplies



Royal Ediswan English Valves

DETECTING OR AMPLIFYING

Price 22/6 Fully Guaranteed

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Sydney Broadcasters Limited  
Farmer's Broadcasting Company

Write for full particulars

We Pay Carriage All Parts to Construct  
Throughout :: Your Own Set ::  
New South Wales

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

One Door From Pitt Street



ONE OF OUR RADIO OUTPOSTS IN A PICTURESQUE SETTING.

A view of the harbour and steep hillsides of Pago Pago, Island of Tutuila, Samoa, showing the towers of the U.S. Government station.

## Trimm "Dependable" Radio Head Set 2400 Ohms

EXPERIMENTERS - TRY THIS WONDERFULLY LOW PRICED 'PHONE

**Price 32/6 each**

MANUFACTURED BY THE TRIMM MANUFACTURING CO. - - - - - CHICAGO

Obtainable from Radio House, 619 George St.; Anthony Hardern & Sons, Ltd., George St.; F. E. O'Sullivan, 296 Pitt St.; Ramsey Sharpe & Co., Ltd., 217 George St.; Radio Co., Ltd., 15 Loftus St.; The Colville-Moore Wireless Supplies, 10 Rowe St.; Wireless Supplies, Ltd., 21 Royal Arcade; Miss F. V. Wallace, 6 Royal Arcade; W. Harry Wiles, 60.62 Goulburn St.; and all Wireless Supply Houses.

SOLE AUSTRALIAN AGENTS—

**O. H. O'BRIEN & NICHOLL,**

37 PITT STREET, SYDNEY.

'Phones: City 3302, 10,592.

ATMOSPHERICS OR PARASITES

Six papers in "Radioelectricite," issues for July, 1922, to February, 1923, deal very thoroughly with the various possible sources of atmospherics or "parasites" encountered in every day practice of wireless telegraphy, and discuss in very great detail the numerous methods which have been employed by the authors and others to eliminate the trouble. In the first paper the authors classify atmospherics as follows:

(a) Atmospherics due to storms (accompanied by lightning flashes); (b) local atmospherics—due to voltage fluctuations in the atmospheric layers near the receiving aerial; (c) cosmic atmospherics—originating outside the boundaries of our planet, possibly having solar sources; (d) miscellaneous—presence of clouds, temperature of the air, atmospheric pressure, etc.

Consideration is given to diurnal and seasonal variations of intensity of the parasitic signals. The form of the wave, optimum wave length, etc., are also discussed. With regard to the elimination of "atmospherics," numerous circuits are described in detail. The more important of these are classified by the authors as follows:—

(a) Continuations of high-frequency circuits—Fessenden's circuits; (b) methods employing detectors in opposition (Round's double crystal or double-valve method—in which one detector is sensitive, the other less sensitive and in opposition); (c) saturated systems (Mareoni-Wright system—limiting the maximum amplitude of the "stray" by adjustment of valve system near the saturation current; (d) miscellaneous.—Mareoni's method in which a nodal point (for a certain wave length of reception) in the antenna circuit is connected to earth. The "stray" of different wave length is conducted direct to earth, while the tuned signals are transmitted through the receiving circuits in the usual manner. Systems invented by de Groot, Pupin (negative resistance method), and others are described in considerable detail.

For the comparison of efficiency of various systems in eliminating parasites the authors have devised a means of measuring the relative intensities of the strays and the normal signals. A method depending on a new principle is developed and various modifications of the method are described in detail.

Amateur Wireless Licenses

Victoria

RECEIVING ONLY.

Nature of Licence.	Name.	Address.
C	Alderman, T. A. B.	42 Perry St., Collingwood. R.
V	Allison, A. C.	20 Geelong Road, Footscray. R.
V	Anderson, L. D.	24 Camberwell Grove, Hawthorn. R.
C	Ashby, G. R.	3 Watt Street, Thornbury. R.
C	Ashman, H. J.	188 Arthur Street, Fairfield. R.
V	Abrahams, L. H.	Majestic Mansions, Fitzroy St., St. Kilda. R.
C	Adecock, F. N.	68 Drummond St., Carlton. R.
V	Bradley, H. H.	52 Victoria Street, Box Hill. R.
V	Brennan, V. F.	401 Mont Albert Rd., Surrey Hills. R.
V	Blannin, A.	Lilydale.
V	Bennett, L. E.	41 Llaneast St., Malvern. R.
V	Bates, P. G.	101 Vine St., Windsor. R.
V	Baylis, J. L.	36 Brighton Rd., St. Kilda. R.
C	Berryman, W.	202 Grange Rd., Glenhuntly. R.
V	Bussell, G. H.	Green Gables, Warburton. R.
V	Belsher, W. J. R.	170 Pickle St., South Melbourne. R.
C	Bennett, G. G.	152 Brighton Rd., Elsternwick. R.
V	Bamford, A.	63 Ashworth St., Albert Park. R.
C	Bingham, T. A.	75 Hambleton St., Albert Park. R.
C	Brackenridge, G. C.	Snell Grove, Pascoe Vale. R.
C	Bateheler, L. N.	161 Cruikshank St., Port Melbourne. R.
C	Braun, D. F.	Burrindi Road, Glenhuntly. R.
V	Brain, H. B.	30 Bertram St., Elsternwick. R.
V	Beauchamp, C. K.	35 Herbert St., St. Kilda. R.
V	Bell, C.	941 Rathdown Street, North Carlton. R.
C	Carroll, J. G.	1 Grosvenor Street, Moonee Ponds. R.
C	Cansfield, G. C.	16 Blenheim St., Balaklava. R.
C	Campbell, B. R.	8 Beach St., Carrum. R.
V	Cassidy, J. J.	20 Lambeth Avenue, Malvern. R.
V	Charley, W. J.	594 Dandenong Rd., Murrumbeena. R.
C	Clark, R. J.	13 Stamsell St., Kew. R.
C	Cleaver, J. H.	34 York Street, Prahran. R.
V	Clyne, E. M.	231 Glen Eira Road, Caulfield. R.
V	Coles, F.	Four Road, East Kew.
C	Collingwood, C.	13 Staniland Grove, Elsternwick. R.
V	Coen, L.	63 Swanston St., Melbourne. R.
C	Cowling, R. T.	24 Thanet St., Malvern. R.
C	Cornish, A. W.	89 Colebrook St., Brunswick. R.
C	Coleman, A. B.	169 Peel St., Kew. R.
C	Constable, W. A. H.	The Vicarage, Diamond Creek. R.
V	Comber, J. F.	Lewis St., Thornbury. R.
V	Cole, W. G.	"Rosewarick," Ferntree Gully Rd., Oakleigh. R.
V	Crawley, J.	127 Inkerman St., St. Kilda. R.
V	Curtin, E. F.	213 Dandenong Road, Windsor. R.
C	Davies, G. T.	6 Howard Street, Brunswick. R.
C	Davies, C. C.	"Molokai," Lower Malvern Rd., Glen Iris. R.
V	Denham, A. E.	43 Collins Street, Northcote. R.
Dingwall, E. C.		13 Chaucer St. Crescent, Canterbury. R.
C	Dixon, J. F.	6 Robinson Rd., Hawthorn. R.
C	Dunn, D. G.	29 Howitt Rd., Caulfield. R.
C	Edwards, J. N.	Jika St., Heidelberg. R.
C	Ellis, O. G.	57 Victoria Rd., Auburn. R.
V	Every, E. W.	Church Hill, Foster. R.
V	Ellison, H.	132 Esplanade, Middle Brighton. R.
V	Evans, R. J.	Gaffney St., Pascoe Vale. R.
V	Eustace, A.	24 Clendon Rd., Toorak. R.
C	Edeling, L. D.	80 Stephen St., Yarraville. R.
V	Embling, S. A.	296 Williams Rd., Toorak. R.

Continued on next page

Amateur Wireless Licenses (Continued)

V	Fisher, G.	66 Rosberry St., Ascot Vale. R.
C	Forster, L. W.	327 Auburn Rd., Auburn. R.
C	Fox, V. J.	Kingston St., East Malvern. R.
C	Fordham, G.	53 Farrell St. East, Port Melbourne. R.
C	Frenchman, H. M.	4 Jolimont Rd., Jolimont. R.
C	Francis, W. A. B.	22 Hall St., Coburg. R.
C	Flynn, J. R.	17 Bent St., Glenhuntly. R.
C	Gear, H.	10 Clayton St., Ballarat East. R.
V	Gibbon, F. T.	31 Foley St., Kew. R.
C	Grainger, E. F.	23 Brooks Crescent, Hawthorn. R.
V	Greenaway, N.	245 Albion St., Brunswick. R.
V	Green, A. L.	22 Aintree Rd., East Malvern. R.
V	Guinea, C. R.	73 Mitchell St., Bendigo. R.
V	Hallifax, H. A.	2 Shaftesbury Ave., Malvern. R.
C	Harrison, R. A.	105 Glenhuntly Rd., Elwood. R.
C	Harvey, D. D.	19 Stanhope St., West Malvern. R.
V	Hainsworth, D.	Bunyip. R.
C	Hall, T. T.	200 Esplanade East, Port Melbourne. R.
V	Hall, J. S.	Darwin St., Heidelberg. R.
C	Hale, J.	27 Nott St., Port Melbourne. R.
C	Hammant, T. E.	26 Emmaline St., Croxton. R.
C	Hart, J. R.	41 Errol St., West Footscray. R.
V	Hamilton, J.	Cranwell Rd., Hawksburn. R.
V	Hart, D. P.	44 Mangarra Rd., Canterbury. R.
C	Henderson, J. W.	854 Sydney Road, Brunswick. R.
V	Henley, T. F.	Commercial St., Yarram. R.
C	Howe, J.	99 Melbourne Rd., Williamstown. R.
V	Howe, H. C.	244 New St., North Brighton. R.
C	Holt, F. H.	14 Golding St., Canterbury. R.
V	Howell, E. D.	57 Willis St., Kew. R.
V	Hoare, J. J.	1 Horsburgh Grove, Malvern. R.
V	Hagan, R.	Piper St., Kyneton. R.
C	Inglis, G. S.	281 High St., Kew. R.
C	Jackson, J. H. H.	Clarke St., Sunshine. R.
V	Jackson, W. L.	27 Elgin St., Hawthorn. R.
C	Jeffreys, H. W.	24 Maitland St., Geelong West. R.

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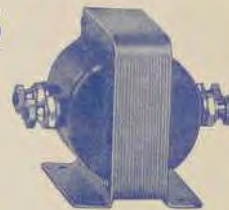
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