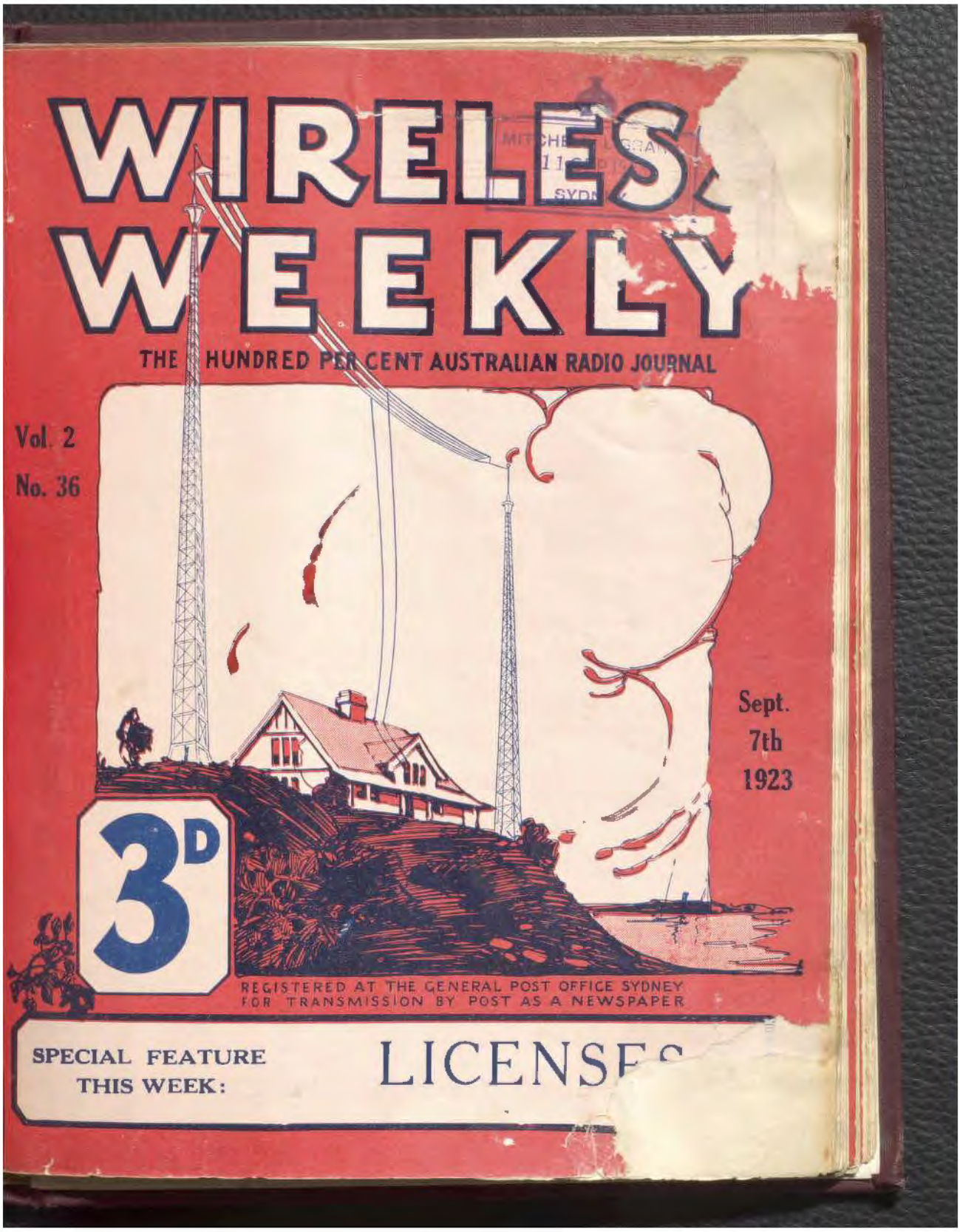
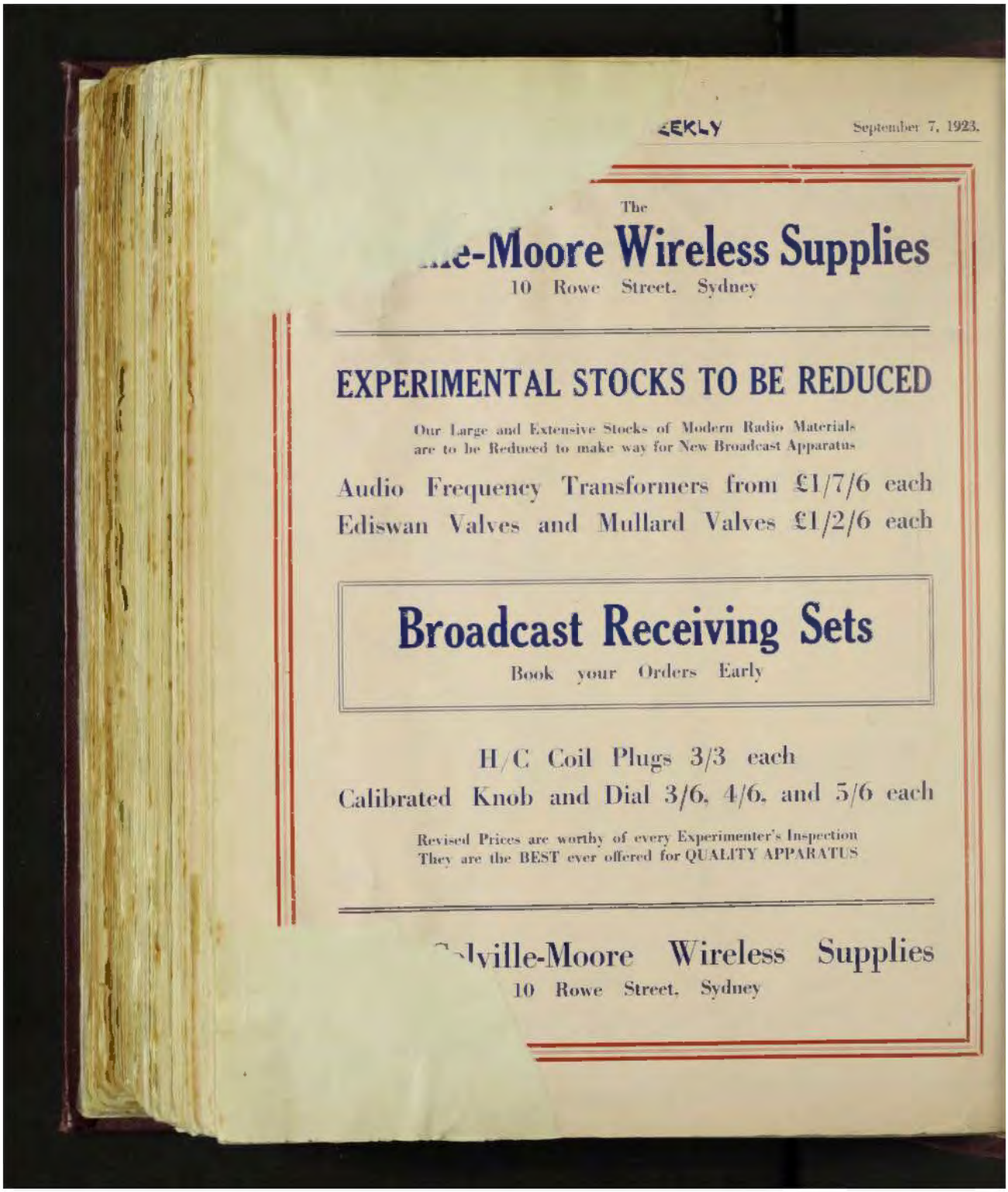




THE WIRELESS WEEKLY

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

OFFICIAL ORGAN OF THE AUSTRALASIAN RADIO RELAY LEAGUE.

Vol. 2. September 7, 1923. No. 36

LICENSES.

Five Shillings Not Wanted Now.

A Sunday paper which a few weeks ago told the public not to buy wireless sets at present, last Sunday had a statement from Mr. E. T. Fisk, of Amalgamated Wireless (Aust.) Ltd., saying that the bona fide experimenter would not be charged 5/-. We hope that means he will not be asked to sign License No. 4, which says that he may not sell his apparatus, or should he find that any of the patents he is licensed to use are invalid he cannot attack them or help anyone else to attack them.

Should this statement be correct, then anyone who holds an experimental license being a bona fide experimenter, will not be asked to pay 5/- to use the patents of Messrs. Amalgamated Wireless (Aust.) Ltd.

Perhaps now License No. 1, which we understand is for the bona fide wireless trader will be treated in the same way, and the charge of 12/6 and 17/6 per valve socket removed.

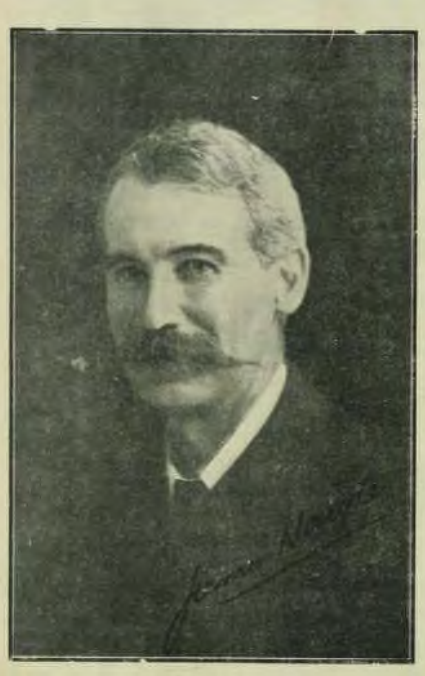
Roster for Week ending 12th Sept., 1923

	7.30 to 8.0	8.0 to 8.30	8.30 to 9.0	9.0 to 9.30	9.30 to 10
Thursday, 6		2 GR		2 CI	
Friday, 7		2 WV	2 KC	2 CI	
Saturday, 8 ..	2 KC	2 GR		2 CI	
Sunday, 9 ..	7 to 8 2 GR		8 to 9 2 BB		9 to 10 2 KC
Monday, 10	2 GR	2 WV		2 CI	
Tuesday, 11 ..		2 GR		2 CI	
Wednes., 12...	2 GR	2 WV	2 KC	2 CI	

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

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

Brief Account of Wireless Station 2MU.

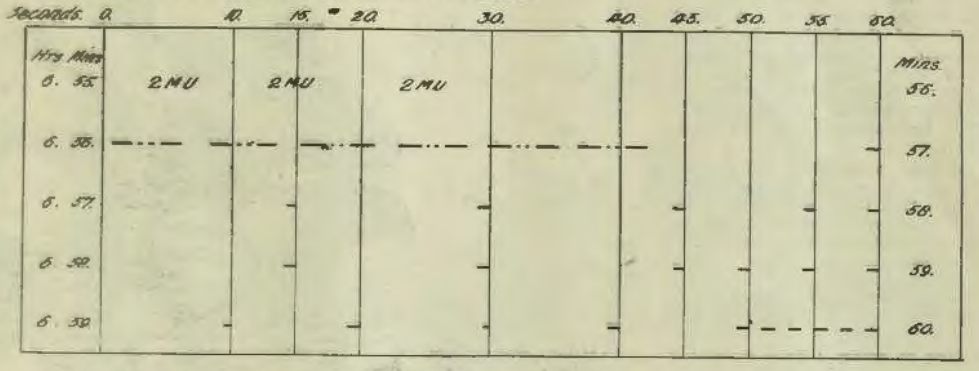


Mr. James Nangle

O.B.E., F.R.A.S.

This station is situated at the private astronomical observatory of Mr. James Nangle, O.B.E., F.R.A.S., at Tupper Street, Marrickville. Mr. Nangle is well known for many years as an amateur astronomer, who has carried on practical astronomical observations and has made many interesting contributions towards the advancement of this interesting science. As a member of the University Eclipse Party which proceeded last year to Goondawindi to make observations of the total solar eclipse. Mr. Nangle had some experience of observing the value of wireless transmission of signals. The astronomers from various parties were able to check their chronometers at the very fine station of Mr. Shaw at Goondawindi. On returning to Sydney, Mr. Nangle determined to take advantage of this method of obtaining accurate checks on his own observations. Accordingly he obtained permission from the Controller of Wireless to instal a receiving station, and from that time on has without intermission checked his clock by the time signals from the Melbourne Radio Station. The Melbourne signals are, however, given at a time which is not convenient to most observers, since to get them means sitting up until midnight. Mr. Nangle was aware that there were many amateur astronomers who would like to get the time earlier in the evening, and he was also aware that there were many young people with modest crystal receiving sets unable to get Melbourne, and at that time with very little music to hear. It occurred to him therefore that some time signals given out at intervals during each week would be useful to amateur astronomers, but would also be an encouragement to lads owning crystal receivers to make accurate observations. The taking of time signals involves very accurate observation, and the comparison of the different observations with almost any clock affords useful information in the performance of mechanical devices. Mr. Nangle therefore applied to and was very graciously given permission by the Controller of Wireless to send out time signals on Saturday and Sunday evenings. Mr. Nangle immediately installed a small Sterling Aeroplane Spark Transmitter. The transmitter, though of limited range is a very highly efficient little instrument, and the last couple of months' signals given out by it have been listened to with great interest by many observers within ten or twelve miles of Mr. Nangle's observatory. Mr. Nangle has arrangements at his observatory for determining local time himself, and checks his clock with signals each night from the Melbourne Radio Station, and each morning from Pearl Harbour, Honolulu. The chart shown herewith illustrates the system followed by Mr. Nangle in giving the signals. It will be seen that the signals are preceded by the station call and by a series of x's, the signals themselves commencing at 6.57 p.m. and ending precisely at 7 p.m. The signals are dashes each one second long. The end of the dash indicating the time. The signals are only issued on Saturday and Sunday evenings. The wave length used is close to two hundred metres.

CHART SHOWING TIME SIGNALS ISSUING FROM STANMORE PRIVATE OBSERVATORY BY WIRELESS ON SATURDAY AND SUNDAY EVENINGS EACH WEEK.



Station Call given during 6.55 to 6.56 p.m.
Series of X's given during 6.56 to 6.57 p.m.
Time signals commence 6.57 p.m. and end at 7 p.m. precisely. Each signal, 1 second duration. End of signal indicates time of each interval.

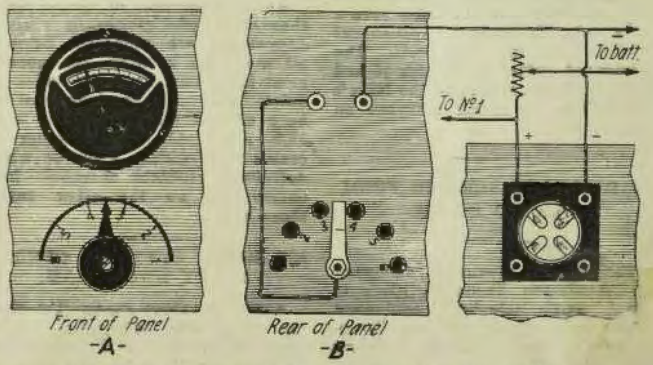
Keeping an Accurate Check on the "A" Battery.

By Dr. ARTHUR E. GARVEY.

Every radio set should have a voltmeter to accurately check the amount of A battery voltage on each tube and also for the purpose of determining the condition of the battery at any time without the least bother. The greatest hindrance to the amateur being so equipped is that he cannot afford voltmeters for each tube, nor does he want to sacrifice the space on the panel for so many meters.

I am using one meter for all tubes and also to test my storage battery. All these tests may be made with a slight turn of the wrist at any time. The wiring is simple, and can be neatly made.

Mount the voltmeter in the desired place on the panel and directly underneath it, any of the many type of inductance switches on the market, first cutting off one of the blades on the back of the switch, making it an ordinary single pole switch. Solder wire to switch arm and lead same through voltmeter and then directly to the negative side of the storage battery connection. Solder wires on to each switch point as directed in diagram and lead to points designated. Points one to four inclusive should go directly to the positive terminal of the tubes indicated. Make sure before doing this, however, that the rheostat is on the positive side of the battery, or, if your hook-up works the other way, reverse the directions just given. All that is necessary is to have the rheostats all on either the positive side of the battery or the negative terminal of the voltmeter to the side opposite the



the rheostats are on and the other voltmeter terminal goes to the terminal on the bulb socket which leads to the rheostat. Switch point number five goes to the positive side of the battery direct. It can readily be seen that a direct reading of the battery is always available. This is particularly handy when trouble develops out of a clear sky, for if the trouble is a dead storage battery, it will immediately be indicated by the voltmeter.

Terminal number six has no battery or tube connection, and it can be seen that there will be no reading on the voltmeter as it will be out of circuit. There is practically no consumption of "juice" by a voltmeter, however, and I always make a practice of leaving it on number five as a register of my battery condition.

Many to whom I have suggested this plan have adopted it, and are delighted with the results obtained, so I feel that there are others who would like to hear about it.

A CHANCE KNOWLEDGE OF RADIO SAVES 33 LIVES AT SEA.

When seaman Addison Galligan, who is an ardent radio fan, picked up a little knowledge of the Morse code, he did it for his own amusement and with no idea that it would be the means of saving the lives of a whole ship's company at sea. But when the S.S. Nikka caught fire off the coast of Washington, he was the only man on board who knew even a little code. Haltingly he spelled out "S.O.S." and then "f-i-r-e." The coastguard cutter Snohomish picked up the call and rushed to the Nika's aid in time to rescue everyone on board.

RADIOPHONE SERVICE FROM SHIP TO SHORE.

The United Steamship Company of Copenhagen, Denmark, plans to instal radio telephone equipment on all boats plying between Copenhagen and the provincial harbours the travelling public's convenience. Travellers will be able to get communication through the telephone service, with their homes or offices.

Australian Wireless as it Stands To-Day.

AMERICAN AMATEUR TRANSMITTERS.

At the suggestion of the amateurs themselves, who generously wish to co-operate with broadcast listeners all over the country, the government has issued an order which requires that all amateur stations keep off the ether from 7.30 until 10.0 p.m. All new amateur licenses will contain a clause which definitely restricts operators from encroaching on the ether during these hours.

885 RADIO STATIONS OPERATED BY UNCLE SAM.

A recent report shows that there are at present 885 radio stations operated by the U. S. government. Of these the Navy has 533 ship and 52 land stations and the army has 180 land stations. The rest are operated by the Post Office, Commerce, Interior and Treasury departments.

RADIO MUSIC THAT COMES BY TELEPHONE.

What appears to be an application of the recently-developed principles of "wired wireless" is now in effect in Backus, Minnesota. As a matter of fact, it is not "wired wireless" at all, but an ingenious device of the local telephone company. The loud speaker of a receiving set located at the central office is placed in front of a transmitter which is connected to a farm line; the patrons of the line are thus enabled to listen in on broadcast programmes even if they have no apparatus of their own.

THE LEGAL STATUS OF AN AERIAL ON A ROOF.

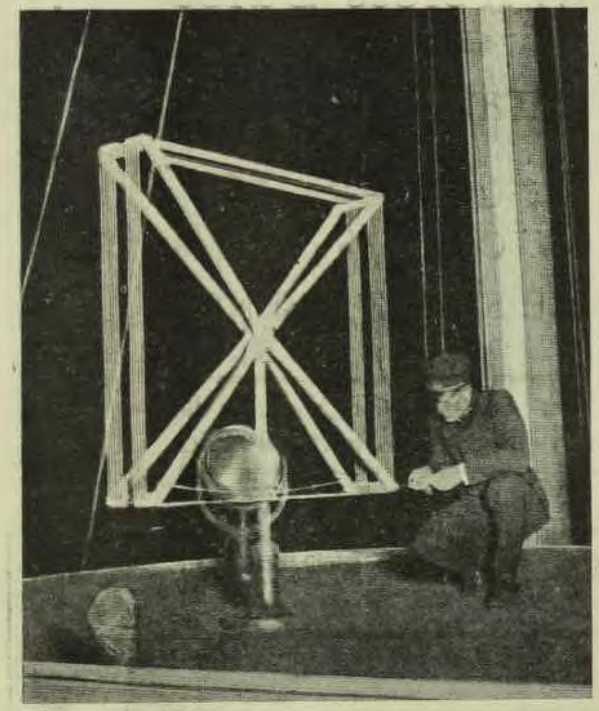
According to a recent decision by a Chicago magistrate, a landlord cannot legally destroy his tenant's radio aerial, inasmuch as the radio set is "an appurtenance to the home."

MAKE YOUR OWN

A Measurement Chart.

FOR DETERMINING THE CONSTANTS OF A LOOP ANTENNA.

By Raoul J. Hoffman, A.M.E.



In these days of modern radio when the multi-stage radio frequency amplifier, the super-heterodyne receiver, the super-regenerative receiver, and the various reflex circuit receivers have been coming into more or less general use, the loop antenna for receiving has been brought more into prominence.

The three outstanding advantages of the loop type antenna—its directional effect, the simplicity of tuning and the absence of the troublesome and bulky outdoor antenna—are important to the city fan who is interested in receiving only.

There are several standard receiving sets now being placed upon the market that incorporate the loop antenna. However, there are many people who make their own sets, and who are experimenting with radio frequency amplification who have occasion to design and build their own loop antennas.

And the question, "How many turns of wire shall I wind on the loop" is not often answered correctly.

For their benefit we have prepared this chart, that tells exactly how many turns of wire to use for a given wave length range. A loop antenna is almost universally tuned by placing it in shunt to a good variable condenser and this is all that is necessary in the way of tuning.

First of all, the wave length range should be decided upon.

Then the size of variable condenser should be chosen for use with the loop.

With these two points determined the prospective builder may easily calculate the necessary inductance which must be used in the loop to cover the wave-length range chosen.

When this inductance is known, you may then use the chart in the present article, for calculating the correct number of turns of wire to use to give the required inductance value.

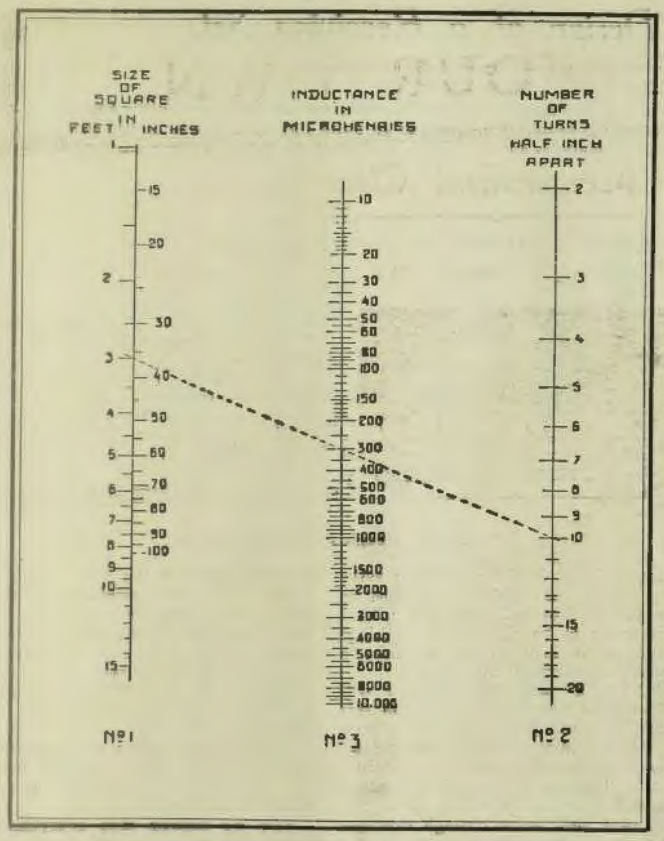
The accompanying chart is based on the square form of loop, on which the wires are spaced ½ an inch apart.

This form of loop should not be mistaken for the spiral loop.

When you use the chart, connect values on scale No. 1, with values on scale No. 3, with a rulet and read the number of turns required on scale No. 2.

Example:

To build a loop on a square form, 3 feet on each side, with the wires spaced ½ inch apart to have a total inductance value of 3000 microhenries. How many turns of wire should be used?



With a ruler, connect the size of the loop (3 feet) on scale No. 1, with the desired inductance value (300 microhenries) on scale No. 3. If this line, connecting the two points is extended over to scale No. 2 it will cross at the correct number of turns (10 turns).

RADIO CARRIES TO MOTHER APPLAUSE GIVEN HER SON.

When the French consul Gaston Liebert conferred the Cross of the Legion of Honour upon Barre Ferre at the annual banquet of the Pennsylvania Society at the Waldorf-Astoria in New York, one of those who heard the applause was his mother Mrs. S. P. Ferre, who was in Rosemont, Pa., where she listened in on the banquet by radio and heard her son receive his honour. Radio broadcasting is becoming a matter of public service.

HOW A RADIO THEORY WORKED OUT IN A TRANSATLANTIC TEST.

An interesting example of how radio theories work out practically was afforded by the tests in transatlantic transmission which were recently carried out on signals from the station at Rocky Point, Long Island. The electric field strength which the signals should have when they had reached London was calculated in advance by means of the Austin-Cohen formula. Then the incoming signals were actually mensured, and were found to have substantially this strength. This is only one case of many where this famous formula has worked out satisfactorily in practice.

General Design of a Receiving Set.

These general suggestions for planning the layout of a radio receiving set and for completing its construction might well be followed by anyone who intends to build any of the sets described in these columns from time to time. It includes specific directions for making a two-stage a.f. amplifier.

Many radio enthusiasts who would like to build sets designed by themselves rather than to use standard blue-prints, hesitate because the problem seems too large. If you go about it in a systematic way it is really very simple. The necessary tools can be found around the average work bench.

In the first place the builder must make up his mind as to what he wants to build, and exactly what instruments he is going to use. Current literature is full of such information, and all reliable dealers will give all necessary information. The parts may be either home-made or bought. The latter are usually of better workmanship and appearance, and the difference in price is usually not great. The results will usually be better because all parts are pretty well standardised nowadays. All the parts that are to be used should be now at hand ready for the next step.

Now the actual designing begins. One should try to form some idea as to how he would like his instrument to look; long or short, high or low, square, etc. This will serve as an end towards which to work.

Considerable thought must be given to accessibility and convenience. Those parts which are to be used the most should be located in the most convenient places. Crowding of such controls is to be avoided. For instance it would be poor judgment to place the tickler and condenser controls near the top of a panel, and have three or four rheostat controls near the bottom. Lay the parts on the table in front of you and imagine them to be in a panel and see if the tuning would be convenient. If not, re-arrange the material. Two other things should also be remembered, symmetry and convenience in wiring, although these are not so important as is convenience in the handling of the finished instrument.

When the builder has pictured to himself a satisfactory arrangement, measure the lay-out and then he will obtain some idea as to the size panel required. It is always well to make a couple of inches allowance to avoid a crowded appearance, and in order to be able to shift things around slightly so as to make a more symmetrical appearance.

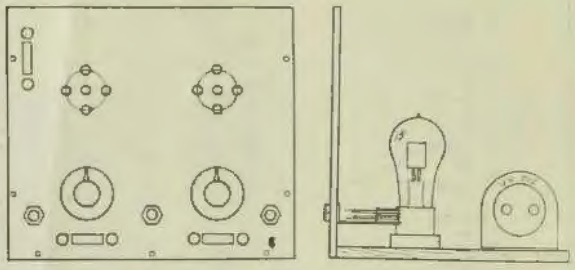


FIG. 1. Rough Preliminary Sketch

At this stage, the builder will know the size of his panel and this panel should be obtained. A cabinet can now be made, if desired, and the panel carefully fitted into it. Planning the panel lay-out is now in order. First it is recommended that several rough sketches be drawn to serve as a guide for the next step. The writer has found through considerable experience that plans and designs of any kind can be quickly and accurately laid out on cross-section paper. A pad of cross-section paper is a handy thing to have around a station; it is generally used for plotting data, making calibration charts for meters, wave meter charts, etc. If used for the panel layout it will do away with the necessity of drawing instruments, and enable a great saving of time and patience. Let one division equal to any convenient unit—say ¼in., or whatever is necessary to enable the complete panel to be drawn to scale on the paper. Then with a soft pencil indicate roughly where the different parts are to be mounted. Now indicate more carefully the centres of the dials and controls, and draw the general shape of the various parts to scale. Squares representing the parts will suffice, the object is to make sure that there will be room enough for all the parts. If this is not done the builder may find in assembling that a certain part will not fit in where intended and a patch job will result. If the lay-out does not appear symmetrical and pleasing to the eye, the misplaced part may be erased and redrawn as before.

Now we assume that everything is satisfactory. The beauty of the use of cross-section paper will now become apparent. To dimension the drawing it is only necessary to count off the number of units to any particular point, and the dimension is known. For example, say the distance between two centres is 8 units, scale 1-unit equal to ¼in. then the dimension or distance is 4in. The writer generally uses cross-section paper with centimeter and millimeter divisions and uses a scale of 1 cm equals 1in., in this way the dimensions may be read directly in inches. If the paper has ¼in. in rulings, a scale of 1 unit equals 1in., or 2 units equals 1in., will be found convenient, depending on the size of the panel and of the paper. In any event this method will be found to be useful in laying out plans for almost any purpose, where extreme accuracy is not required.

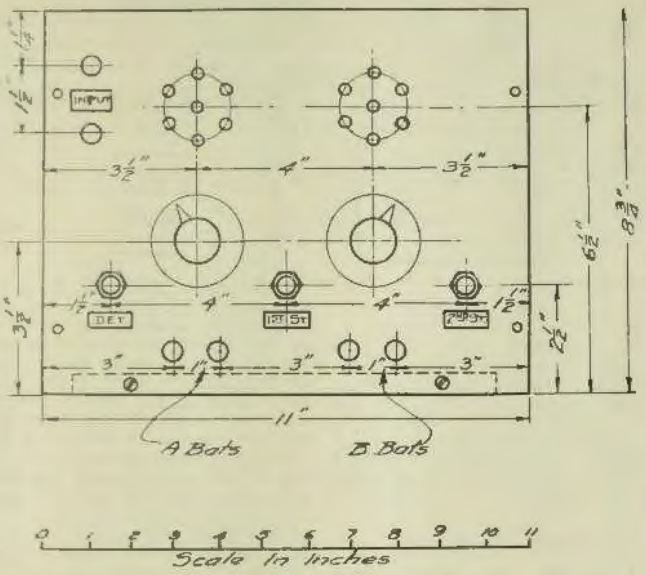


FIG. 2. Actual Layout Based on Sketch.

Usually one side of a panel will have a better finish than the other. The better side is used for the front. Now place the panel, good side down, on a table and lay off the dimensions by means of a scale and make marks (either crosses or points) where holes are to be drilled. Please remember that you are working now on the reverse side of the panel, and that the drawing is for the right side. This means that all dimensions must be marked in the reverse order from those on the drawing. In other words simply imagine that the drawing is the panel, turn it over (as you did the panel for marking) and hold it up to the light, and you will see how the marks are to be made on the back of the panel. Indeed, if you are afraid that you will make a mistake, you can stick the drawing to a window pane, reverse side facing you, and lay off on panel as it then appears. If you will simply remember this fact, you won't make a mistake in any event.

After marking, the panel is ready for drilling and assembling. If proper care has been used in making measurements, the parts will be found to fit into their respective places very nicely, and the panel will have a "factory-like" appearance. For mounting condensers and similar things where more than one screw hole is required, little paper templates will help to locate the holes accurately.

We are now ready to consider the last but not least important stage; namely, the wiring. For a real fine appearing job, hard drawn copper wire is recommended, and wherever a wire changes direction, a sharp right angled bend should be made. This is commonly spoken of as "bus wiring." The wires should not be run here and there at all angles, but rather run them all either horizontally or vertically, or combine the two in order to reach a certain point.

A glance at the wiring of most modern sets will serve as an example. Go to your dealer and look at a Grebe set, or turn to the advertising section of some magazine and you will see how this is done. The results in appearance are really astonishing. To further improve appearances the writer used varnished cambric tubing. Copper wire will turn black due to corrosion, in time, and the tubing will hide this, furthermore, in case any of the wires should ever touch, short circuits will be prevented. All connections should be carefully soldered. Clean joints are essential to good soldering.

The writer uses No. 14 hard-drawn copper wire for all wiring. This wire is nice and stiff and once bent to shape will stay that way. Annealed copper wire is bad because the wire soon gets out of shape due to jarring or handling, and the job soon looks sloppy.

As an example of the method outlined above, suppose we wished to build a two-stage amplifier, and we wanted three jacks (detector, first stage and second stage). We would first get our material together.

3 Jacks, 2 sockets, 2 rheostats, 2 amplifying transformers, 6 binding posts, name plates, screws, wire, etc.

Suppose further that the amplifier is to match a set whose panel is 8¾ in. high. This will at once fix one dimension. The other dimension will be determined by the amount of space required for the transformers, sockets, rheostats and jacks. After making several rough sketches and after arranging the parts on the table, we arrive at a dimension of say 11 in. We now lay a panel 8¾ in. x 11 in. off on our cross-section paper and indicate roughly where the parts are to go. This is done very lightly, and now the parts may be shifted slightly to give a symmetrical appearance. See Fig. 1. Next the centres are located with reasonable accuracy and the sizes of the parts indicated. It is found there is plenty of room. Fig. 2. The drawing is then dimensioned as described above.

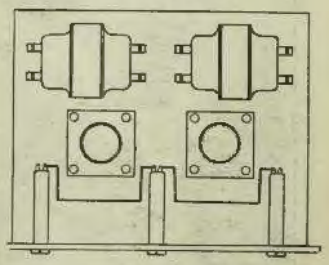


Fig. 3. Top View for Planning Inside Arrangement.

Often, to improve appearances and avoid crowding of the interior, it is well to lay out the parts there also. This was done. In order to allow for the size of the other set, the size of the amplifier cabinet, etc., we assume that we are allowed a depth of 8 inches. Fig. 3 shows

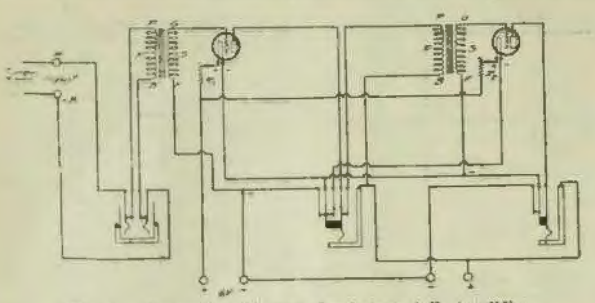


Fig. 4. Connection Diagram for 2-stage A.F. Amplifier.

the result. Such a plan will tell us if there is room for the sockets and transformers and the jacks which protrude considerably.

With the above example as an illustration the writer believes that anyone should understand the method of attack set down in the first part of this article. It will be seen that the design of a set or of a piece of apparatus is not difficult if the prospective builder goes at it in the right way and if he has a little creative imagination.

For the benefit of those who do not care to design their own equipment and who like the design of the above amplifier, we shall include the wiring diagram. The above amplifier was actually designed and built by the writer for a friend of his, so no mistake will be made by copying it.

BEER—OR RADIO.

A decision was handed down recently by an English court which declares that it is illegal for a public house (English for what we used to call a "saloon" to furnish their patrons with both liquid refreshment and radio music. From now on, evidently, the customers will have to choose between broadcasting and beer.

RADIO IN THE WAITING ROOM.

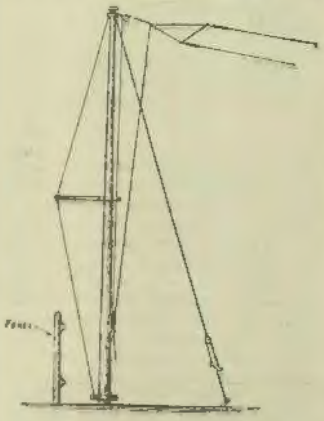
Callers upon Mayor Hylan of N. Y. are not at a loss for entertainment even while waiting to be ushered into the sanctum, for a radio set has been installed in the reception room at City Hall. "It will be a welcome diversion for humble citizens who come daily and kick their heels while sitting on the benches in the lobby or in the reception room waiting to see the executive," observes one newspaper. "It is understood that a private connection has been made with Mayor's private office so that he can switch on a concert now and then to break the strain of his working hours."

MAKING BROADCAST SETS. An Industry about to commence in Australia.

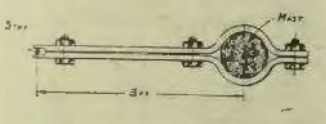
Backstaying a Mast.

In locations where the aerial has to be erected in a very confined space, it is very often found that it is only by sacrificing a few yards of an already short enough aerial length that sufficient room is available to backstay the mast.

Now these backstays, or stays, are of the utmost importance as they



have to take the weight and wind strain of the aerial, but a simple remedy for confined spaces is to use a cross arm at right angles to the mast as shown in the diagram. This arm, which is made in two halves to clamp on to the mast, should be made of malleable iron and will be knocked up by the local blacksmith for a trifling amount. It should, for a 35 ft. mast, not be less than 3 ft.



in length, and the end which carries the staywire filed out to provide hitch for the wire and the two halves pulled up tight behind to prevent the wiring running into the joint. In all other respects the diagram explains itself. In erecting a mast with a backstay of this type the cross arms and stay should be fitted while the mast is on the ground and the stay tightened up sufficiently just to raise the small end of the mast (i.e., the pulley end) a matter of two or three inches off the ground. When the mast is raised and the usual front and side stays secured and taut, it will be found that the backstay has then just the right amount of tension to take the pull of the aerial if the latter is of the twin wire type.

A RECORD LONG-DISTANCE RECEPTION.

A radio message from the Naval station at Cavite, P.I., addressed for San Francisco for relay to Washington was picked up in the Washington Radio Central and copied before the San Francisco operator indicated its receipt. Needless to say it was not relayed to Washington. This message was copied without error over 11,500 miles of sea and land.

A PRACTICAL INDOOR ANTENNA.

My landlord will not allow me to put an outdoor antenna, but I get very good results by running a wire in back of the picture moulding down one side of the entry hall of my apartment and back on the other side to my apparatus. Only one end is connected, the other end being left free. I am using a single tube set and I get all the local stations.

BROADCASTING IN JAPAN.

Although radio enthusiasts in Japan do not have all the advantages of their brother fans in the United States, from now on they will at least be able to enjoy regular broadcasting. The Japanese Government has realised the wisdom of relaxing its rigid policy and has licensed a number of firms to broadcast music, speeches, and Government reports. This service will be paid for by a fee which will be collected by the Government and handed over to the companies.

Crystal Receivers are well worth while

Some Types that are simple to put together, cheap and of value to beginner and confirmed enthusiast

By ZEH BOUCK.

Are you interested in radio, but without any experience in it; eager to enjoy the programmes that fill the air, and to have the fun of building or operating your own receiver; broke—or at least unwilling to pay "beaucoup francs" for apparatus, which you think you cannot operate, to hear programmes which you think you may not care for? If so, get yourself a crystal set and have a taste of radio reception before tackling vacuum-tube apparatus.

Or, if already of the radio fraternity, are you building and rebuilding, soldering and unsoldering apparatus that passes in a single week through the throes of super-regeneration and inverse duplex? If so, build yourself a crystal receiver as a standby to tide you over whenever your tube set is hors de combat, so to speak.—The Editor.

The advent of the dry-cell tube, and the general drop in the price of vacuum-tube apparatus has by no means sounded the knell of crystal receivers. The advancement in bulb apparatus has been accompanied by similar strides in crystal equipment, notably in the development of synthetic crystals which make possible fairly consistent reception over moderately long distances. Experienced operators still recommend the purchase or construction of crystal receivers by beginners, as the least expensive way of mastering the fundamentals of tuning, and by the possessors of bulb apparatus as a standby when tubes burn out and batteries run down. When bulbs have suddenly ceased to function, many an interesting programme has been "saved" by requisitioning a discarded crystal set. Also, a familiarity which the theoretical and practical aspects of crystal reception is of value in the operation and design of many reflex sets, in which a crystal is used as the detector.

The crystal provides the simplest means of detecting radio signals, and reception is effected by imposing the incoming radio frequency energy on the circuit containing the detector, where it is "rectified." The radio current, as the reader is probably aware, is an alternating current and of so high a frequency that, due to a phenomenon known as [illegible]e, it cannot pass through the windings of the telephone receivers. However, by means of rectification, which the crystal accomplishes through its property of passing electricity in only one direction, half the alternating current is suppressed, leaving only that part travelling in one direction (a direct current), which passes quite readily through the receivers.

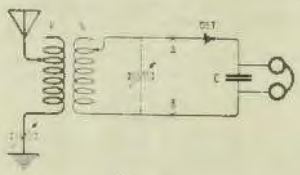


Fig. 1.
The preferred crystal circuit, which, with the addition of the indicated condensers, makes an excellent set.

There are several ways in which the radio wave may be delivered to the crystal, but as the sound from an unamplified crystal set is actually furnished directly by the power of the received wave, which is necessarily weak, only two methods, those making the most of the weak radio impulses, will be considered. The fact of direct power transformation, from energy of radio frequency to energy of audio frequency, should be constantly borne in mind when building crystal apparatus, to emphasize the necessity of painstaking construction tending to eliminate all possible losses. A carelessly made tube set may work, its imperfections probably being manifest in undesirable sounds and lack of selectivity, but a poorly constructed crystal receiver, incapable of compensating for inefficiencies by local batteries, will function far below its ability.

The most efficient system of crystal reception employs a loose or variocoupler in the tuning circuit. Fig. 1 indicates the manner in which it is connected to the detector and phones. The coupler, P'S may be of the type designated commercially as the "universal" or "all wave" coupler, or it may be a standard short-wave variocoupler with the secondary coil rewound (if necessary) with smaller wire. Good variocouplers can be had from reliable dealers for a reasonable price; for the person who does not care to make his own apparatus and yet would be glad to save money by assembling bought parts himself, the purchase of a variocoupler is recommended. Many complete crystal receivers, of course, are also on the market. They cost comparatively little to buy, and nothing at all

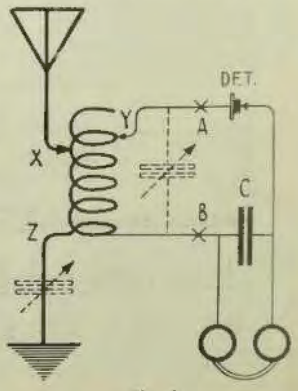


Fig. 2.
An efficient and simpler circuit

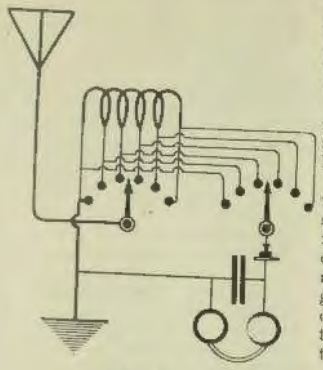


Fig. 3.

to operate, since they require no bulbs or batteries. However, a home-made coupler is well within the ability of many experimenters, and the primary coil should be wound with 60 turns of any convenient wire on a three-and-a-half-inch tube, tapped every sixth turn. The secondary may be wound with 72 turns on a three-inch tube, tapping every twelfth turn.

If the fan already posseses a short-wave vario-coupler, but does not care to rewind and tap the secondary, a variometer may be added to the circuit at point A, figure 1, and tuning accomplished by means of it.

The loose coupler circuits are very selective, and close tuning is possible through variation of the coupling.

A single coil of wire combining the functions of both primary and secondary, is perhaps, the more usual form of inductance for crystal reception, but while quite efficient, it necessarily lacks the advantages gained by variable coupling. This circuit, Fig. 2, is theoretically identical with that just discussed, the turns of wire between X and Z acting as the primary, and those between Y and Z as the secondary coil. (It might be well to note here that the functioning of many electrical circuits, particularly those associated with wireless, depends upon one coil acting in the capacity of two or more.

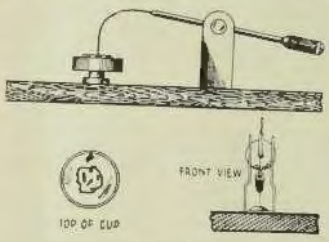


Fig. 4.

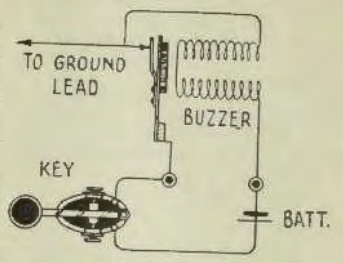


Fig. 5.
Test buzzer connections.

The inductance coil in Fig. 2 may be wound with 120 turns of No. 20 to No. 28 magnet wire, and tapped every tenth turn. Fig. 3 shows the method of doubling up on the taps, permitting the two switch levers to cut in individual amounts of wire from the same taps.

The fixed condenser, shown across the telephone receivers, should be of about .0015 microfarad capacity.

The crystal sets just described are well adapted to the refinements associated with audion equipment, and the addition of variable condensers in the primary and secondary circuits will add to the selectivity, and to the ease which the apparatus may be tuned. Such condensers are indicated by dotted lines in Fig. 1, and are preferably of the 43-plate (.001 mfd.) size, though the 23-plate condensers will be found useful. If only one condenser is avail-

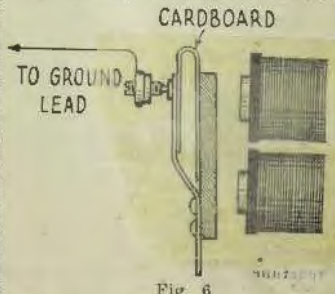


Fig. 6.
Showing how a piece of cardboard may be inserted between the armature and spring contact to improve the tone of the buzzer.

able, it can probably be used to greater advantage across the secondary coil, in the loose-coupler circuit, and in the ground-lead when the tuning coil is used. Whether or not condensers are employed, apparatus constructed in conformity with the directions given, will respond to all the broadcast wavelengths.

The detector itself may be any one of the popular types on the market, from the simple moving-bar design to the more elaborate glass-enclosed instruments. The majority of crystal detectors are of the catwhisker type in which contact with the crystal is effected by means of a fine, springy wire such as phosphor-bronze. Such a detector is easily built by the experimenter. A simple design is shown in Fig. 4. The support is a "U" shaped strip of brass or other convenient metal. The ball and the brass rod which is passed through it after drilling, may be made from the end of a curtain rod. The catwhisker (a short, single strand from a flexible lighting cord, will do for this) is soldered to one end of the rod, while an insulating handle is attached to the other. The crystal may be purchased mounted in a revolving cup.

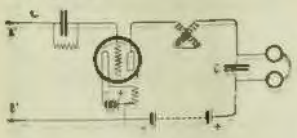


Fig. 7.

The bulb unit for connection to Fig. 1 and 2. This will make the crystal set into a regenerative receiver.

Another popular detector design which is particularly adapted to mounting on a vertical panel is that of the rotating type made in the form of a hard-rubber wheel. It contains a sensitive crystal with which contact of the required delicacy is obtained through gold or other metallic dust. Adjustment is effected by turning and tapping the wheel.

The crystal may be galena, a natural crystal, or a synthetic product, which is sometimes more sensitive than the average natural mineral. Galena is a double sulphide of lead and silver along with many unrectifying impurities—all in varying proportions. It is not difficult to imitate the natural process of galena crystallisation, and the majority of manufactured crystals are merely an artificial galena built up in the most efficient proportions (from a rectifying standpoint) with the useless and perhaps undesirable impurities eliminated.

A crystal set is most easily adjusted for the highest sensitivity by means of artificial signals from a test buzzer. The buzzer, though preferably of the high-frequency type, may be of the ordinary door-bell design, the note of which can often be improved by inserting a pasteboard slip between the armature and the spring contact. (Fig. 6). The sole connection between the buzzer and receiver (and no connection at all is required when the detector is correctly adjusted) is a single wire running from the stationary contact to the ground-lead (Fig. 4). The detector should be adjusted while the key or push-button is down, and the note of the buzzer will be plainly audible in the receivers when a sensitive adjustment is secured.

The apparatus is preferably mounted on a panel after the fashion of bulb sets, with the detector placed on the front in such a manner as to permit of easy adjustment. A push-button may be set flush in the panel for operating the buzzer test, but many enthusiasts prefer a telegraph key on the operating table, making the buzzer additionally useful for code practice. Care should be taken in the construction and mounting of the instruments, in order that the crystal receiver may be given the finish and appearance which it merits.

ADDING AN AUDION TO THE CRYSTAL RECEIVER.

The crystal sets which have been described employ a tuning system that is readily adaptable to bulb reception, it being merely necessary to build up the bulb equipment as an auxiliary unit. The additional parts which will be required are: the bulb, A and B batteries, socket, rheostat, grid condenser, and grid leak, and the plate variometer. The extra equipment should be connected as shown in Fig. 7, and is hooked up to the crystal receiver by connecting wires A and B to wires A and B respectively in Figs. 1 or 2 after eliminating the detector and receivers (the phones of course being transferred to the bulb circuit). The result will be an efficient regenerative receiver, which, if desired, may as easily be changed back to a crystal set.

Fig. 8 shows a combination crystal-tube set, in which either form of detection is immediately available. When tube reception is desired and the tube is lighted, it is merely necessary to remove the catwhisker from its position on the crystal. When crystal reception is preferred, the current that lights the bulb is turned off and the catwhisker is adjusted to rest lightly on the crystal. No switches are required unless it is desired to keep the detector permanently adjusted, in which case a single-pole single-throw switch may be placed between the crystal detector and the phones, thus obviating the necessity of removing the cat-whisker. The principle is quite clearly indicated in Fig. 8, and it may be applied with equal simplicity to almost any crystal or bulb circuit which you may at present possess.

The crystal receiver is capable of remarkable results when constructed and operated with some degree of "finesse"—which, alas, is often as totally lacking in radio as in bridge. The close of the war found crystal receivers covering fifty to a hundred miles, on amateur power and wave lengths; and until much more recently they were used almost exclusively for commercial work (due to patent complications on bulb apparatus), traffic being handled in many instances over distances of a thousand miles! Of course, you cannot expect to hear broadcasting stations a thousand miles away with a crystal set; and even fifty miles reception may be considered exceptional; but if you live within about twenty-five miles of a broadcasting station, you should be able to hear it consistently and plainly; and the music will come in without the distortion so common with sets employing vacuum tubes.

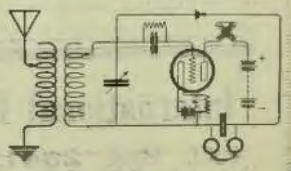


Fig. 8.

A combination audion-crystal set, permitting instant change to either form of detection.

ILLAWARRA RADIO CLUB.

There was a good attendance of members at the 29th meeting, held on August 14th, when Mr. A. E. Atkinson addressed the members on "Symbols used in Wireless." The speaker went through and explained the whole of the numerous signs used in the science and to be found in circuit diagrams, and exhibited many samples of the units in question, much to the interest of members. The lecture was well received and succeeded in clearing up many little points of doubt which were to be met with in the deciphering of the numberless circuits, complicated and otherwise, which came under the notice of the experimenter in the course of his operations.

A pleasant little interlude occurred during the evening when a presentation was made to Mr. and Mrs. McNeill as a mark of the club's appreciation of the kindness which had been extended towards it by these good people in providing club room accommodation for the past year. Mr. McNeill was the recipient of a gold-mounted pipe, while Mrs. McNeill received a tea set, tray and flower bowl. Mr. Atkinson (Vice-President) in making the presentation referred to the very fortunate position in which the club had been placed in the matter of club quarters owing to the generous manner in which their hosts had made available that very comfortable room for their meetings, for which the club was deeply thankful. He hoped the very friendly relations which had hitherto existed between Mr. and Mrs. McNeill and the members would continue for long in the future. His remarks were vociferously supported by the members, with the usual vocal accompaniment.

Another well attended meeting (the 30th) was held on the 28th August. The Secretary read a notification which had been received from the Radio Inspector in reference to the new regulation on the question of regenerative circuits, and explaining the conditions on which experimental licenses would in future be issued in this connection.

A talk was given by Mr. C. A. Gorman on "Circuits." In response to numerous questions, a great many circuits were given on the board. He dealt particularly with valve circuit which were (1) non-regenerative, (2) regenerative, and would energise the aerial, and (3) regenerative but which would not energise the aerial. A great deal of interesting argument and discussion followed, which was of benefit to all. At the conclusion Mr. Gorman was accorded a vote of thinks.

Members are particularly requested to attend in full strength at the next meeting, to be held at club-room, 75 Montgmery St., Kogarah, on Tuesday, 11th September at 8 p.m., when a lecture will be given by J. G. Reed, Radio Engineer. Any others interested are invited to attend.

The Secretary would be pleased to hear from any experimenters in the Illawarra Suburbs (not already members) with a view to their joining the club, and will supply any information concerning same on application. His address is: Mr. W. D. Graham, 44 Cameron St., Rockdale.

MARRICKVILLE AND DISTRICT RADIO CLUB.

At the School of Arts Hall in Illawarra Road, Marrickville, the weekly meeting of the above club was held on Monday, 27th August. President Hamilton occupied the chair.

Regarding the matter of the club's transmitting and receiving set, the Technical Committee were asked to investigate the matter in and make arrangements to put this matter in hand.

This club limits membership to 50 experimenters, and the Secretary, A. W. Hemming, of Central Av., Marrickville, would like to hear from intending members.

MANLY RADIO CLUB.

The usual fortnightly meeting of this club was held on Monday, 20th instant, in this club room, School of Arts, Manly, when a very fine lecture on "Wave Meters and Their Construction," was delivered by Mr. C. W. Mann, Science Master of the Canterbury High School. The lecture was voted one of the finest and most instructive heard by the club to date. Mr. Mann also exhibited and demonstrated a heterodyne wave meter of his own design and calibration, which was a very fine piece of construction.

The lecturer stressed the absolute necessity of a wave meter in every station, whether receiving or transmitting.

The club continues to make new members at almost every meeting.

The new aerial is now erected, and will be used for the first time at next meeting, September 3rd. Visitors are always welcome to the club. The Secretary, Mr. W. J. S. Perdriau will be pleased to answer any enquiries per 'phone 1093, Manly.

KURING-GAI DISTRICT RADIO SOCIETY.

At the last meeting of the society held on Tuesday, 21st instant, Mr. Hill delivered an interesting lecture on transmission, and also dealt with receiving circuits, which kept the members busy with pencil and paper.

The next meeting of the Society is to be held on Tuesday, 4th September, at Almonds, corner Victoria Avenue and Anderson Street, Chatswood, when Mr. Swinbourne, of the Manly Club, will lecture.

Persons intending to become a member of a radio club are cordially

invited to be present and to note that buzzer practice commences at 7.30 p.m.

Please address all inquiries to R. R. Wilshire, Hon. Sec., "Lauriston," Help Street, Chatswood.

THE NEUTRAL BAY RADIO CLUB.

This new club promises to be a most active one, already an attractive programme has been arranged for its members.

At the last general meeting, a lecture on "The Elementary principles of Wireless," was given by Mr. E. J. T. Moore, the lecture being followed by a series of short talks on various components of a "Receiver."

On Tuesday next, September 4th, Mr. J. G. Reed will address the club, the subject being, "The Wireless Receiver, with Special Reference to the Valve."

Mr. George A. Taylor has promised to address the club at an early date, and negotiations are in progress to arrange a club visit to the broadcasting studio of the Amalgamated Wireless Ltd.

In all an interesting series of lectures and visits has been drawn up.

General meetings are held every alternate Tuesday, September, 4th, etc., at "Belle Vue," 180 Kurraba Road, Neutral Bay.

All interested should communicate with the Hon. Secretary, Mr. E. J. T. Moore, "Newstead," Lower Wycombe Road, Neutral Bay.

HOW TO PROTECT YOUR TUBE FILAMENT.

Although the normal life of the average radiotron filament is more than 1,000 hours, it will be burned out in an instant if the high voltage leads from the "B" battery are connected across it. The burn-out requires but a fraction of a second; consequently it frequently remains unnoticed until the set is used again. This causes great inconvenience—particularly if a new tube cannot be obtained immediately.

Fortunately, however, it is an easy matter to protect the filament. Merely insert a 25-watt, 110-volt tungsten lamp in the circuit. The resistance of this automatically increases with the current and it becomes an effective ballast lamp that will prevent all injury.

Glossary of Technical Terms Used in Wireless Telegraphy and Telephony.

DAMPING.

See Decrement.

DECREMENT.

A measure of the rate of decrease of damped oscillations. Defined as the ratio between the amplitude of one oscillation and that of the next, or as the log of this ratio.

DETECTOR.

A device to convert the energy in oscillating currents into some form perceptible to our senses. Particularly used in connection with the very weak currents forming received signals. All detectors in common use are rectifiers. Suitable types are:—

DETECTOR, CRYSTAL.

Utilises the fact that contacts between certain crystalline substances and metals or one another have rectifying properties. Favourite substances are: Bornite, Carborundum, Chalcopyrites, Copper Pyrites, Galena, Graphite, Molybdenite, Silicon, Tellurium, Zincite, q.v. Very sensitive, but in some cases hard to adjust, though other types are easy. The best types give excellent results. Sometimes need readjustment after powerful atmospherics.

DETECTOR, ELECTROLYTIC.

A detector now seldom used, depending on the polarisation of a minute electrode in an acid solution. Sensitive, but easily upset by strong signals or atmospherics. Potentiometer needed.

DETECTOR, MAGNETIC.

Now obsolete. Depends on demagnetising action of oscillations on iron. Reliable but insensitive; needs circuit of a different type to those suited to most detectors.

DETECTOR, VALVE (FLEMING).

Depends on rectifying effect of bend in plate current curve.

DETECTOR, VALVE (3 Electrode).

Either as above or by accumulation of charge on grid condenser. See special handbooks on the valve. As a pure rectifying detector without retroaction the valve is not greatly superior to the crystal.

DIELECTRIC.

The name applied to the insulator between plates in a condenser. Sometimes extended to cover any insulator subjected to electric stress. Important properties are:—

DIELECTRIC CONSTANT, OR SPECIFIC INDUCTIVE CAPACITY.

The property which gives similar condensers different capacities according to the dielectric used.

DIELECTRIC HYSTERESIS.

A source of loss due to the fact that some of the energy stored in a dielectric when a voltage is applied to it is not given out again.

DIELECTRIC STRENGTH.

The voltage which a dielectric of a given thickness will stand without breakdown. Not to be confused with surface or solid insulation resistance. (See Resistance.)

DYNATRON.

A special type of valve having a negative slope of characteristic, so that it will produce oscillations without retroaction.

EARTH.

In wireless, a short name for the earth connection used in most cases. Often used by analogy to indicate the connection to a counterpoise, even if this is insulated from earth.

EARTHING SWITCH.

Placed between aerial and earth, to connect them directly together when the apparatus is out of use.

ELECTROMOTIVE FORCE (E.M.F.) OR VOLTAGE.

The electrical analogue of pressure. Measured in volts.

ELECTRON.

The ultimate unit of electricity, usually believed to be also a fundamental unit of matter. Apparently the only "material" object capable of moving at speeds approaching the velocity of light. The foundation stone of all valve theory.

ENDODYNE.

See Heterodyne.

ETHER.

Originally postulated in support of the wave theory of light, in reply to the question "What is it that undulates?"

In the light of later philosophy, it would appear that it is not necessary to demand that there must be "something that undulates," and it is possible that the whole supposition of an ether will be dropped.

History Repeats Itself in Great Britain.

We are not alone in our radio experience. It seems as though Great Britain, which is following in our radio broadcasting footsteps, must pass through much the same experiences as we have passed through. "There are many reasons why this unfortunate controversy should be settled at the earliest possible moment," states "The Electrician," of London, referring to a broadcasting scramble in which the British radio men now find themselves. But more to the point: "And one of the most important of these is that a slump has occurred in the sale of wireless apparatus. This is unfortunate at a time when manufacturers were beginning to get into the swing of the business, but, having all circumstances in view, it can hardly be described as unnatural. The paragraphs, columns, and discussions on the subject of broadcasting which have appeared in the daily press during the past few weeks have, to put it mildly, puzzled the public. Those who were about to buy wireless sets are holding off until they can decide for themselves whether to become a listener-in is or is not an illegal act. Even those who have sets are not certain whether they are entitled to use them, and sales are suffering on that score." True, the British broadcasting situation is unfortunate, especially the licensing phase, which compels listeners-in to secure a license from the Government, and pay a rather distasteful fee. But to our mind the British radio industry is passing through the same sort of a slump which struck our young radio industry last summer, at a time when manufacturers were just getting into their full stride and the public, because of summer weather, stopped buying.

FARAD.

Unit of capacity.

FIELD.

That part of space which comes under any particular influence which is being considered. In wireless work fields are either magnetic, in the neighbourhood of any conductor carrying a current; or electric, in the neighbourhood of any part at a potential differing from that of earth or neighbouring parts.

FILAMENT.

In wireless, used for the cathode of a valve owing to its construction, which is that of the filament of an electric lamp.

FILTER.

A circuit specially arranged to cut out undesired signals or atmospheries while admitting those to which it is tuned. The ordinary coupled circuits, of course, form a filter, strictly speaking, but the term is mainly applied to special circuits, usually only employed in large stations.

A filter circuit designed to operate at audio frequencies.

A NEW PACIFIC COAST BROADCASTING STATION.

A new broadcasting station is to be erected in Oakland, California, by the General Electric Company. Work has begun on the buildings, and workmen are already assembling the radio equipment. It is expected that the new station will be in the air within four months. The plans provide for a two-storey brick structure. On the first floor will be the office of the studio manager, a general correspondence room for artists and quarters for motor-generator sets and storage batteries. There will be two studios on the second floor, the main studio being large enough to accommodate large bodies of musicians such as a band or symphony orchestra, and a smaller studio from which solo numbers and addresses may be broadcasted. The use of two studios will make possible continuous broadcasting. Research is now being carried on to determine the reverberating qualities of the ideal studio in order that the proper amount of dampening may be secured in the Oakland studio to assure the maximum musical quality. The radio control room will be on the second floor. One thousand feet back of the studio

(Continued on page 19)

VICTORIAN NOTES.

BY OUR SPECIAL CORRESPONDENT.

On the 17th instant a Conference was held at Menzies Hotel with a view to bring the Victorian Association for the development of Wireless into close touch with the New South Wales Association. The Meeting was rather abortive and acrimonious discussion was the only result achieved. The Victorians desired a band for free broadcasting and receivers to be able to function over the entire band. This was strenuously opposed by the New South Wales representative, Mr. G. A. Taylor the convenor of the Meeting. Mr. Taylor stated that he had succeeded in bringing the other States into line with his Association but letters and papers in the possession of the Victorian Association amply prove that Mr. Taylor is somewhat mistaken in his conception of the views of other States. It is definitely known in Melbourne that all the firms of any importance both in Queensland and South Australia incline to the Victorian views of the broadcasting situation. Furthermore, the method of election of the members of the Board of Control left Victoria, and indeed all other States, unrepresented. The election of two absolute laymen to the Board has convinced the Victorian Association that good results need not be expected from that quarter. The one point which is quite clear is that Mr. Taylor and his supporters were left in no doubt as to the attitude of Victoria. It is to be hoped that a few more New Zealanders will visit Australia and give us a helping hand to get along with broadcasting. America absolutely leads the world in effective broadcasting, and the service is free over there. Eternal bickering and poor business characterises the service in England, and we are going to adopt all the worst features of broadcasting as practised in that country. The public, whose back is fortunately broad are going to suffer, and wireless will ultimately slip back another cog.

Mr. Love, the President of the Trans-Pacific Test, has received a few more details from America concerning the types of transmitters who did the work. Participants will be interested to learn that 6CGW, one of the most consistent stations, used only a 50 watt tube, with 2,200 volts on the plate. Wonderful results, but—poor tube! A remarkable phase of the test is that many high powered stations were not received at all in Australia. The success of the last test has stirred experimenters in America, and the next test in October will be taken up with great enthusiasm.

Reports from Mr. Bell, of Otago, New Zealand, show that to date he has been able to log 14 Australian stations, whose call signals are as follows: 2CM, 2CM (the loudest so far), 2GB, 2IX, 3AM, 3BD, 3BG, 3BL, 3BQ, 3BY, 3MC, 5BG (S.A.), and 5BQ. 3JU (Mr. Hull) was heard on CW 100 yards from the loud speaker. These results speak for themselves. Mr. Bell has succeeded in logging 87 American amateurs, and every radio district in America is represented in the call signals.

St. Kilda recently held an Exhibition Night, which was a pronounced success. A large quantity of apparatus was exhibited, and instruments of real quality were on view. The feature of the evening was a demonstration by Mr. C. Hiam with an old coherer. Mr. Hiam lighted lamps and exploded small charges by wireless, the transmitter being a small spark coil. There is no doubt that St. Kilda leads among the suburbs, though Brighton is running very close. On Saturday last a working bee built a wall on to the Wilson Hall, where the Brighton Club meets, thus consolidating their quarters. A complete up-to-date station will shortly be installed.

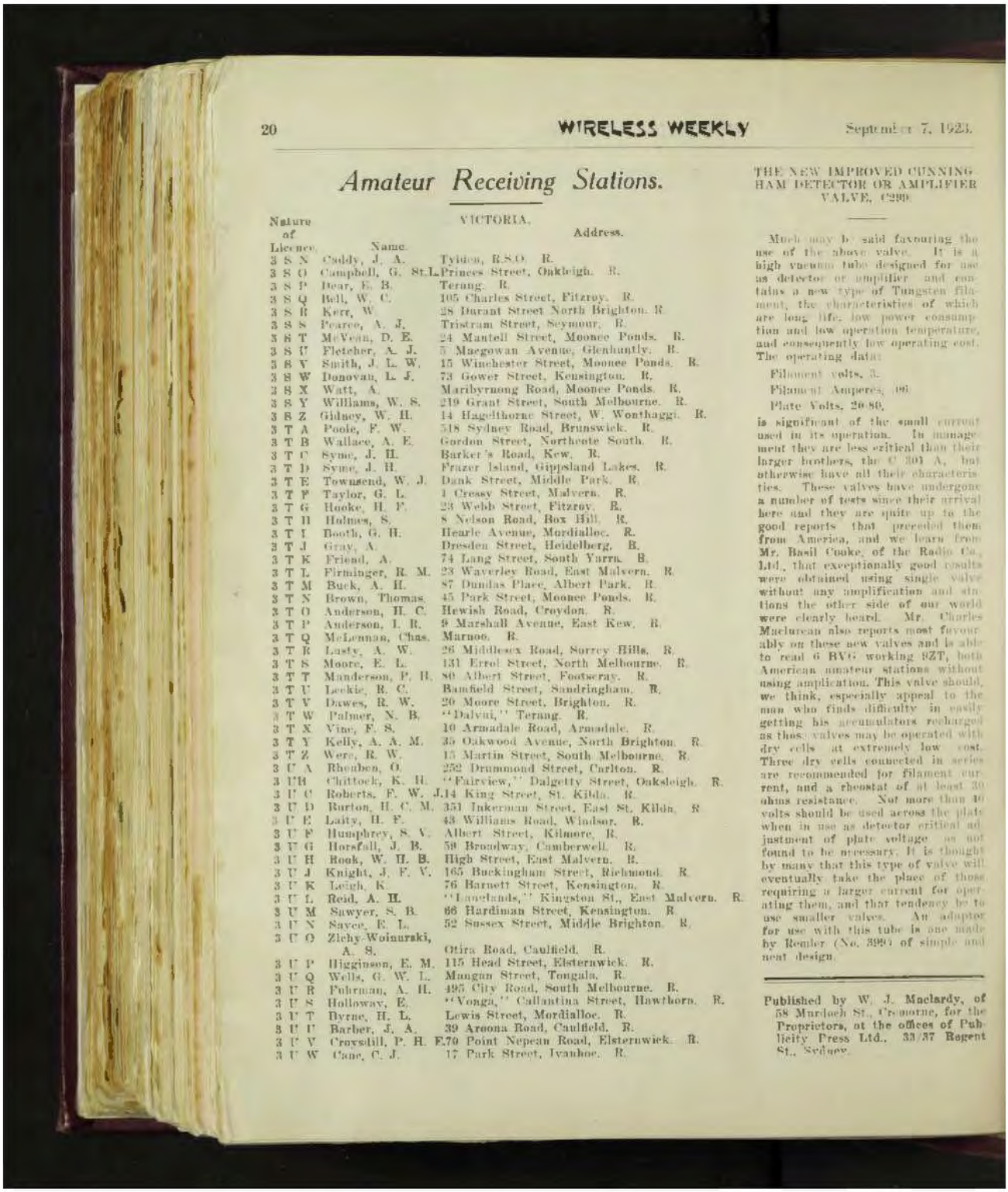
A meeting of the relay league will be held shortly, and the New South Wales scheme will probably be adopted. The roster system will also be brought into being. This scheme also will probably be copied from New South Wales, where it is operating with such success. A recent visitor to Sydney from Melbourne was much struck with the control in that city, and Victorians are going to set their house in order likewise.

(Continued from page 18)

building will be the power house and antenna system. The antenna will be multiple-tuned and strung between two steel towers, each 150 feet high and placed 260 feet apart. Beneath the antenna proper will be the counterpoise consisting of a network of wires, 14 feet above the ground, covering an area of 150 by 300 feet. In addition to the power house, which will be one storey high, there will be a small building for the tuning apparatus and the end of the multiple-tuned antenna. It is probable that an auxiliary studio, connected with the transmitting equipment of the station by telephone lines, will be located in San Francisco.

IMPROVED LOOP AERIAL SYSTEM.

A receiving tube, when directly connected across the tuning condenser of a loop aerial has a voltage impressed on it in two ways: (1) The coil circuit is in tune with the incoming wave, and (2) the coil acts as a capacity area, one end being at or nearer earth potential, since the filament battery is connected to one end of the coil and the small grid to the other, thus giving through the battery a relatively large capacity to earth as compared with the very slight capacity to earth through the small grid, recently wrote F. W. Dunsmore, in "Wireless Age." The voltage induced in the second way is detrimental, as its amplitude is constant regardless of the position of the coil with respect to the approaching wave. To avoid this difficulty an iron-core coupling coil is used. The primary of this is wound in several sections and its ends are connected to the tuning condenser terminals. The secondary is interleaved with the primary and is connected to the grid and filament battery. From the latter a connection is made to the rotating vane of a small balancing condenser whose two plates are connected to the tuning condenser terminals. If necessary, the iron core can also be connected to the same filament battery terminal by a switch. It is claimed that this arrangement distributes the capacity effect more evenly to earth and serves partially to by-pass to earth through the iron-core distributing influences such as motor noises.



Amateur Receiving Stations.

VICTORIA.

Nature of Licence.	Name.	Address.
3 S N	Cuddy, J. A.	Tylden, R.S.O. R.
3 S O	Campbell, G. St.L.	Princes Street, Oakleigh. R.
3 S P	Dear, E. B.	Terang. R.
3 S Q	Bell, W. C.	105 Charles Street, Fitzroy. R.
3 S R	Kerr, W.	28 Durant Street North Brighton. R.
3 S S	Pearce, A. J.	Tristram Street, Seymour. R.
3 S T	McVean, D. E.	24 Mantell Street, Moonee Ponds. R.
3 S U	Fletcher, A. J.	5 Macgowan Avenue, Glenhuntly. R.
3 S V	Smith, J. L. W.	15 Winchester Street, Moonee Ponds. R.
3 S W	Donovan, L. J.	73 Gower Street, Kensington. R.
3 S X	Watt, A.	Maribyrnong Road, Moonee Ponds. R.
3 S Y	Williams, W. S.	219 Grant Street, South Melbourne. R.
3 S Z	Gidney, W. H.	14 Hagelthorne Street, W. Wonthaggi. R.
3 T A	Poole, F. W.	518 Sydney Road, Brunswick. R.
3 T B	Wallace, A. E.	Gordon Street, Northcote South. R.
3 T C	Syme, J. H.	Barker's Road, Kew. R.
3 T D	Syme, J. H.	Frazer Island, Gippsland Lakes. R.
3 T E	Townsend, W. J.	Dank Street, Middle Park. R.
3 T F	Taylor, G. L.	1 Cressy Street, Malvern. R.
3 T G	Hooke, H. P.	23 Webb Street, Fitzroy. R.
3 T H	Holmes, S.	8 Nelson Road, Box Hill. R.
3 T I	Booth, G. H.	Hearle Avenue, Mordialloc. R.
3 T J	Gray, A.	Dresden Street, Heidelberg. R.
3 T K	Friend, A.	74 Lang Street, South Yarra. R.
3 T L	Firminger, R. M.	23 Waverley Road, East Malvern. R.
3 T M	Buck, A. H.	87 Dundas Place, Albert Park. R.
3 T N	Brown, Thomas.	45 Park Street, Moonee Ponds. R.
3 T O	Anderson, H. C.	Hewish Road, Croydon. R.
3 T P	Anderson, I. R.	9 Marshall Avenue, East Kew. R.
3 T Q	McLennan, Chas.	Marnoo. R.
3 T R	Lusty, A. W.	26 Middlesex Road, Surrey Hills. R.
3 T S	Moore, E. L.	131 Errol Street, North Melbourne. R.
3 T T	Manderson, P. H.	80 Albert Street, Footscray. R.
3 T U	Leckie, R. C.	Bamfield Street, Sandringham. R.
3 T V	Dawes, R. W.	20 Moore Street, Brighton. R.
3 T W	Palmer, N. B.	"Dalvui," Terang. R.
3 T X	Vine, F. S.	10 Armadale Road, Armadale. R.
3 T Y	Kelly, A. A. M.	35 Oakwood Avenue, North Brighton. R.
3 T Z	Were, R. W.	15 Martin Street, South Melbourne. R.
3 U A	Rhenben, O.	252 Drummond Street, Carlton. R.
3 UH	Chittock, K. H.	"Fairview," Dalgetty Street, Oaksleigh. R.
3 U C	Roberts, F. W. J.	14 King Street, St. Kilda. R.
3 U D	Burton, H. C. M.	351 Inkerman Street, East St. Kilda. R.
3 U E	Laity, H. F.	43 Williams Road, Windsor. R.
3 U F	Humphrey, S. V.	Albert Street, Kilmore. R.
3 U G	Horsfall, J. B.	59 Broadway, Camberwell. R.
3 U H	Rook, W. H. B.	High Street, East Malvern. R.
3 U J	Knight, J. F. V.	165 Buckingham Street, Richmond. R.
3 U K	Leigh, K.	76 Barnett Street, Kensington. R.
3 U L	Reid, A. H.	"Lanelands," Kingston St., East Malvern. R.
3 U M	Sawyer, S. B.	66 Hardiman Street, Kensington. R.
3 U N	Sayce, E. L.	52 Sussex Street, Middle Brighton. R.
3 U O	Zlehy-Woinurski, A. S.	Otira Road, Caulfield. R.
3 U P	Higginson, E. M.	115 Head Street, Elsternwick. R.
3 U Q	Wells, G. W. L.	Mangan Street, Tongala. R.
3 U R	Fuhrman, A. H.	495 City Road, South Melbourne. R.
3 U S	Holloway, E.	"Vonga," Callantina Street, Hawthorn. R.
3 U T	Byrne, H. L.	Lewis Street, Mordialloc. R.
3 U U	Barber, J. A.	39 Arcona Road, Caulfield. R.
3 U V	Croysdill, P. H. E.	70 Point Nepean Road, Elsternwick. R.
3 U W	Cane, C. J.	17 Park Street, Ivanhoe. R.

THE NEW IMPROVED CUNNINGHAM DETECTOR OR AMPLIFIER VALVE, C299.

Much may be said favouring the use of the above valve. It is a high vacuum tube designed for use as detector or amplifier and contains a new type of Tungsten filament, the characteristics of which are long life, low power consumption and low operation temperature, and consequently low operating cost. The operating data:

Filament volts, 3.

Filament Amperes, .06

Plate Volts, 20-80,

is significant of the small current used in its operation. In management they are less critical than their larger brothers, the C 301 A, but otherwise have all their characteristics. These valves have undergone a number of tests since their arrival here and they are quite up to the good reports that preceded them from America, and we learn from Mr. Basil Cooke, of the Radio Co., Ltd., that exceptionally good results were obtained using single valve without any amplification and stations the other side of our world were clearly heard. Mr. Charles Maclurcan also reports most favourably on these new valves and is able to read 6 BVG working 8ZT, both American amateur stations without using amplication. This valve should, we think, especially appeal to the man who finds difficulty in easily getting his accumulators recharged as these valves may be operated with dry cells at extremely low cost. Three dry cells connected in series are recommended for filament current, and a rheostat of at least 30 ohms resistance. Not more than 40 volts should be used across the plate when in use as detector critical adjustment of plate voltage as not found to be necessary. It is thought by many that this type of valve will eventually take the place of those requiring a larger current for operating them, and that tendency be to use smaller valves. An adaptor for use with this tube is one made by Rembr (No. 3920 of simple and neat design.

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