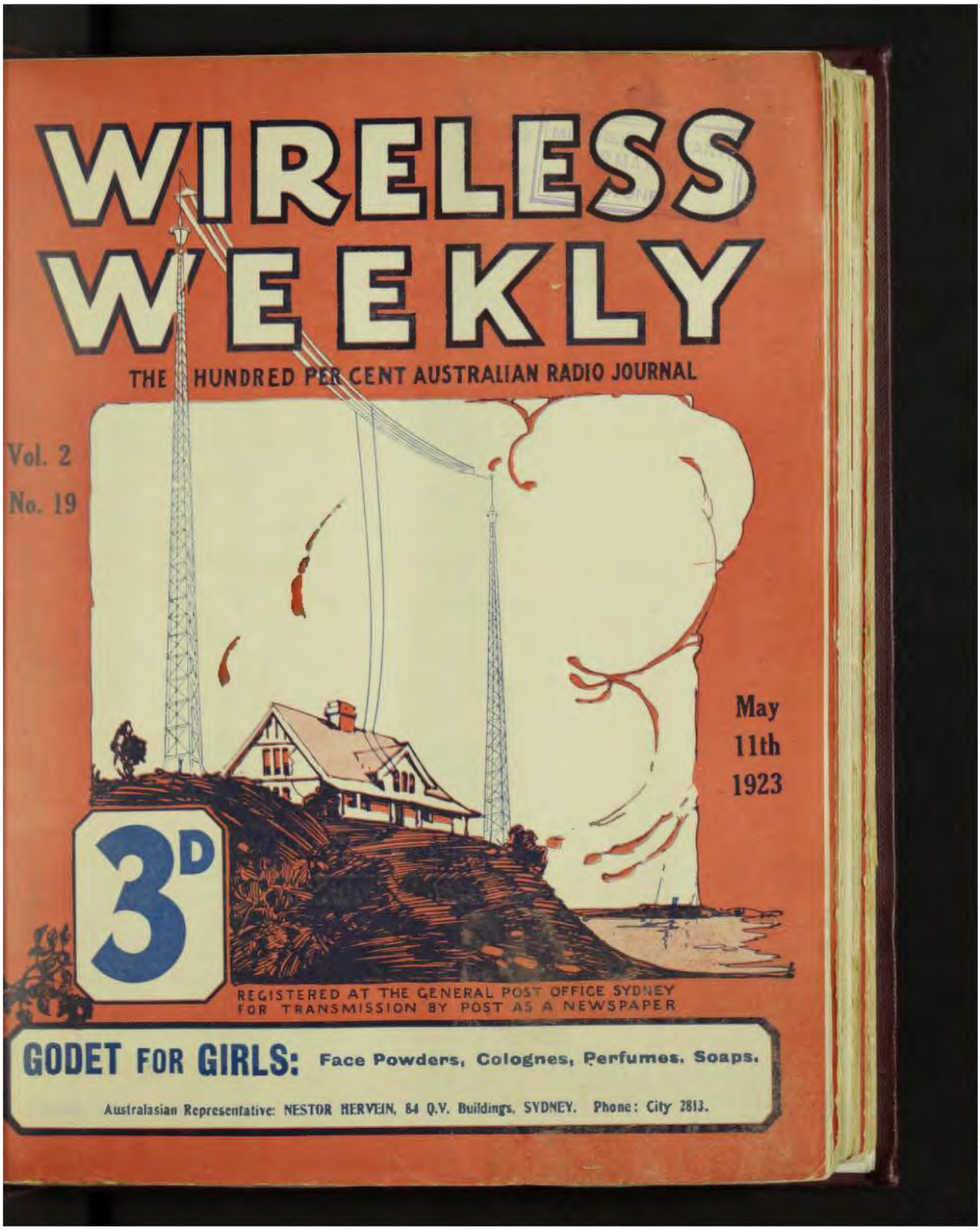
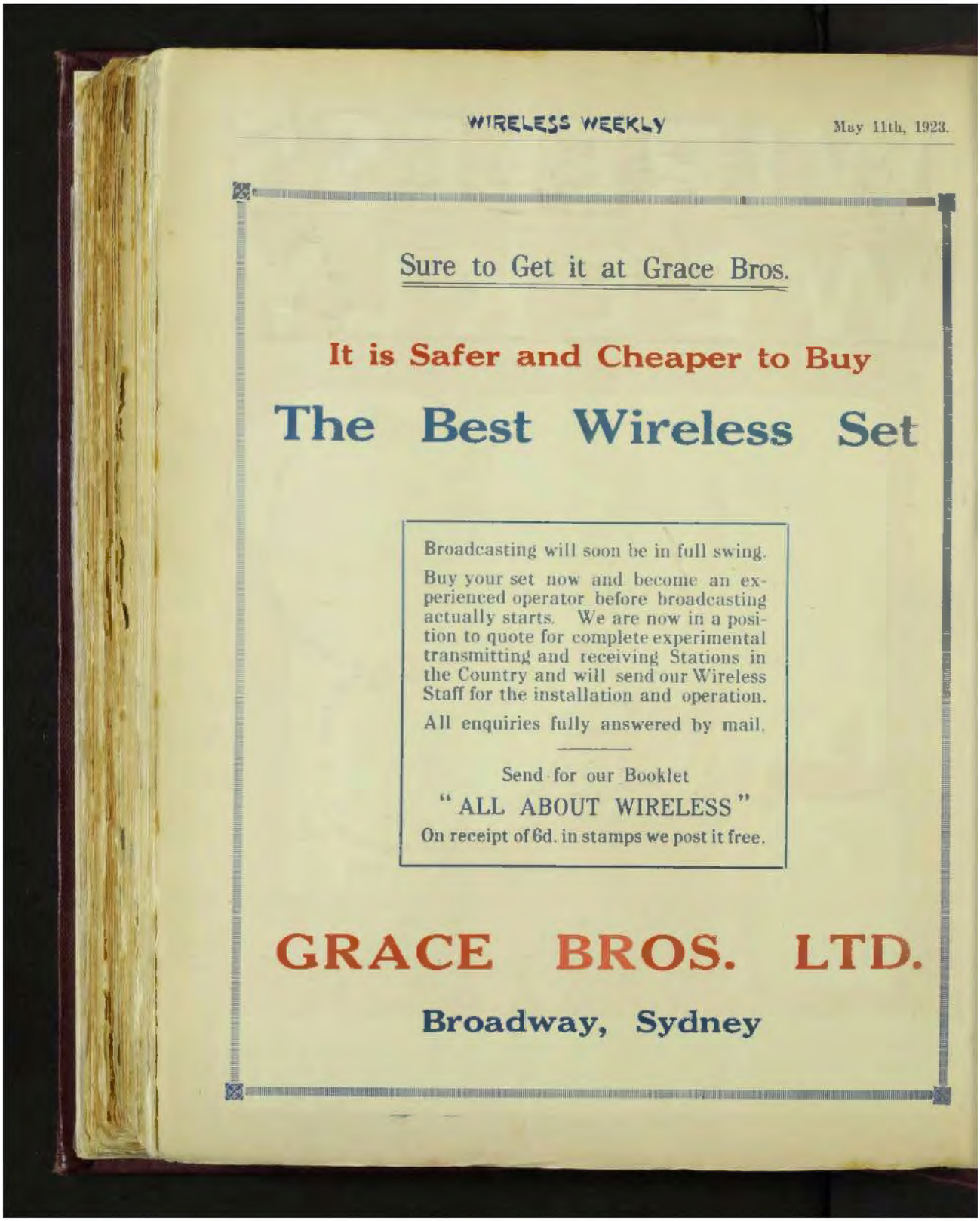




THE WIRELESS WEEKLY
A Journal Devoted to the Interests of Wireless Enthusiasts both Amateur and Professional

Vol. 2. May 11th, 1923. No. 19

A Talk with Wireless Weekly.

Experimental Transmitting

WHAT a wonderful change. Some six months ago we had only one amateur experimental transmitting station, and how we all used to wait for Sunday nights for 2 CM to start. Now any night in the week you can have a choice of at least three sending music in N.S.W., and one or two from other States.

THE CONFERENCE.

We hope by next week that the date of the Broadcasting Conference will be available. There has been quite enough delay in this matter and the sooner a start is made the better. We are glad to see that both the Amateur and the Wireless Dealer have a strong Society in each State to represent them, so feel sure that their interests will be well looked after.

It will be interesting to readers to see what attitude the Amalgamated Wireless Ltd. take at this Conference. It will be remembered that their Acting General Manager, Mr. Wilson, at a public meeting, called for the formation of an association for the best development of wireless in Australia, stated that they had no intention of creating a monopoly or words to that effect.

HON. RADIO INSPECTORS.

The nominations of the different Radio Clubs have been forwarded to Melbourne and appointments should be forthcoming shortly. We feel sure that these Inspectors will have the whole-hearted assistance of every genuine experimenter. Of course four Inspectors for the Metropolitan area is not sufficient, and we hope that should the experiment prove successful, the Department will lose no time in appointing at least one Inspector to each suburb.

TRANS-PACIFIC TESTS.

The Trans-Pacific Tests, commenced on the 1st of the month. We are sorry to hear that such a muddle has been made of the arrangements either in Melbourne or by the American Amateurs. We understand the proper verification of transmitting times, names of stations, etc., will not arrive from America until the middle of the month.

We do hope that after the trouble so many experimenters have gone to, preparing for these tests, that signals will come through, and success be achieved by many.

We do know it can be done, as more than one Amateur has already heard American Amateur Stations on sets prepared for these tests.

"SERVICE?"

Last week I needed 3 valves. Like most people I left it till the end of the week and then called on one of the largest wireless firms in this city. When my turn came I told the salesman the class of valves I needed. He informed me that he had none in the department at the moment, but, that there were plenty in the store, and that if I would wait a few minutes he would have a case opened. This was a position that might occur in any shop, so I decided to wait.

The salesman then went to the house telephone and was put through to the store. From the one side of the conversation I could hear, I gathered that the storeman refused to open the case; the salesman then rung up the department manager, and again from the one-sided conversation I gathered that very little satisfaction was being had from him, probably it being Saturday morning he was too wrapped up in picking a winner, and had not time to think of "Service."

The salesman returned to me and most tactfully tried to smooth the matter over; he said that if I returned a little later he might have them up, but when asked to promise, he said he really could not, he tried hard to make a customer of me and sell me a different class of valve.

Now, what was the cause of this "Bad Service"? The salesman did his best, but the storeman wouldn't help him, the department manager didn't care, and the manager, well———There's the rub—no co-operation.

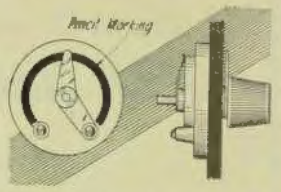
A capable manager, a man that knows his job, a man that department managers, clerks, typists, salesmen, office boys, etc., respect—then we have co-operation which means "SERVICE."

Mr. Fisk, manager of Amalgamated Wireless Ltd. should shortly be back from the Old Country. No doubt he will bring many new and up-to-date ideas which should be of great service to his firm, and to wireless in general.

A VARIABLE GRID LEAK.

Many of us have old rheostats laying around whose resistance wire is either loose or broken. Why not make a variable grid leak out of one of these?

Pry out the fibre ring on which the wire is wound and remove the wire. Then replace the fibre ring and glue it back into place. Next, take a very



fine file and make the surface of the fibre, where the contact lever touches, very smooth, and mark this surface all the way around with a pencil. Connect one end of this marking to a binding post. It will then be seen that we can vary our resistance by just turning the knob located on the other side of the panel.

TIMES WHEN PRINCIPAL AUSTRALIAN STATIONS SEND TIME SIGNALS AND WEATHER REPORTS.

TIME SIGNALS.

(VIM)—Melbourne, noon and midnight.
(VIA)—Adelaide, 12.30 p.m. and 12.30 a.m.

WEATHER REPORTS.

(VIS)—Sydney, 8.30 a.m. and 8.30 p.m.
(VIM)—Melbourne, 9 p.m. and 11.30 p.m.
(VIA)—Adelaide, 9.30 p.m.
(VIB)—Brisbane, 10 p.m.
(VIP)—Perth, 11 p.m.

All times Sydney local time.

Logs of Amateur Transmitting Stations

Call	Strength by audibility meter, max. 1000	Wave length	Hum, by a.d. meter max 1000	Modulation perfect 10	Dist. miles from 2 cm	Name
2BB	210	360	3	8-9	4	Crocker
2JM	70	408	30	8-7	9	Marsden
2LI	34	407	—	8	8	Radio College
2DK	300	395	—	6-7	4	Whitburn
2DS	23	375	9.7	7-8	9	Davis
2IX	500	380	—	8-9	1	Burwood R.C.
2FA	11	360	8.7	4	3½	Colville

All measurements on detector valve.

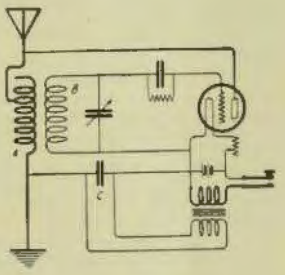
These logs were compiled on Mr. Chas. Maclurean's Station, Strathfield, using 1 detector valve only. Transmitters have to thank Mr. Maclurean for the large amount of time he has devoted to compiling these records. Most of the logging is of recent date, but Mr. Maclurean informs me that readings taken during the last few days show improvements in one or two stations.

A GOOD LOW-POWER TRANSMITTER.

By Everett H. Gibbs.

There has been much demand of late for a cheap but efficient C.W. transmitter from many men about to venture into the amateur transmitting field.

The following is such a transmitter, requiring only a spark coil, an 8-volt storage battery, a transmitting tube rated at five watts, a rheostat, a .001 mfd. grid condenser (mica), a .0005 mfd. variable condenser, and a glass plate condenser to prevent sparking across the base of the tube. The inductances are wound with bell wire. The circuit diagram is shown in Fig. 1.



The inductance A is 25 turns of No. 18 wire on a tube 3 inches in diameter, and the inductance B, the grid-tickler coil, is 20 turns of No. 18 wire on a tube 4 inches in diameter. The coupling between these coils is not critical; simply place one inside the other.

C is the condenser, across the secondary of the spark coil to prevent sparking across the base of the tube.

This circuit was used because it is a constant oscillator and is so easily tuned to the legal 200 meters.

TRANS-PACIFIC TESTS.

A prize of £3/3/- donated by Continental Radiolo for most complete log of signals on least number of valves was omitted from prize list published last week.

Considerations Governing the Choice of a Receiving Circuit

WHAT SORT OF A CIRCUIT SHOULD ONE USE?

When a student or experimenter realises how many thousands of circuits may be arranged with a number of three electrode valves, it is little wonder that he frequently asks for guidance as to which of these multitudinous circuits he is to use.

The advice he will get will probably vary a great deal. The question when put to the average experimenter of experience will usually be met evasively. The number of those who have experimented with practically every circuit is very small, and the beginner is therefore handicapped at the start by hearing excellent accounts of different kinds of circuits which really in no way resemble each other.

SOME PRELIMINARY QUESTIONS TO BE CONSIDERED.

I am, perhaps, a little ambitious myself in putting forward some suggestions regarding the choice of circuits. If I were asked what is the best class of valve circuit using one, two, three, four, five, or six valves, I would probably first reply by asking the following questions:—

(1) Do you desire to receive signals which are initially weak, such as Trans-Pacific signals, or signals which are initially loud, such as those from the Cavite.
(2) What is the main object of the reception? Is it to produce very loud signals, or will it do if clearly readable signals are obtained?
(3) Is it necessary for the receiver to be absolutely reliable?
(4) How many valves are to be used?
(5) Is a loud-speaker to be employed?
(6) Is it desired to lessen interference from other stations?
(7) It is desired to eliminate atmospherics?
(8) Does a certain amount of distortion matter?
(9) What are the experimenter's resources?
(10) Is the set to be made up of bought component parts, or made entirely by the experimenter?
(11) Is the set to be rapidly tuneable or not?
(12) Are standard circuits to be employed or not?
(13) Is the circuit to work on a narrow band of wave-lengths or not?
(14) Are continuous waves to be received?

Let us examine these questions carefully and see what effect the answers have on the most suitable design of a circuit. Are the signals to be received initially weak or strong? If the answer is "weak," then I recommend the use of one or more stages of high-frequency amplification, as otherwise the signals will not effectively operate a detector. If the initial signals are strong there is no particular point in amplifying at high-frequency, unless exceedingly loud results are required, and then efficient amplification cannot be obtained alone by low-frequency stages; high-frequency stages have to be introduced in order to get the loudest effects. This really brings us on to question (2): Are very loud signals desired?

Assuming that very loud signals are not desired, but that the incoming signals are strong, then a rectifier followed by one or more low-frequency amplifying valves is all that is required. A crystal detector followed by a two-valve note magnifier will do excellently for receiving broadcasting signals or other strong signals over a short range, and, moreover, the use of two or more valves will enable a loud-speaker to be effectively operated. A three-electrode valve may be used as a simple detector, followed by a low-frequency amplifier, or the first valve may have reaction introduced to strengthen the incoming signals. This, of course, cannot be done on broadcast wave-lengths during the broadcasting hours. The question of whether very loud signals are desired is an important one, as it chiefly governs the number of valves to be used.

If the final signals are to be very loud and the incoming signals are very weak, it will be obvious that several stages of high-frequency amplification followed by several stages of low-frequency amplification, after rectification, will be required. If, on the other hand, the incoming signals are strong and sufficient, final strength is obtainable by the use of two or, at the most, three valves amplifying at low frequency, then high-frequency ampli-

fication may be eliminated altogether. I cannot advise more than three stages of low-frequency amplification. Trouble is usually experienced when more than three valves are used, owing to self-oscillation at audible frequencies. Personally, I think two stages of note amplification should not be exceeded under ordinary conditions.

Is it necessary for the receiver to be absolutely reliable? If the answer is "No," then a crystal detector may be employed with advantage as the rectifier. If absolute reliability is required, then it is necessary to employ a valve as the detector.

How many vales are to be used? This, one would imagine, would be a perfectly straightforward question, but many experimenters prefer to say that they want to receive Annapolis, The Hague, Paris, Rome, or some other station, and then proceed to inquire how many valves are necessary. My own recommendation is that not less than three valves should be employed for general reception, and not less than five if the reception is to be over long distances, such as have to be spanned when receiving American stations. In the case of the amateur who is limited as regards means, or who desires to try simpler circuits as a start, one or two valves may be employed.

Is a loud-speaker to be employed? If a loud-speaker is to be used, then a two-stage low-frequency amplifier is an almost unavoidable necessity, especially when using a Magnavox, or similar loud-speaker, which only operates off fairly heavy currents. Loud-speakers are very rarely worked off a circuit comprising a few stages of high-frequency amplification and a detector.

Is it desired to lessen interference from other stations? If the answer is "No," not particularly, then the circuit recommended will be a relatively simple one. Direct aerial coupling may be employed as distinct from an oscillation transformer, having two separate windings. If, however, other stations are to be cut out, then an initial oscillation transformer is to be recommended, together with tuned intervalve transformers between the high-frequency amplifying valves. Both plate and grid circuits should be tuned to the desired wavelength, and the coupling kept very weak. Reaction from the last high-frequency valve to the first of the series will improve the selectivity of all the tuned circuits.

Is it desired to eliminate atmospherics? The answer to this question will almost invariably be "No." The elimination of atmospherics is the greatest problem in wireless to-day, and only very few would care to adopt special precautions for lessening atmospherics.

Does a certain amount of distortion matter? If spark or C.W. signals are to be received the answer is "No." If speech is to be received the answer will probably be "Yes." In the latter case, it is most emphatically desirable to keep to high-frequency amplification as much as possible. The more iron in the circuit the greater the distortion. Only inter-valve iron-core transformers of thoroughly sound design should be employed. The steady grid potentials of the low-frequency amplifying valves should preferably be adjustable and should be negative, care being taken, however, that the representative point on the characteristic curve does not travel off the steep straight portion. Reaction invariably introduces a certain amount of distortion, although it is not very noticeable, except when signals are amplified to a great extent. Reaction becomes troublesome as regards distortion if carried to excess. The moral is not to use too much reaction.

Distortion is also caused by the inherent tendency of low frequency amplifiers to oscillate, and distortion is therefore prevented by lessening the tendency of the amplifier to oscillate.

What are the experimenter's resources? If the experimenter's purse is well filled, considerations of this sort need not be a source of worry. On the other hand, the financial question is, in many cases, a distinctly serious one. This will govern the number of valves in use, and will also usually limit the number of variable condensers available. High frequency amplification is very much cheaper than low-frequency amplification, unless the low-frequency transformers are made by the experimenter himself. This class of experimenter will generally prefer to use variometers for tuning purposes, rather than variable condensers, and he will cut down low-frequency amplification to a minimum, making up signal strength by a high-frequency amplification.

Is the set to be made up of bought component parts, or made entirely

Continued on page 14

MAKE YOUR OWN

An Easily Constructed Variometer.

The following article covers a concise description of a variometer that is unusually efficient and is very easy to make.

The materials necessary are as follows: 1 cigar box; 1 dowel, size 5-8 in. in diameter, 36 in. long; 2 doz. brass screws or brass brads; 1 brass shaft, 6 in. long, ¼ in. diameter; ½ lb. No. 20 cotton covered wire.

Fig. 1 shows the front and back pieces. Two pieces of the cigar box are tacked together, and cut out as shown. This can be done either by knife or by a small scroll saw.

Fig. 2 shows the front and rear of the rotor which can be cut out together. It is better that both pieces be cut together, as a more accurate job can be done.

Six dowels are cut, each 2¼ in., or slightly more for the rotor.

Six dowels are cut, each 3¼ in. or slightly less for the frame.

The best procedure is to make the rotor dowels first and after the rotor is assembled the frame dowels should be made to allow just enough clearance.

In assembling this variometer, only brass screws or nails should be used.

The only difficult thing to make is the shaft. I made one variometer, using a wooden shaft, and found that it was not sensitive enough as it did not stay exactly in place. Also the wood shaft would hang at times. My other variometers have the brass shaft. It is necessary to drill a hole ¼ in. or so in diameter in one end of the shaft for about ¾ in. in depth, just to get inside of the rotor as shown by letter D in Fig. 3. Then a hole D1 is drilled through the side of the hole D.

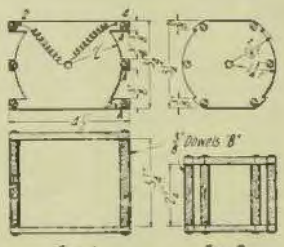


Fig 1 Fig 2

A piece of brass E, Fig. 3, is soldered to the shaft and two holes F and F1, are drilled in this strip. One end of the rotor is then screwed to the shaft by means of screws F and F1, being longer and projecting through the wood of the rotor. This projection is made to hit against a piece of brass G, that is nailed on the front frame to limit the rotation of the rotor.

The rotor is first wired. The wire is led in through hole D1D. Fig. 3, and then wound continuously around the rotor, making 30 turns on each half. It will be necessary to start the wiring from each end and join the wires in the middle. Both leads come through the hole D1D.

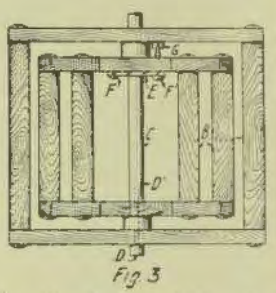


Fig 3

The frame is wired as follows: Drill a small hole through the dowel at point 1 Fig. 3, and at point 5, Fig. 1, and run the end of the wire through this hole. Knot one end of it and wire one-half of the frame with 30 turns of wire.

Next drill a similar hole in dowel at point 2, Fig. 3, on side 3, Fig. 1, and start winding from there. Solder the two wires in the centre. Be careful in winding the two halves that the wire is wound in the same direction. At point 5, Fig. 1 put one binding post and solder one lead to it. At point 4 put another binding post and coil one of the leads from the rotor and solder. Coil the other lead of the rotor and bring it down to point 3, and bring the other frame lead from point 2 around to point 3 and solder them together to the brass screw.

In making this variometer the clearance should be as little as possible and a very excellent variometer, both in appearance and efficiency, can thus be made. The wood should be given one or two coats of varnish to keep it from warping.

THIS ARTICLE PICTURES CONDENSER AS WAITING ROOM FOR ELECTRONS.

(We all know what a condenser is—two sets of metal plates insulated from one another. But what is it in terms of electrons—those tiny specks of negative electricity which are so useful in vacuum tubes? The answer to this question is given in the following article prepared by John Mills, former professor, author and engineer of the Western Electric Company, from his explanation of a condenser given his own son and published in his recent book, "Letters from a Radio Engineer to His Son.")

A condenser is merely a gap in an otherwise conducting circuit. It's a gap across which electrons cannot pass, so that if there is electro-motive force in the circuit electrons will be very plentiful on one side of the gap and scarce on the other side.

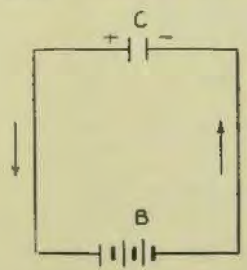


FIG-1

If there are too many electrons waiting beside the gap there must be room for them. For that reason we usually provide waiting rooms for the electrons on each side of the gap. Metal plates or sheets of foil serve nicely for this purpose.

Look at Fig. 1. You see a battery and a circuit which would be conducting except for the gap at C. On each side of the gap there is a sheet of metal. The metal sheets may be separated by air or mica, or paraffined paper. The combination of gap, plates and whatever is between, provided it is not conducting is called a condenser.

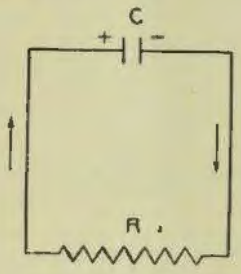


FIG-2

WHEN WE CONNECT A BATTERY.

Let us see what happens when we connect a battery to a condenser as in the figure. The positive terminal of the battery calls electrons from one plate to the condenser while the negative battery terminal drives electrons away from itself toward the other plate of the condenser. One plate of the condenser, therefore, becomes positive, while the other plate becomes negative.

This action of the battery will go on until there are so many electrons in the negative plate of the condenser that they prevent the battery from adding any more electrons to that plate. The positive plate of the battery calls electrons away from the condenser plate which is making positive, until so many electrons have left the protons that the atoms of the plate are calling for the electrons to stay home just as loudly and effectively as the positive battery-terminal is calling them away.

When both these conditions are reached—and they are both reached at the same time—then the battery has to stop driving electrons around the circuit. The battery has not enough electro-motive force to drive any more electrons. Why? Because the condenser has now just enough electro-motive force with which to oppose the battery.

WHAT IS THE CHARGING CURRENT?

We say that the battery sends a "charging current" around its circuit and "charges the condenser" until it has the same electromotive force. When the battery is first connected to the condenser there is lots of space in the waiting rooms, so there is a great rush or surge of electrons into one plate and away from the other.

Just at this instant the charging current is large, but it decreases rapidly, for the moment the electrons start to pile up on one plate of the condenser and to leave the other, an electro-motive force builds up on the condenser. This electro-motive force, of course, opposes that of the battery so that the net electromotive force acting to move electrons round the circuit is no longer that of the battery, but is the difference between the electromotive force of the battery and that of the condenser.

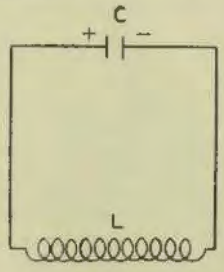


FIG-3

WHY THE CURRENT STOPS.

And so, with each added electron, the electromotive force of the condenser increases until finally it is just equal to that of the battery and there is no net electromotive force to act.

Continued on Page 10

Why and How of Electrons.

JOHN MILLS, ELECTRICAL ENGINEER, MAKES PUZZLES SEEM LESS DEEP.

(The radio enthusiast of today speaks familiarly of electrons because he knows how they behave in a vacuum tube detector. But when it comes to the rest of the radio hook-up—to the coils and the condensers—he loses track of the electrons although they are there just as well as in his detector and amplifier tubes. In the following article prepared by John Mills, a former college professor, who has devoted much time to radio in the research laboratories of the Western Electric Company, the action of the electrons is explained in the same manner in which the author started his own son in radio with his new book, "Letters from a Radio Engineer to His Son.")

By JOHN MILLS
(Engineer of the Western Electric Company).

What is a radio set? Wires, tinfoil, glass, sheets of mica, metal and wood. Where does it get its ability to work—that is, where does the "energy" come from which runs the set? From batteries or dynamos. That much you know already, but what is the real reason that you can use copper wires, metal plates, audions, crystals and batteries to send messages and receive them?

The reason is that all these things are made of little specks, too tiny ever to see, which we might call specks of electricity. There are only two kinds of specks, and we had better give them the right names at once to save time.

One kind of speck is called "electron" and the other kind "proton." How do they differ? They probably differ in size, but we don't yet know so very much about their sizes. They differ in laziness a great deal. One is about 1,845 times as lazy as the other. That is, it has eighteen hundred and forty-five times as much inertia as the other. It is harder to get it started, but it is just as much harder to get it to stop after once started, or to change its direction and go a different direction. The proton has the larger inertia. It is the electron which is the easier to start or stop.

DIFFER IN THEIR ACTIONS.

How else do they differ? They differ in their actions. Protons don't like to associate with other protons, but take quite keenly to electrons—they go with protons, but they won't associate with each other. An electron always likes to be close to a proton. Two is company when one is an electron and the other a proton, but three is a crowd always.

It doesn't make any difference to a proton what electron it is keeping company with provided it is an electron and not another proton. All electrons are alike as far as we can tell, and so are all protons. That means that all the stuff or matter of our world is made up of two kinds of building blocks and the blocks of each kind are just alike.

ATOMS AND MOLECULES.

Whenever there is a group of protons and electrons playing together we have what we call an "atom." There are about ninety different games which electrons and protons can play, that is ninety different kinds of atoms. These games differ in the number of electrons and protons who play and in the way they arrange themselves. Larger games can be formed if a number of atoms join together.

Then there is a "molecule." Of molecules there are as many kinds as there are different substances in the world. It takes a lot of molecules to form something big enough to see, for even the largest molecule, that of starch, is much too small to be seen by itself with the best possible microscope.

HYDROGEN AND HELIUM.

Now, the simplest form of a game that can be played and the one with the smallest number of electrons and protons is that played by a single proton and a single electron. I don't know just how it is played, but I should guess that they sort of chase each other around in circles. At any rate, I do know that the atom is called "hydrogen," is formed by just one proton and one electron. Suppose they were magnified until they were as large as the moon and the earth. They then would be just about as far apart, but the smaller one would be the proton.

All the other possible kinds of groups are more complicated. The next simplest is that of the atom of helium. Helium is a gas of which small quantities are obtained from certain oil wells, and there isn't very much of it to be obtained. It is an inert gas, as we call it,

Continued on Page 10

WIRELESS HUMOUR.

RADIO NURSERY RHYMES.

Mary had a wireless set,
(Got tired of keeping lambs),
Her phones were of the Baldwin type,
With mica diaphragms.
She took it to the school one day,
And moved a little slider,
And in a twinkling of an eye
The kids were all beside her.
They smashed the valves: and all the parts,
Were scattered on the floor;
Now Mary's given wireless up,
And keeps a lamb once more.

Jack and Jill went up the hill
To build a wireless station,
According to the both of them,
'Twould cause a big sensation.
The sending gear cost quite a sum,
The masts were like young spires,
And Jack and Jill quite lost their way,
Amongst the maze of wires.
Then turned a switch—the main fuse blew
'Twas not a scene for laughter,
For Jack and Jill shot down that hill,
And the gear came tumbling after.

R. H. E. Channon.

"SHOCKED" THE TEACHER

School Teacher: "Now, Tommy, you should not say 'what' when addressing me. Write the word 'what' a thousand times!"

Tommy (radio enthusiast) handed her the slip of paper, on which was written the single word, Kilowatt.

Why didn't Milli Henry go over to play Mrs. Wheatstone Bridge?

Because she wasn't at home to Receiver.

Why was Miss Solenoid?

Because she didn't want to let Doctor Morse Sounder.

Why wouldn't Mr. Ampere Meter?

Because he had to see Meg Ohm, and meet Miss Transformer.

When did Milli Volt become engaged?

When she let Mr. A. C. Ringer.

A Shore Station Undamped

WIRELESS WILLIE'S WEEKLY WARBLE

Dear Experimenters,

Should you wish to ask 2CM any wireless questions, do so before 24th inst., and save expense. After that date you will have to pay 2/6 entrance, 6d. for skates, and if you can wade through the crowd of "Fluffy Ruffles" who throng round this excellent skater, you may be successful.

Mr. Colville, of Colville-Moore, showed me, a few days back, a dinky little valve control panel, which they are putting on the market. It is only 5 1-8 x 3 1-4 inches, in cast bakelite, with metal plated fittings. Have a look at it next time you pass.

Mr. Cooke, of Radio Company has a few Australian made wave meters in his office. They are the goods, believe me.

In regard to our offer for subscriptions, do not wait till you have collected a number so as to get a large order, send each one in as you get it and we will credit you and pay on your demand.

Radio House, George Street, will shortly be moving to their new and more up to date premises a few doors below Goulburn Street.

Last week's 2s. 6d. for best "bit of humour" was won by Mr. R. H. E. Channon.

The Broadcasting Conference will be held shortly. W.W. will be there with a bundle of questions to ask on behalf of the experimenter, etc. But two heads are better than one, so send along any questions you would like asked.

Is the Trans-Pacific Test a

Continued on Page 12

Continued from Page 8

because it won't burn or combine with anything else. It doesn't care to enter into the larger games of molecular groups. It is satisfied to be as it is, so that it is not of much use in chemistry because you can't make anything else out of it.

This helium atom is made up of four electrons and four protons. Right at the centre there is a small, closely crowded group, which contains all the protons and two of the electrons. The other two electrons play around quite a little way from the inner group.

LIKE OUR SOLAR SYSTEM.

It will make our explanations easier if we learn to call this inner group "the nucleus" of the atom. It is the centre of the atom, and the other two electrons play around about it just as the earth and Mars and the other planets play or revolve about the sun as a centre. That is why we shall call these two electrons "planetary electrons."

In each atom of copper there are twenty-nine electrons playing around the nucleus. The nucleus itself is a little inner group of electrons and protons, but there are more protons than electrons in it, twenty-nine more in fact. In an atom there is always an extra proton in the nucleus for each planetary electron. That makes the total number of protons and electrons the same.

Continued from Page 7

What would happen if we should then disconnect the battery? The condenser would be left with its extra electrons in the negative plate and with its positive plate lacking the same number of electrons. That is, the condenser would be left charged and its electromotive force would be of the same number of volts as the battery.

THE ELECTRONS RUSH HOME.

Now, suppose we connect a short wire between the plates of the condenser as in Figure 2. The electrons rush home from the negative to the positive plate. As fast as they get home the electromotive force decreases. When they are all back the electromotive force has been reduced to zero.

Sometimes we say that "the condenser discharges." The "discharge current" starts with a rush the moment the connecting path is offered between the two plates. The electromotive force of the condenser falls, the discharge current grows smaller, and in a very short time the condenser is completely discharged.

That's what happens when there is a short conducting path for the discharge current. If that were all that could happen I doubt if there would be any radio communication to-day. But if we connect a coil of wire between two plates of a charged condenser, as in Figure 3, then something of great interest happens. To understand you must know something more about electron streams in coils.

OUR WIRELESSES COLUMNS.

Wirelesses.

Pupils of the Croydon Radio School, run by Mr. Chas. W. Slade, are creating records. Two pupils after having only ten ordinary lessons passed the test for valve license with 98 per cent. and 93 per cent. proficiency.

Those who have heard Mr. Jack Davis (2DF) lately, will notice the remarkable improvement since he started transmitting a few weeks back. Modulation vastly improved. Hum practically eliminated.

Mr. Marsden can be heard nearly every night now testing, and though still almost unreadable, and with tremendous hum —every night's test shows an improvement.

Mr. Colville should be going strong again in a few days. His set is now properly mounted on a panel and looks a credit to the firm of Colville-Moore, for Australian workmanship.

Burwood Radio Club.

The Hon. Secretary, Burwood Radio Club, writes:—

With reference to an article published in your paper, dated 27th instant, we would be glad if you would publish the following report in your next issue, as some misunderstanding has arisen.

This Club has received numerous reports from Melbourne amateurs, stating that music and speech were received regularly from our station (2IX), modulation being reported excellent in all cases. Two of these stations reported speech and music exceedingly loud.

Different powers were used during the transmissions, which were not previously arranged, and at no time did it exceed fifteen watts (input).

The Club is pleased to announce that the hum has been eliminated as far as is practicable; using one valve, no reading can be obtained on an "audibility meter," at a distance of one mile.

Wishing "Wireless Weekly" every success.

SHIPS YOU SHOULD HEAR THIS WEEK.

Nearing or departing from our Coast.

AUSTRALMOUNT	VZY
CALULU	VZV
CITY OF SHANGHAI	EMM
DURHAM	XIB
ERROLL	ERZ
ESSEX	GXE
KHYBER	MCE
MAKURA	GDZV
MAMARI	GKE
MORELLA	GBKJ
MASANIELLO	IEW
NERBUDDA	GBML
PALMA	MKD
PORT VICTOR	EQD
SONOMA	WHM
ST. ALBINS	MGG
TAIYUAN	GVBF
VICTORIA	GVBD
HOBSON'S BAY	VZBW
MARSINA	VKZ
PACIFIQUE	FNW

Continued from page 9

fares? I know some who have already dropped out, as they say sitting up from 10 p.m. till daylight for a number of nights is too much for them.

If you want some real good British apparatus, try the Burgin Electric Co.

Yours weekly,

W. W.

Broadcasting Conference

will be held in

Melbourne

on

Empire Day

24th May

HANS HASN'T MUCH CHANCE.

Up to the time of writing only one station in Berlin has obtained a broadcasting licence. There are several receiving stations, but mainly for business purposes only, and the lone broadcasting station deals solely with market and exchange quotations and fluctuations. Its service is confined to subscribers, who pay for a licence to erect a receiving apparatus, also a monthly subscription varying from one thousand to seven thousand five hundred marks. Subscribers can either do this, or else hire a receiving set from the Post Office Department, which costs them 2,500 marks (about 10/-) every month.

Save to men of science, engineers and professional operators and experimenters, radio telephony is, in Berlin at least, an unknown quantity. Therefore, the demand for instruments is so small that it does not warrant their manufacture in very large quantities.

Our Competition Column.

An order for 2/6 will be presented to the first correct solution received for each competition in these columns. The judgment of the Editor shall be final in each and every case.

(1)

By measurement the aerial current of a transmitter is 1 amp. Assume the transmitter is radiating 11 watts. By the ordinary Power Equation (P. V.A.) the voltage in the aerial should be only 11 volts. Actually it is found to be 1000 volts. Explain reason.

(2)

These two are making the same remark. What is it?

(3)

Presume a cliff 1000 feet high over the sea. A bullet is fired from a rifle lying flat on the cliff edge. At the same time as the bullet leaves the nozzle a weight the same size and weight drops from the cliff's edge. Which would reach the water first, bullet or weight?

(4)

In writing a verse of 2 lines above the 10 Commandments on a tablet, a stonemason could not make one letter, so left it out in a number of places. These are the letters he engraved:

PRSVRYPRFTMN,
VRKPTHSPRCPTSTN.

How did the verse read?

So as to allow our country and Interstate readers to compete, competitions will not close until the Friday following each issue (1 week). Answers and winners' names will be published in W.W. on the Friday following the closing of each competition.

FROM OUT THE DEPTHS.

Radio has yet another new feat to its credit. Experiments made at the Baggeridge Colliery (England), resulted in successful communication between the deepest section of the working (some 700 yards down) to the mouth of the mine. For receiving, a three-valve set was used, and the aerial made by attaching a wire from a 100 ft. steel hoisting gear to the girder of a railway bridge, the ground wire being clamped to the lower part of a railway rail. At first the transmitter was installed in the steel cage (elevator) in the shaft, but this was found impracticable owing to "screening." So it was taken into the actual workings of the mine, its ground wire being a cable laid down on the floor, and its aerial being a wire slung on props. Signals were easily audible at the mine at variable distances down the shaft, and it was found that the lower the transmission, the clearer the reception became. There will always be mining disasters, but as radio, unlike ordinary telephony, cannot be put out of order by an explosion, a fall of rock, or "gas," a means of communication for entombed miners with the outer world is now practically a certainty. Thus that popular classic, "Don't go down the mine, Daddy!" will now become obsolete.

BALMAIN DISTRICT RADIO SOCIETY.

At the meeting of the Balmain District Radio Society, on Tuesday, May 1st, at the Society's Room, quite a large amount of business was put through.

The principal business was in connection with the Society's transmitting apparatus, the whole of which has been approved by the Postmaster-General's Department, and it is expected to put the apparatus in operation within two or three weeks on a wave-length of 400 metres.

Various pieces of apparatus belonging to members of the Society were on exhibition, and a discussion on the advantages or disadvantages of various types of transmitters and receivers was also gone into.

Mr. D. Dickins, of the Technical Committee, had a honeycomb coil winding machine on exhibition, and he also gave many useful hints to the members on honeycomb coil construction.

The whole of the machine, including level gears, cans, rotors, bearing, bed, etc., were made by Mr. Dickins, who has a first-class workshop and up-to-date in every respect.

Mr. Preston gave members a very interesting lecture on variometers and vario-coupler construction, and for the benefit of beginners he used many analogies which enabled them to follow his lecture.

It would also be interesting to other experimenters to know that Mr. Lancer, of Balmain, receives telephony from Mr. C. Maclurcan and many other amateurs on crystal.

The membership is showing signs of further increases.

Mr. P. G. Stephen, who is now well on the road to recovery again, will be in charge of any and all tests on behalf of the Society. Any experimenter of the Society desirous of conducting tests per radio with the Society, can get all particulars from the Honorary Secretary.

All inquiries regarding activities of the society can be had from Mr. F. W. Riccord, 77 Grove Street, Balmain.

MARRICKVILLE AND DISTRICT RADIO CLUB.

The usual meeting of the above Club was held in the Congregational Church Hall, Perry Street, Marrickville, on Monday, the 1st May.

Two new members were enrolled.

After the business of the meeting had been finalised, a discussion was entered into regarding the 'Discovery' made by Mr. Crey, a junior member, who claimed that by adding a second circuit comprising a honeycomb coil of 35 layers of No. 26 wire, and a crystal detector amplification of signals could be obtained.

Many theories were advanced to account for this remarkable occurrence, but each and everyone fell very far short of what appears to be a correct solution.

We will publish next week this circuit which may be of interest to many other amateurs, who wish to go further in the matter.

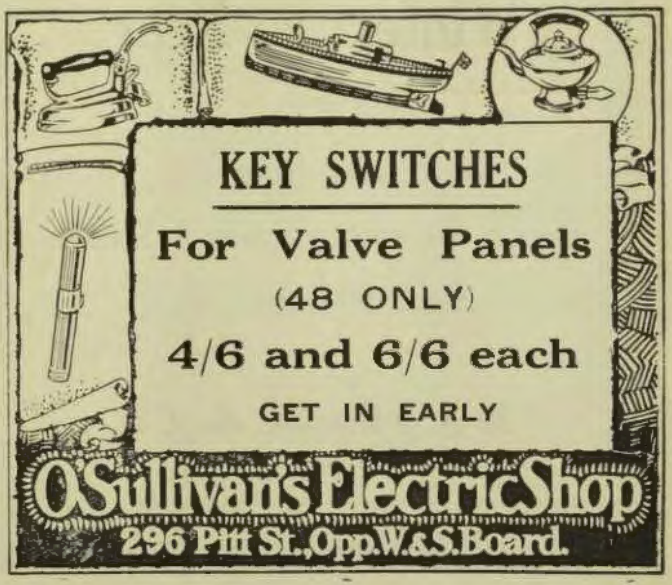
The publicity officer informed the meeting that Mr. A. J. Connelly would lecture to them on Monday, the 14th May, and the subject would be "The proper control of valves."

Intending members are asked to communicate with the Secretary, Mr. R. G. Ellis, Park Road, Marrickville.

LEICHHARDT AND DISTRICT RADIO CLUB.

Members of the Leichhardt and District Radio Society held their eighth business meeting on Tuesday, May 1st, when three new members were elected, bringing the total to 41. Business most engaging the attention of members at the present time is the erection of an aerial, and the installation of a set, and when completed, the former will be a very

---



substantial and serviceable construction. The Society has been fortunate in securing the services of an experienced ships' rigger to supervise the work of erection, and it is safe to predict that, once in position, nothing short of a hurricane will shift the masts from the positions in which they are put. It has yet to be decided what form the receiving set will take, but the technical committee has this matter well in hand, and may be relied upon to provide for the members the best that the means at their disposal will allow.

The Society meets every Tuesday night at the club room, 176 Johnston St., Annandale, and all inquiries should be addressed to the Hon. Secretary, Mr. W. J. Zech, 145 Booth St., Annandale.

WESTERN SUBURBS AMATEUR WIRELESS ASSOCIATION.

Quite recently the Western Suburbs Amateur Wireless Association gave a demonstration of the reception of telephony at the flower show in the Auburn Town Hall. It proved a great success, the music sent by 2IX (Burwood Radio Club) and numerous other transmitters being heard, per medium of the Magnavox, all over the hall. The set used was a three valve set built by the club.

The meeting night of the club is every Wednesday at the Club rooms, Park Road, Auburn, and all intending members seeking information are requested to get in touch with Mr. T. V. Gow, "Gleanoy," Dudley St., Lidcombe, Hon. Sec.

Continued from Page 5

by the experimenter? Personally, I recommend the purchase of component parts, the connecting up of them being left to the experimentalist. If the amateur makes his own set, then let him make his own component parts rather than make any special complete set.

Is the set to be rapidly tuneable or not? This is another vital question to be answered before advice can be given. Some experimenters like to have a set with which it is possible to search the whole band of existing wavelengths from, say, 150 metres to 25,000 metres. Such a set, of course, is useful for entertaining friends and impressing them with the wonders of wireless.

This in my opinion, is not wireless experimenting, but such a set can be extremely useful as a sort of stand-by to see what stations are working. The trouble with such a set, however, is usually that several stations may be heard on any given adjustment. On long wave-lengths, for example, the interfering continuous wave signals often cause a mere jumble of differently pitched notes. This class of circuit used to be favoured to a much greater extent than it is at present. A saner view, however, is now being taken of experimental wireless; and those engaged in this work, while still anxious to have a set applicable to all ranges of wavelengths, do not forget that selectivity and efficient reception are factors of primary importance. Interchangeable coils have become more popular, and may be strongly recommended, although effective variable intervalve high-frequency transformers of good design may be purchased or made.

For general reception there is nothing to beat the simple reaction detector followed by one, two or three low-frequency amplifying valves, the reaction being variable. There is simply one main adjustment, but the selectivity is appalling. Greatly improved results may be obtained by having a separate aerial circuit, which, however, immediately introduces a new variable. This, however, is nearly always an advantage. If the experimenter is going to specialise in a given band of wave lengths, say the band on which the Trans-Pacific stations work, he cannot do better than use tuned intervalve transformers, tuned by means of condensers across each winding, the coupling, however, being kept very loose. The trouble here, of course, is that about a dozen adjustments

will be necessary. The circuits are expensive to construct, but the results obtained are always worth the trouble.

Then there is the question of the local oscillator for heterodyne reception. I am, myself, strongly in favour of employing a separate local oscillator for all continuous wave reception, reaction being employed whenever possible. An exception might be made in the case of very low wavelengths, when a self-heterodyne circuit is generally as convenient as anything else, and does not require an additional valve.

Are standard circuits to be employed or not? The reply to this will largely govern the actions of an experimenter of an inquiring turn of mind. The inquiring experimenter will want to try all kinds of freak circuits which he has read about, or possibly has thought out himself. Work of this kind is of the greatest importance, and every experimenter should realise that he has the opportunity of inventing something new. My advice to the beginner, however, is to keep off freak or unusual circuits. Most of these, it will be found, are freakish methods of obtaining reaction or doing in a complicated way what may be done in a straightforward manner. Many, no doubt, will have found that by touching certain parts of their circuit, or by connecting a condenser here, or a resistance there, louder signals may be obtained. This, in 99 cases out of a hundred, will be because a certain amount of reaction is introduced, and if this reaction is put into the circuit in one of the well-known standard ways equally good results may be obtained.

Is the circuit to work on a narrow band of wavelengths or not? This matter has already been discussed fairly fully above, but there are one or two points of special importance. If a narrow band of wavelengths is to be covered, then fixed inductances with variable condensers may be employed throughout, and the experimenter may easily make these inductances himself. My advice to the experimenter whose experience is limited is to use a fairly large variable condenser, not less than 0.001 uF., unless a number of tappings are employed, in which case a capacity of 0.0005 uF. may be used. The advantage of a large variable condenser is that you can find your station rapidly in nearly all cases even if your inductance is not altogether the right size. If you are working with a variable con-

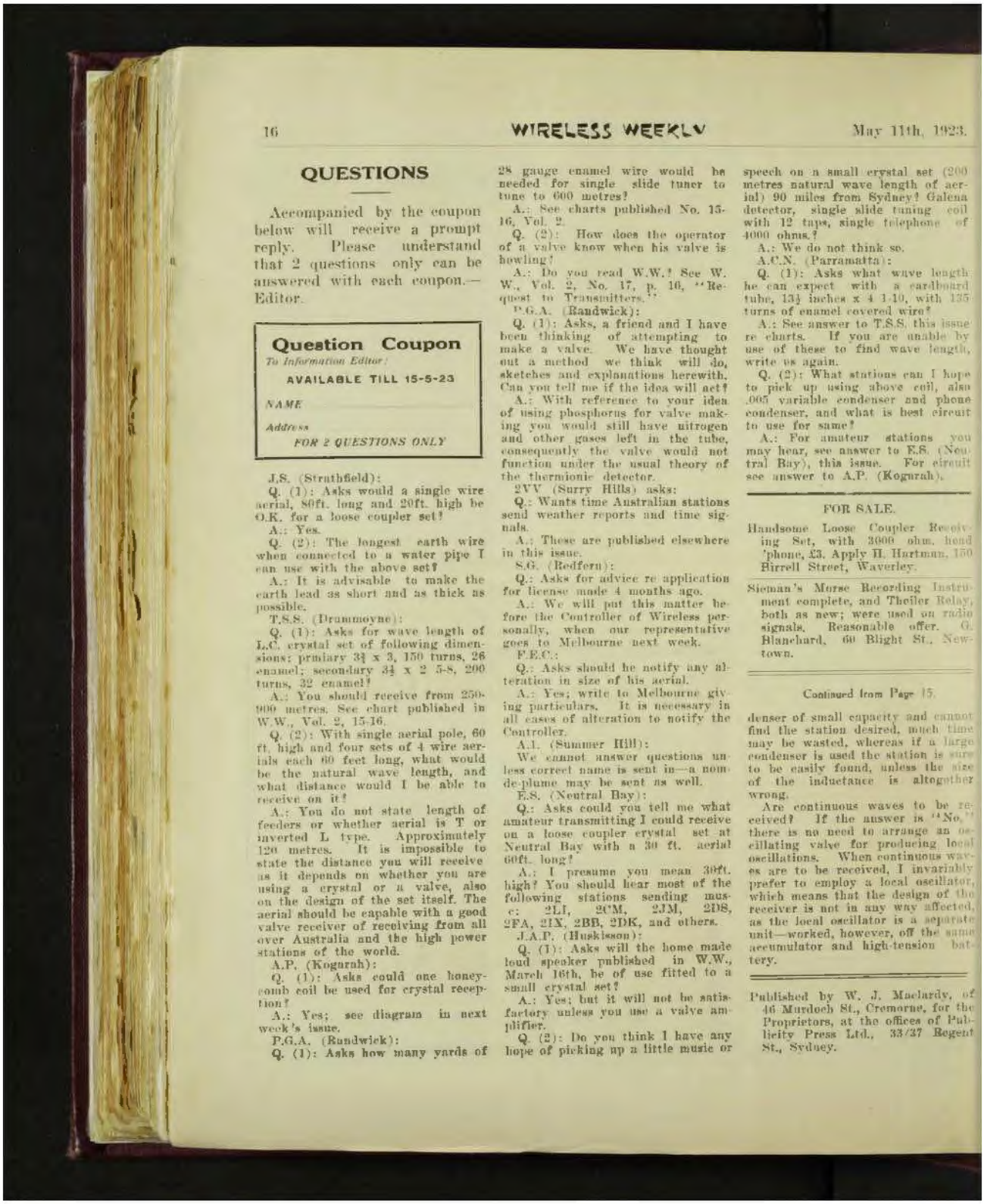
Amateur Calls

Victoria

Call Sign.	Name.	Address.
3 N J	Bryans, H. H.	Orrong Road, Toorak. R.
3 N K	Baxter, W. F.	7 Hunter Street, Northcote. R.
3 N L	Bennetts, R. C. R.	45 Type Street, Richmond. R.
3 N M	Butler, A. O.	30 Munro Street, Auburn. R.
3 N N	Brown, H. R.	Yanac. R.
3 N O	Wilton, H. D.	38 The Avenue, Windsor.
3 N P	Davies, R. F.	25 Alexandra Avenue, Canterbury. R.
3 N Q	Fox, A. W. S.	258 Dandenong Road, East Caulfield. R.
3 N R	Merrin, A. K.	324 Orrong Road, Caulfield. R.
3 N S	Linklater, S. T.	138 Garton Street, North Carlton. R.
3 N T	Walls, Wm.	Horne Street, Sunbury. R.
3 N U	Watts, F.	Theatre Royal, Bourke Street, Melbourne. R.
3 N V	Richards, C.	32 Washington Avenue, East Malvern. R.
3 N W	Coonan, E. E.	8 Closeburn Avenue, Windsor. R.
3 N X	Rudspeth, G. J. E.	10 Willow Street, Elsternwick. R.
3 N Y	Odgers, F. J.	17 Davison Street, Richmond. R.
3 N Z	Klemmer, H. S.	165 Richardson Street, Middle Park. R.
3 O A	Cottrell, H. C.	Pascie Vale Road, North Essendon. R.
3 O B	Walsh, T. O.	338 High Street, Windsor. R.
3 O K	Conry, W. H.	32 Irving Avenue, Armadale. R.
3 L Q	Downing, W. E.	Hopkins House, Hopkins River, Warrnambool. R.

New South Wales

2 U A	Searl, J. B.	4 Malvern Avenue, Croydon. R.
2 U B	Tunks, A. R.	"Eurubba," Willandy Road, West Wyalong. R.
2 U C	Tripp, C. J.	Lithgow Street, Campbelltown. R.



QUESTIONS

Accompanied by the coupon below will receive a prompt reply. Please understand that 2 questions only can be answered with each coupon.—Editor.

Question Coupon
To Information Editor:
AVAILABLE TILL 15-5-23
NAME
Address
FOR 2 QUESTIONS ONLY

J.S. (Strathfield):

Q. (1): Asks would a single wire aerial, 80ft. long and 20ft. high be O.K. for a loose coupler set?

A.: Yes.

Q. (2): The longest earth wire when connected to a water pipe I can use with the above set?

A.: It is advisable to make the earth lead as short and as thick as possible.

T.S.S. (Drummoyne):

Q. (1): Asks for wave length of L.C. crystal set of following dimensions: primary 3¾ x 3, 150 turns, 26 enamel; secondary 3¾ x 2 5-8, 200 turns, 32 enamel?

A.: You should receive from 250-900 metres. See chart published in W.W., Vol. 2, 15-16.

Q. (2): With single aerial pole, 60 ft. high and four sets of 4 wire aerials each 60 feet long, what would be the natural wave length, and what distance would I be able to receive on it?

A.: You do not state length of feeders or whether aerial is T or inverted L type. Approximately 120 metres. It is impossible to state the distance you will receive as it depends on whether you are using a crystal or a valve, also on the design of the set itself. The aerial should be capable with a good valve receiver of receiving from all over Australia and the high power stations of the world.

A.P. (Kogarah):

Q. (1): Asks could one honeycomb coil be used for crystal reception?

A.: Yes; see diagram in next week's issue.

P.G.A. (Randwick):

Q. (1): Asks how many yards of 28 gauge enamel wire would be needed for single slide tuner to tune to 600 metres?

A.: See charts published No. 15-16, Vol. 2.

Q. (2): How does the operator of a valve know when his valve is howling?

A.: Do you read W.W.? See W. W., Vol. 2, No. 17, p. 16, "Request to Transmitters."

P.G.A. (Randwick):

Q. (1): Asks, a friend and I have been thinking of attempting to make a valve. We have thought out a method we think will do, sketches and explanations herewith. Can you tell me if the idea will act?

A.: With reference to your idea of using phosphorus for valve making you would still have nitrogen and other gases left in the tube, consequently the valve would not function under the usual theory of the thermionic detector.

2VV (Surry Hills) asks:

Q.: Wants time Australian stations send weather reports and time signals.

A.: These are published elsewhere in this issue.

S.G. (Redfern):

Q.: Asks for advice re application for license made 4 months ago.

A.: We will put this matter before the Controller of Wireless personally, when our representative goes to Melbourne next week.

F.E.C.:

Q.: Asks should he notify any alteration in size of his aerial.

A.: Yes; write to Melbourne giving particulars. It is necessary in all cases of alteration to notify the Controller.

A.I. (Summer Hill):

We cannot answer questions unless correct name is sent in—a nom-de-plume may be sent as well.

E.S. (Neutral Bay):

Q.: Asks could you tell me what amateur transmitting I could receive on a loose coupler crystal set at Neutral Bay with a 30 ft. aerial 60ft. long?

A.: I presume you mean 30ft. high? You should hear most of the following stations sending music: 2LI, 2CM, 2JM, 2DS, 2FA, 2IX, 2BB, 2DK, and others.

J.A.P. (Husklsson):

Q. (1): Asks will the home made loud speaker published in W.W., March 16th, be of use fitted to a small crystal set?

A.: Yes; but it will not be satisfactory unless you use a valve amplifier.

Q. (2): Do you think I have any hope of picking up a little music or speech on a small crystal set (200 metres natural wave length of aerial) 90 miles from Sydney? Galena detector, single slide tuning coil with 12 taps, single telephone of 4000 ohms.?

A.: We do not think so.

A.C.N. (Parramatta):

Q. (1): Asks what wave length he can expect with a cardboard tube, 13½ inches x 4 1-10, with 135 turns of enamel covered wire?

A.: See answer to T.S.S. this issue re charts. If you are unable by use of these to find wave length, write us again.

Q. (2): What stations can I hope to pick up using above coil, also .005 variable condenser and phone condenser, and what is best circuit to use for same?

A.: For amateur stations you may hear, see answer to E.S. (Neutral Bay), this issue. For circuit see answer to A.P. (Kogarah).

Continued from Page 15.

denser of small capacity and cannot find the station desired, much time may be wasted, whereas if a large condenser is used the station is sure to be easily found, unless the size of the inductance is altogether wrong.

Are continuous waves to be received? If the answer is "No," there is no need to arrange an oscillating valve for producing local oscillations. When continuous waves are to be received, I invariably prefer to employ a local oscillator, which means that the design of the receiver is not in any way affected, as the local oscillator is a separate unit—worked, however, off the same accumulator and high-tension battery.

Published by W. J. Maclardy, of 46 Murdoch St., Cremorne, for the Proprietors, at the offices of Publicity Press Ltd., 33/37 Regent St., Sydney.