N.S.W. WIRELESS NEWS

With which is incorporated "THE BOYS WIRELESS NEWS"

2d.

Vol. 2.—No. 18.
Sydney: August 15, 1925.

N.S.W. Wireless News

(With which is incorporated "The Boys' Wireless News")

Vol. 2 ; No. 18 SATURDAY, AUGUST 15, 1925

Let Us Talk It Over—

A Few Words from the Editor's Chair

BY a special double-page advertisement in our last number, the attention of "News" readers was called to the fact that a big campaign was in progress, launched by the Radio Traders' Association of Sydney, with the object of interesting people in broadcast reception, and in making the benefits of possessing a receiving set more widely known.

On first consideration, this may not seem to concern us as experimenters or listeners-in, but, like many other matters, this one must not be dismissed in such a summary manner, and without further thought.

Very little contemplation of the subject will force us to realise that every one who is taking part in wireless to-day, either as a broadcast listener or as an experimenter, is part and parcel of the greatest co-operative movement the world has ever known. Once we delve into wirelesss, we become units in a great co-operative movement, a movement of world-wide scope, as before a radio receiver of any kind becomes of practical value, and even before it is possible for the receiver to exist, huge organisations are called upon to carry on research work, and to devise and manufacture those parts and components of which a radio receiver is constructed. This applies with equal force to transmitters and transmitting apparatus, without which, the radio receiver is useless.

Some of us are mainly interested in sending and receiving Morse signals over immense distances with low power input, and splendid pioneer work is being done by those amateurs who are pursuing this branch of wireless experimental work. The very large majority of us, however, are more concerned in radio reception as a means of entertainment and information, mainly entertainment, to be quite candid. As an entertainer, there is nothing on earth to compare with radio, as, a vocal or instrumental concert in progress thousands of miles away, may be enjoyed by millions of an audience, scattered throughout the entire civilised world.

Coming nearer home, radio entertainment is provided by a great co-operative scheme whereby we all pay our quota, and centrally situated broadcasting stations render the broadcasting service thus provided for. Each broadcast listener who takes out a licence, and all decent ones do, becomes, automatically, a member of this great co-operative scheme. As members of a co-oprative concern it is our duty to ourselves to see that we get the greatest benefit out of it we can, to see that all who can shall share in the advantages to be derived.

The way in which we may secure the greatest benefit to ourselves is to move in that direction which will ensure the best of broadcasting service at the cheapest possible rate. The way to do this is to get our friends interested in wireless, and as the number of licences issued grows larger and larger, we can first have broadcast service of better quality and greater continuity, and then we can look for a substantial reduction in the amount of the licence fee.

Every reader of the "News" may become an apostle of wireless if he or she will only exert themselves to bring about broadcast reception under the attention of those who are not yet interested.

During the day, and every day and evening, there are a thousand and one opportunities of talking wireless with our friends, letting them know what we heard last night, some enjoyable concert, or some wonderful event like the re-broadcasting of K.D.K.A., etc. An invitation to come along and hear the broadcast concert will, in most cases, meet with a ready response from your friends. Even if you have only a crystal set, remember that there are many thousands of Australians, who have not yet heard even a crystal set in operation. That which has become commonplace to you, perhaps, will be new and wonderful to those who have never heard a wireless set before.

Anything you can do to make wireless better known is for the benefit of yourself and for the advancement of the science.

Writing now particularly of Sydney, we have to bear in mind that it is due to the initiative and enterprise of the radio traders of this city that we have a second broadcasting station, and which renders excellent service to broadcast listeners, furnishing that element of variety which is the very essence of all entertainment.

Like every other body of traders, the radio traders render a big public service; they search the world for the latest and best in radio development, and they bring all that is new and good to our doors for our edification and enjoyment, and give us the means of making our receivers more efficient and more practical.

Their fight to popularize wireless is therefore our fight, for we cannot benefit them without benefiting ourselves, nor can they benefit themselves without benefiting us.

Get the spirit of co-operation; get out after new converts to wireless; help make wireless the biggest thing ever in the history of Australia, and let us have the finest broadcasting service in the world, and we will not only be proud of it, but we will be getting a real pounds, shillings, and pence return, for every ounce of energy we put into the fight to push wireless into popular favor.

Talk wireless, let your friends hear your sets receiving broadcast concert, hand your old copies of wireless journals to those not yet interested, and so help push the 'ole chariot along.

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N.S.W. Wireless News

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Vol. 2 ; No. 18 SATURDAY. AUGUST 15, 1925

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OF THIS NUMBER

ADVERTISING.—ADVERTISERS PLEASE NOTE: All copy or changes of copy must be in the hands of the Manager not later than Wednesday of the week preceding the week of issue, otherwise previous week's copy will be repeated. Advertising rates may be had on application to the Manager.

SUBSCRIPTION RATES.—Twelve months (52 issues) 8/8, post free. Six months (26 issues) 4/4, post free.

CORRESPONDENCE.—All business communications should be addressed to the Manager, "The N.S.W. Wireless News," 304 Kent Street, Sydney.
Editorial communications should be addressed to the Editor. Our 'phone number is B 5729.

AGENTS IN GREAT BRITAIN.—Messrs. Reuters Ltd., 24 Old Jewry, London, E.C.2.

AGENTS IN U.S.A.—Messrs. Gordon & Gotch. N.S.W. WIRELESS NEWS. 304 Kent Street, Sydney. 'Phone: B 5729

Chemical Rectifiers

A CHEMICAL or electrolytic rectifier, as it is otherwise called, is a very easily made up article for the experimenter who desires to rectify alternating current for experimental purposes, and many amateurs, who possess transmitting sets, still prefer this type of rectifier to the two-element valve, as used for rectifying purposes.

The chemical rectifier is composed of strips of aluminium and lead immersed in a solution of sodium phosphate, ammonium phosphate, or "20 mule team" borax, otherwise known as "calcined borax."

The advantages of the chemical rectifier are that it rectifies perfectly; its resistance is low, enabling it to pass sufficient current; the solution may be covered with transformer oil, preventing evaporation, and when this is done the sodium phosphate solution does not crystallize and creep over the tops of the jars, as does the borax solution.

If good aluminium and lead are used, these elements will last for years with little or no attention.

The number of jars to be used for the purpose of making up a rectifier of this description is determined by the voltage of the current supply, if no transformer is used, or by the voltage of the secondary, if a transformer is used. In each case, the voltage divided by 25 will give the number of jars required.

The size of the plates are determined by the amount of current that is to be passed through them. A square inch of metal immersed in the solution will pass 50 milliamperes. The total milliamperage, divided by 50 will, therefore, give the area in square inches of metal to be used for each plate, that is, the area of the part immersed. There will have to be added the necessary length above the solution, for connecting up purposes.

One ounce of sodium phosphate is dissolved in 14 ounces of water to form the electrolyte or solution.

A test tube set will only pass up to 30 milliamperes without excessive heating. A pint jar will pass up to 300 to 400 milliamperes and keep fairly cool.

To prevent evaporation and creeping of the solution, a high-grade transformer coil should be poured into each jar for a depth of about one quarter of an inch.

As an example, suppose that a rectifier were required to rectify the alternating current supplied from the secondary of a transformer at a voltage of 500, and that 100 milliamperes would be the maximum demand:—

The number of jars required would equal 500 divided by 25—20 jars.

And with the plates one inch wide, two inches in length would be required to be submerged in the solution, and say two inches more for connecting up. Both plates to be of the same size. Total length of each—4 inches.

ONE of the most spectacular events in connection with the arrival of the Fleet, was carried out by Farmer & Company, Limited, Sydney, through their broadcasting station, 2.F.C. Chartering the s.s. "Sir Dudley de Chair" from Messrs. Dorman Long & Co., they had her fitted out with a special transmitting set. Proceeding through the Heads the "Sir Dudley de Chair," despite the rough sea, took the 17B Area (North Sydney) military band out to welcome the Fleet. As each battleship was reached, the 2.F.C. band played the "Star Spangled Banner," the men on the decks of the Fleet standing to the salute. Immediately at the close of the national air each battleship dipped her flag in recognition of the greeting.

Turning for the run back, the "Sir Dudley de Chair" accompanied the Fleet through the Heads. During the whole of the trip a running description of events was broadcast from sea, and relayed to the 2.F.C. station, where it was transmitted on the 1100 metres wavelength.

On the morning following the Fleet's arrival, letters from many parts of the State reached station 2.F.C. stating what a great success the transmission had been.

The efficient mechanical arrangements were in the hands of Amalgamated Wireless (Australasia) Limited, while the staff of 2.F.C. carried out the musical and descriptive programme. The ship was beautifully decorated by the Display Department of Farmer's, while the same firm's restaurant staff arranged the catering.

Considerable criticism was levelled against 2.F.C. on the question of the feasibility of the transmission from sea, but the great success of Thursday's effort has removed from the realm of experiment this type of broadcasting. Once again, as in the case of the Parliamentary transmission, 2.F.C., Sydney, has given a world demonstration in progressive broadcasting.

GOBLI'ME!!!

	£	s	d
Radiotron U.V. 201a Valves	£0	16	0
Radiotron U.V. 199 Valves	0	16	0
De Forrest D.V. 3 Valves	0	19	6
Phillips Genuine Bright Emitters, D I., II, IV., V. and E.	0	6	3
Genuine Bakelite Standard Sockets	0	2	6
Standard to U.V. 199 Adaptor	0	5	0
Jefferson Type 41 Transformers	1	4	0
Jefferson Star Transformers	0	19	0
Modern Ratio, 4 to 1	1	3	0
Ormond, .001 Plain Variable Condenser	0	12	6
Ormond .0005 Variable Condenser	0	10	0
Fibroc .001 Variable Condenser	0	13	0
Fibroc .0005 Variable Condenser	0	10	9
Fibroc .0005 Vernier Condenser	0	17	0
Condenser Kit of 10 Fixed Condensers	0	14	6
Amplion Music Master Loud Speaker	8	4	0
Amplion Dragon Loud Speaker	7	5	0
Amplion Junior Loud Speaker	3	17	6
Amplion Dragon Fly Loud Speaker	1	15	0
Echo Fireplace Loud Speaker	4	0	0
4 in. De Luxe Bakelite Dials, brass bush	0	4	6
Shock Absorber Cushions for Sockets	0	1	3
Bus Wire, per dozen lengths	0	1	9
Bradley Stats and Leaks	0	12	6
Coil Mounts, First Class Quality	0	2	0
Coil Mounts, Second Class Quality	0	1	3
Panel Mounts	0	1	6
Moveable Panel Mounts	0	2	0
Three Coil Mounts	0	11	9
Two Coil Cam-Vernier Mount	0	7	0
Buck's English 4 to 1 Transformers	0	12	0
Engraved Vernier Buttons for Condenser	0	1	6
Double Circuit 'Phone Jacks	0	2	11
Single Circuit 'Phone Jacks	0	2	3
Dymac 30 ohm Bakelite Engraved Rheostat	0	5	9
Dymac 400 ohm Potentiometers	0	7	0
Columbia 1½ volt 30 amp. Guaranteed Cells	0	3	0
Bakelite Geared Vernier Dials	0	7	6
Brightson True Blue Valves	1	3	6
Modern Push-Pull Transformers, per pair	2	8	0

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Which is the Posititive?

THERE are many occasions when it is desirable to determine the polarity of a source of electric current, as—to mention one only—when charging accumulators from the mains. There are many methods of doing this, some of which require special means, such as the use of a small piece of apparatus purposely designed for this purpose or the use of pole-finding paper.

A simple plan where high-voltage mains are concerned is to dip the two wires in a glass containing very dilute acid (vinegar and water will do) when bubbles will rise from the negative end. Care should be taken to keep the wires fully 1 in. apart, and it is advisable that the current, if of high voltage, should pass through a lamp, which will act as a resistance.

Another method requiring no apparatus, and suitable for any voltage up to 500, is to take a potato and after removing a portion of the skin to insert the ends of the two wire leads. The distance the wires should be apart will depend on the voltage; the lower this is the closer should they be to each other. It will be found that the positive wire will turn the potato green, whereas the negative wire will not make any mark at all. The time necessary for the result to show will never exceed one minute and will depend on the voltage.

Pole-finding paper can be purchased or made. Mix 1 oz. of best starch with distilled water to form a thick creamy paste and stir in boiling water until the starch becomes translucent. Add the greater part of a pint of water in which had been dissolved ½ oz. potassium iodide and 1 oz. potassium nitrate. When cool, immerse in it pieces of white filter paper and dry in the dark.

A simple galvanometer can always be made to show the polarity of wires, but it is necessary to first determine in which direction the needle moves with a current of known source. If used on high-voltage mains a lamp resistance should always be placed in circuit.

Another class of apparatus is the liquid pole-finder, which consists of a glass tube containing a liquid and provided with two electrodes. Normally the solution is colourless, but on passing a current through it a reddish purple colour will be observed at the electrode connected to a particular lead. The explanation is that when an electric current is passed through a neutral solution containing some salt of potassium or sodium, the metal is liberated at the negative electrode. This (potassium or sodium) at once reacts with the water, producing hydrogen gas and potassium or sodium hydrate.

The presence of the alkali at the negative electrode may be demonstrated by having in the solution some chemical indicator, for example, phenol phthalein. This, with neutral or acid solutions, is colourless, but with alkaline liquids is of a reddish-purple colour. Hence, a reddish-purple liquid round the negative electrode would show the formation of the alkali. On, however, shaking the liquid, the acid formed at the negative electrode, in equivalent quantities, re-combine; a neutral solution is produced and the colour is discharged.

Suitable solutions may be made up in the following manner: (1) In 1 oz. of distilled water dissolve 2 gr. or 3 gr. of sodium sulphate, and add a few drops of a 1 per cent. solution of phenol phthalein dissolved in alcohol. Normally this solution is colourless. On passing current through the solution a reddish-purple colour will be observed at the electrode connected to the negative power lead. (2) In place of the phenol phthalein add to the sodium sulphate solution one drop of a 1 per cent. solution of methyl orange dissolved in alcohol. The solution is of a yellow colour normally in neutral or alkaline solutions, and red in acid solutions. Therefore, on passing current through the solution, the presence of the acid at the positive electrode is indicated by a red colour at the electrode connected to the positive power lead.

The first solution, being colourless normally, is to be preferred. The electrodes may be of copper, 1 in. apart.

A Few Definitions

MAGNETOMOTIVE FORCE (M.M.F.).—The driving force behind magnetic flux. A magnatomotive force is necessary to produce magnetic flux, and the amount of flux produced by a given magnetomotive force depends upon the reluctance of the magnetic circuit, just as the current produced by a given electromotive force depends upon the resistance of the electrical circuit. The magnetomotive force produced by a solenoid is equal to 1.257 times the number of ampere-turns in the coil.

MEGOHM.—The unit for measuring high resistance, being equal to 1,000,000 ohms.

MICROFARAD.—The practical unit of capacity, equal to one millionth of a farad.

MICROPHONE.—A device forming part of a transmitting telephone, which enables mechanical vibrations of a diaphragm (due to sound waves) to produce corresponding electrical vibrations or oscillations, usually by varying the contact resistance of carbon granules.

NATURAL FREQUENCY.—The natural frequency of a circuit is the frequency with which an electric discharge, as from a condenser, will oscillate when no external electromotive force is applied. Two circuits having the same natural frequency are said to be in tune with one another.

NEGATIVE.—See Positive.

OHM.—The unit of electrical resistance, being that resistance which will limit the current produced by a pressure of 1 volt to 1 ampere. One yard of No. 28 S.W.G. iron wire has a resistance of 1 ohm.

OHM'S LAW.—The law which states the relation existing in any circuit between current, voltage, and resistance. These relations are as follows:

$$\text{Amperes} = \frac{\text{Volts}}{\text{Ohms}}$$

$$\text{Volts} = \text{Amperes} \times \text{Ohms}$$

$$\text{Ohms} = \frac{\text{Volts}}{\text{Amperes}}$$

Thus, for example, 36 volts are required to send a current of 4 amperes through a resistance of 9 ohms.

OSCILLATIONS.—High-frequency alternating currents.

PARALLEL.—Two or more conductors or pieces of apparatus are in parallel when they are so connected that the current in the circuit divides, and part goes through each of them. Cells are connected in parallel when the required current is equal to the sum of the current which can be given by each individual cell, and the voltage required is that of a single cell. See Shunt.

PERMEABILITY.—The capability of a material for conducting magnetic flux. The permeability of air is taken as unity, so that the permeability of any material is the ratio of the flux density produced in the material by a given magnetomotive force, to the flux density that would be produced in an air path of the same length, by the same magnetomotive force. The permeability of magnetic substances decreases as the flux density increases; for instance, at a flux density of 10,000 lines per sq. cm., the permeability of transformer stampings is about 2,000, while it is only 200 at a flux density of 17,500.

PHASE.—In an alternating current or voltage, the fraction of a complete cycle which has elapsed at any instant under consideration. Two alternating phenomena are said to be in phase when they are exactly "in step" with one another. If they are of different frequencies, they are out of phase except at periodic intervals, as in heterodyne reception.

PLATE.—The anode of a thermionic valve, consisting usually of a small metal tube surrounding the filament and grid.

PLATE CIRCUIT.—The circuit which externally connects the filament and plate of a valve, and is completed internally by the electron stream between them.

POSITIVE and NEGATIVE (+ and —).—Names given to distinguish the terminals of a source of electric supply. Current is assumed to flow, round a circuit from positive to negative, although it actually consists of an electron stream flowing from negative to positive. Positive and negative terminals are often distinguished by the colours red and blue or black respectively.

POTENTIAL DIFFERENCE (P.D.).—The difference of potential, or electrical pressure, between two points is the electromotive force trying to send current from one point to the other.

POTENTIOMETER.—A device for adjusing the voltage supplied to a circuit. It consists of a resistance joined across the supply terminals, from which tappings are taken off to supply the circuit. A potentiometer wastes a large amount of energy, and so should not be used if a plain rheostat is suitable.

POWER.—The electrical power in a circuit is measured in watts, and is given by the product of the amperes flowing and the volts applied. Thus, if 4 volts are driving half an ampere through a valve filament, the power being used is 2 watts. 746 watts are equivalent to 1 horse power.

PRESSURE, ELECTRICAL.—See Potential Difference.

MILLI-.—A prefix denoting one-thousandth. Thus, a milliampere is one-thousandth of an ampere, a millivolt is one-thousandth of a volt, and so on. One-thousandth of an inch is called a mil.

QUANTITY.—When an electric current flows, a certain quantity of electricity is moved round the circuit per second. This quantity is given by the product of the amperes flowing, and the time, in seconds, for which they flow. The unit of electrical quantity is the coulomb, which is the quantity of electricity moved by 1 ampere in 1 second.

QUENCHED SPARK.—In a transmitting set, a spark the duration of which is made as short as possible, and which is prevented from forming an arc by the use of electrodes of large heat-dissipating capacity.

LOOSE-COUPLER.—A type of tuning coil very popular with amateurs, and one of the most efficient for general use. It employs the principle of mutual induction. Two coils are used, one capable of sliding inside the other, thus making a coupling, or the degree of proximity of one coil to the other, variable. Owing to the induction effect between the two coils good selectivity of tuning is available.

RECTIFIER.—A device for converting an alternating current into a unidirectional current. This is usually brought about by means of apparatus (e.g., a crystal detector) which allows current to flow through it in one direction only, and so wipes out one half of each alternating current cycle.

REGENERATIVE COUPLING.—A system of coupling in which the varying anode current is sent through a reactance coil which is inductively coupled with the grid circuit. Thus, variations of anode current produce further impulses on the grid, these in turn producing still greater vibrations of anode current, and so on. Regenerative coupling, therefore, enables one valve both to detect and amplify.

RELUCTANCE.—The opposition offered by a magnetic path to the passage of magnetic flux. The reluctance of any path depends upon the length and the permeability of the material of which it is composed. In any magnetic circuit, the reluctance is given by Magnetomotive Force divided by Magnetic Flux. Cf. Ohm's Law.

SHUNT.—When two portions of a circuit or pieces of apparatus are connected in parallel, one is said to shunt the other. In a grid circuit, for instance, the grid condenser is shunted by the grid leak, the two being connected in parallel.

SKIN EFFECT.—Unequal distribution of current in a conductor—the current tending to flow near the surface of the conductor and not in the centre. The effect is only noticeable in the case of high-frequency currents. For this reason, conductors for large high-frequency currents are often made of copper tubing—sometimes silver-plated.

SOFT VALVE.—A valve in which a little gas remains. The anode current is carried partly by this gas as well as by the electron stream from the filament.

SOLENOID.—A coil of wire wound in a long spiral, for the purpose of producing a magnetomotive force along its axis.

SPARK.—An electric discharge which occurs between two electrodes when the applied voltage is sufficient to break down the air in the gap. A spark usually consists of damped oscillations, the frequency of which depends upon the inductance and capacity of the circuit, and the number of which depends upon the resistance of the circuit, including the gap.

SPARK TRANSMISSION.—The transmission of wireless waves by means of oscillating condenser spark discharges across an air gap. Each discharge sends out one train of damped oscillations.

Beginning in Wireless

THERE are really three distinct classes of wireless amateurs. Firstly, there is the enthusiast who has no technical knowledge, merely making use of a receiving set for the purpose of listening to concerts. Then there is the amateur who buys a receiving set, with which he listens to anything and everything he can hear. And lastly, there is the experimenter, whose set is never complete, and whose interest in wireless never diminishes. He makes as much apparatus as he can, and buys as little as possible.

If the reader is about to become a wireless enthusiast, he will be able to judge from the preceding paragraph to which category he belongs. If it is only desired to listen to the special broadcasting programmes of speech and music in the area in which he lives, it is merely necessary either to buy or make a very simple set. This set would be designed to receive only the one particular broadcasting station. If it is desired to listen to broadcasting stations from other areas the set would need to be much more sensitive, but it need not have a greater wavelength range, a matter, however, which will be dealt with later on.

At the present time there are not very many receiving sets on the market which cover the wavelengths used by commercial stations as well as those to be used by the broadcasting stations. If, therefore, the reader wishes to receive all typs of transmission he should consider this point very fully before purchasing any apparatus, and if he is quite a beginner he will be well advised to obtain the help of a friend who has already had some experience in wireless work.

The wavelength of a wireless station does not refer to the distance to which it can send. This depends upon the power used by the transmitter and the sensitiveness of the receiving apparatus. For example, a station working on a long wavelength may be heard a few miles away, while another working on a short wavelength may be heard across the Atlantic. Wavelength has an electrical meaning.

When a stone drops into a pond a number of little rings travel across the surface of the water. These rings are in reality little waves in the water, and it will be noticed that the distance between each ring is the same. Now, this distance between the crest of one wave to the crest of the next is called the wavelength. Wireless communication is carried out by means of waves, not in water, but in what is known as the ether. The waves, of course, are set up at the transmitting station by electrical means. To prevent the message from one station mixing up with the message from another each station transmits on a different wavelength, and by adjusting the receiving apparatus it is possible to pick up any particular station. This process of adjusting the receiver is known as "tuning," and, therefore, to pick up a certain station it is necessary to tune the receiver to the wavelength which is being used for transmission.

Wavelengths are measured in metres, the French equivalent of the yard, or, to be more exact, approximately 39¼ in. Broadcasting stations are allotted certain wavelengths, and, therefore, to receive these stations the apparatus must be able to tune to these wavelengths.

You can see "Southern Cross."

Wirless communication makes such rapid advances that what is written to-day is almost out of date to-morrow. However, the wavelengths which are in everyday use range from 5 to 25,000 metres. Speaking generally, the lower the wavelength the more critical is the process of tuning, and hence a beginner usually finds more difficulty with the shorter wavelengths. This refers to wavelengths below about 200 metres, and, therefore, it will be seen that the broadcasting wavelengths of 350 to 1250 metres will present no difficulty whatever.

A certain number of qualified amateurs are allowed to transmit for experimental purposes with very low power, and they are allotted wavelengths of from 150 to 250 metres. There are a few ships and coast stations working on 300 metres. The next wavelength of interest is 600 metres, as it is responsible for nearly all the ship traffic. It is possible to hear ships working with the shore stations at almost any time of day or night.

Wireless messages can be sent by three different methods. These are the "Spark System," "Telephony," and the "Continuous-wave System." Spark and telephony can be received on extremely simple apparatus, provided that the transmission is powerful enough. To receive continuous wave, or C.W. as it is usually called, it is necessary to employ thermionic valves. This necessitates the use of batteries, and hence there is a slight cost in upkeep. It is almost impossible to receive a large number

of distant spark and telephone stations without the use of valves, since the valve is not only extremely sensitive, but it can also be made to amplify the strength of the received signals.

Powerful spark signals and telephone, such as would emanate from a near broadcasting station, can be received with what is known as a crystal detector.

WIRELESS WITHOUT AN AERIAL.

ANY doubt that the owner of a wireless set has as to there being an element of danger in using the Ducon fitting to an electric light socket, in place of an aerial, will be dispelled on reading the opinions of two well-known authorities in electrical engineering.

Under date, July 8th, 1925, Mr. K. G. Knowle, Chief Electrical Inspector of the Fire Underwriters of N.S.W., wrote to Amalgamated Wireless (A/sia) Ltd., stating that, "I have known of the Ducon fitting for some years past, during which period I have not taken exception to its use, nor am I likely to do so while it is constructed as at present."

Mr. J. R. Forbes Mackay, General Manager of the Electricity Department of the Sydney Municipal Council, writes under date, July 17th, 1925, on the Ducon fitting: "This fitting and the method of using it is known to me, and I have no objection to the connection of wireless installations to electric installations which are connected to this Department's electric mains, provided the connection is made by means of a Ducon fitting which has been designed for this purpose and manufactured by the Dubilier Condenser Company."

Always keep the terminals of your accumulator well greased. Vaseline is a good medium for this purpose, and will save a lot of trouble and add to the life of the accumulator.

FLEET RADIO MEN.

THE radio men of the Fleet fully availed themselves of their visit to Sydney, to secure as much local information as possible. Sydney residents who are interested in radio gave them every facility, and the men of the Fleet were highly pleased with their experiences.

On Monday night, Mr. J. H. Hapgood entertained a party, including Messrs. D. L. Dickson, A. W. Harmon, Paul C. Hohl, M. M. Holt, C. E. Mannhaim, James W. Mullins, Fred Rucker, E. C. Saums,(and Earl T. E. Etitruid. The opportunity was taken to listen-in to several stations, 3.L.O. (Melbourne) being picked up very distinctly.

Among local radio men present at Mr. Hapgood's party were:—Messrs. E. G. Beard, T. N. Bore, R. Burgin, H. S. Codde, O. J. Collidge, C. C. Faulkner, J. Kreiger, L. M'Lellan, P. H. Pettyfer, N. Phelps Richards, L. D. Rudolph, and Harry Wiles.

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SOUTHERN RADIO SUPPLIES, Auburn St., Goulburn.

Hints for Constructors

For supplying voltage to the valve plate circuit, ordinary flash-lamp batteries may be used. A large number should be connected in series; but it is very uneconomical, and the cells soon run down.

Amateurs are often puzzled to know how to find the negative pole of a low-voltage direct current. If both wires are placed in vinegar and water—taking care not to let them touch—the end where the bubbles are more numerous is the negative pole. When charging accumulators, this pole should be connected to the negative terminal on the battery.

"Howling" in valve sets may be greatly reduced by earthing the valve sockets and transformer cores. In circuits which employ amplification valves, the transformer leads to the valve grids should be as short as possible.

When a several stage amplifier is employed, and a resistance coupling is used, the voltage of the plate battery should be increased from two to four times owing to the absorption of voltage in the coupling.

Very illusive failures can be caused by loose or bad connections. It is a good plan to run over the entire wiring of the set at intervals, tightening screws and terminals (and it is astonishing the number that at times will be found to have worked loose), and cleaning contacts. This latter should include such details as valve legs and plugs, accumulator straps, etc.

Wires which connect various parts of your wireless apparatus should be kept short. Always scrape bright the ends of wires before fastening to terminals. Also see that the terminals are clean where the wires join.

No wireless set looks really smart unless all the brass work is lacquered. This, of course, excludes the under parts of terminals, etc., where contact must be good—in this case no lacquer is employed. It is best when lacquering to put on a thin coat while the brass is cold, and then to warm it up until the lacquer melts. This is then cooled and the process repeated, the result being a very fine smooth surface.

Crystals should be cleaned with carbon disulphide in preference to methylated spirit.

Pocket batteries are often used for the H.T. battery, and a good way to link them up is to make clips similar to a trouser-clip used for cycling. These clips should be made up in pairs on a short length of flexible wire. It will readily be seen that it is easy to remove a run-down battery, or to make any sort of combinations of connections, without the bother of soldering. Make sure that the clips are a tight fit and make good contact.

The slider on a crystal receiver may make poor contact. This may be remedied by soldering a short length of flexible covered wire to the metal part of the slider, and fixing the other end of the wire to the slide rod terminal.

The time has now arrived when all "outdoor" adjuncts to the wireless set, aerial, earth, lead, etc., should be thoroughly overhauled.

A piece of iron wire flattened out at the end to act as a "spoon" is very useful to add a little more borax or solder if required.

Very often, when about to mount a terminal on your ebonite board, it will be found that the screw that fastens down the terminal is too short to go through the ebonite. This may be easily remedied by drilling, first, the hole to take the screw, and then drill out with a larger drill (large enough to take the head) a recess until deep enough to allow enough thread to appear above the board to hold the terminal.

If you are building a set with very hard wood, such as teak, and joining up with small brass nails, a very firm hold will be made by the nails if you just "nick" them first with something sharp—like a small cold chisel. Make small nicks by holding the nails on a piece of flat iron and dig the cold chisel into the nails by slanting the chisel away from the point. This will make the nails hold much firmer.

If your ebonite does not seem to be quite flat, do not try to alter it whilst cold; simply warm it in hot water or in front of a fire and lay it between two pieces of stout wood with a heavy weight on top and do not take out till quite cold.

Small steel parts to be "tempered" are best heated in molten lead; the heat in this manner will be very equal.

The Valve

THE most remarkable of all wireless appliances, and possibly one of the most notable discoveries of modern science, is the thermionic valve, sometimes styled the ionic valve or the audion, or, most usually, simply the "valve." To this appliance must be ascribed the meteoric development of wireless telephony.

At an early date it is intended to devote attention in these pages to the valve in detail, this brief reference only being for the purpose of bringing it to the notice of those readers who have had no previous acquaintance with wireless matters.

In construction and appearance, the valve may be best described as a modified electric lamp. The internals consist of what are termed the filament, the plate and the grid. With different makes there is variation in their design, but in each case these elements fulfil the same purpose. The filament is the exact counterpart of a filament in any small-size electric lamp; the plate is a small plate of metal, usually in the form of a cylinder surrounding the filament; and the grid is a small spiral of wire or actually a wire grid placed between the filament and the plate.

In use, the filament of the valve is heated by current (usually from an accumulator) in exactly the same manner as is the filament of an ordinary electric lamp, and it emits from its surface minute negative charges of electricity called electrons, which are subject to the usual laws of electrostatic repulsion and attraction, which will be entered into fully in a later issue. The metal cylinder or anode, being maintained at a potential positive to that of the filament, attracts the electrons. The flow of elecrons, however, may be caused to vary by means of the third electrode or grid by varying the potential of the latter with respect to the filament. If the grid is strongly negative to the filament, it tends to drive the emitted electrons back into the filament, despite the attraction of he posiively charged anode. As the negative grid potential in decreased, electrons begin to flow through the spaces in the grid to the anode. The variation in potential, of course, is obtained with the incoming signals.

This is the simplest aspect of the valve. Its most remarkable properties are evidenced in other ways, of which the space in this present issue will not permit of more than brief mention. It will act as an amplifier, permitting of strong currents being impressed upon feeble ones; it will act as a detector, and also as an oscillator or transmitter.

It has been called the modern Aladdin's lamp, but, truth to tell, it is more wonderful than the author of "A Thousand and One Nights"—and he was not without imagination, was he?—ever dreamed!

WATT.—The unit of electrical power, being the power exerted by a current of 1 ampere flowing under a pressure of 1 volt. 746 volts are equivalent to 1 horse-power.

TUNING.—The operation of adjusting the natural frequency of one circuit to be equal to that of another, by varying the values of the inductance and capacity in the circuit.

A Charger for "B" Batteries

A NUMBER of amateurs and listeners-in are adopting the storage "B" battery instead of using the ordinary dry-cell type.

Charging any kind of storage "B" battery is such a simple matter that there is no disability in adopting this type of "B" battery.

A "charging board" can be made up on the top of a cigar-box, a 100-Monopole box being ideal for the purpose. Measuring one inch in from one end, rule a line across the width of the box. Next, rule two lines, parallel and 2½ inches apart, along the length of the box. From the end of the box, used to measure off the first line, measure off another line four inches in, and rule across the width of the box. At the intersections of the lines mount four ebonite-topped terminals. Between the last pair of terminals and the other end of the box, mount a batten lampholder. Between the batten holder and end of the box, mount a single terminal. All this is done on the lid.

Now open the box and connect the two terminals on the right by a piece of low-fusing-point fuse wire, and connect the left pair similarly. Connect the last terminal of the right-hand pair to one connection of the lampholder, and connect the other lampholder connection to the single terminal.

Using a plug adapter and a length of "flex," two wires from a lighting socket are connected to the first pair of terminals. It is a wise precaution to solder a washer on the end of each wire so that it may be tightly clamped under its terminal without fear of its slipping off and short-circuiting on its neighbour, which would result in blowing the lighting fuse.

Looking down the box lengthways, with the end where the first pair of terminals are mounted towards you, we see on the right-hand side, two terminals, a batten lampholder and a solitary terminal at the end, all in "series" with the electric light wire which will be attached to the right-hand terminal. That is to say, that electric current applied to the right-hand terminal will pass by the fuse wire underneath the lid, to the second right-hand terminal and from there to the batten lampholder, and from that to the last terminal, and this means that, as the electric current will have to pass from the first terminal, over the fuse wire and through the batten holder to the last terminal, the whole forming a series of "bridges," so to speak, these bridges are said to be "in series."

Still looking from the same end of the box, we have a terminal on the left to which the other electric light wire will be connected and this terminal is connected underneath the lid of the box, with another length of fuse wire, to the second terminal on the left side.

The box, or "charging board," is now ready to be connected up to the charger.

The charger consists of two one-pound glass jam jars. In the jars are placed lead and aluminium electrodes. These are strips, one inch wide and six inches long. The lead is ordinary 1/16th inch thick sheet-lead, obtainable from the plumbers, and the aluminium is sheet-aluminium, about 22 or 24 gauge, which may be procured at any metal dealers, such as Messrs. Danks & Co., Pitt Street, Sydney.

Four electrodes are required, two of lead and two of aluminium.

One strip of lead and one of aluminium are drilled in the centre, and half an inch from one end, and these are bolted together, with small brass bolts and nuts. A switch point stud answers for the purpose. After being bolted together, a knife is passed up between them, and they are then shaped over a piece of wood into a "U" sufficiently wide in the curved part to allow one leg to rest in one jar and the other leg in the other jar. The jar with the aluminium leg of the pair will now have a single strip of lead inserted in it, and the one with the lead leg, a strip of aluminium. Strips of glass are cut from pieces which any glass-cutter will give away, just wide enough to slide into the jars, and a little longer than the height of the jars. These prevent the two electrodes in each jar from touching each other and short-circuiting.

A few crystals of caustic soda are dissolved in a pint of cold water and this is poured into the jars. After 10 or 15 minutes this is poured off, and the jars well rinsed with tap water. This cleans the lead and "forms" the aluminium, upon which will be seen a film of oxide, which must not be touched or rubbed off, as the rectifying action of the charger depends upon this.

The electrolyte for the charger is a solution of borax, sodium phosphate or ammonium phosphate. The borax has the advantage of being very cheap, although sodium phosphate is also fairly cheap and cleaner in its action.

However, the borax acts quite well, but the right kind must be procured. This is "Calcined Borax," or 20 Mule Team Borax, as it is termed by the Americans. It may be obtained at any chemists' supply house.

It is not a very soluble chemical, a good heaped tablespoon being stirred up in a quart of hot water, and dissolved as far as possible, and when cool a crystalline deposit will be found on the bottom of the vessel, giving the impression that none of it has dissolved. This is not so, and the solution will be found to be quite strong enough for the purpose intended. It costs about 1/3 per pound.

The solution is poured into the jars to within an inch of the top, and a little paraffin oil may be poured on top to avoid evaporation. If sodium phosphate is used, a teaspoon of it is dissolved in a half-pint of water.

It is well to drill the single lead and aluminium electrodes and fit them with small brass bolts and nuts for making connections.

Before connecting up the charger, the brass connectors should be well smeared with vaseline.

Returning now to the "charging board," the solitary terminal on the end is connected to the lead electrode at one end of the charger, and the aluminium electrode at the other end is connected to the positive terminal of the battery to be re-charged. The second terminal of the left-hand side pair is now connected to the negative terminal of the battery to be charged.

A 17-candle-power carbon filament or other type of lamp is inserted in the batten lampholder, and we are all ready to switch on.

Before we do so, let us check our connections.

A wooden plug adaptor is plugged into any convenient electric light socket. The plug is wired with a length of "flex," as long as may be necessary to easily reach the place where the battery is to be charged.

The ends of the wires have washers soldered to them for reasons stated, and these are clamped under the terminals nearest the end of the box from which we commenced operations. Each electric light wire is connected to another terminal by a piece of fuse wire.

The second terminal on the right-hand side is connected to the batten lampholder, and from there to the last terminal.

Now assuming that the electric current will travel from the wire on the right, over the fuse wire to the second terminal, and from there through the filament of the lamp in the holder, and from there to the last terminal, and thence to the lead electrode of the charger it will pass through the charger to be rectified into unidirectional, pulsating, positive current, and from the aluminium electrode into the battery being charged, through its positive terminal, and the electric current will "return" by way of the battery, out through its negative terminal, back to the second terminal on the left of the "charging board," over the protecting fuse wire to the first left-hand terminal to which the other electric line wire is attached, so completing the circuit.

The charger is called an "electrolytic rectifier," and its action depends on the formation of a protective skin or surface on the aluminium electrode, and which film or surface allows current to pass in one direction but not in the other. In other words, it allows the positive half of the electric "wave" to pass, but prevents the negative half of the wave passing into the positive pole of the battery.

A week or so ago, particulars were given of a simply-made "B" battery, and this article gives fuller particulars of the charging device necessary to charge such a battery.

The battery described requires to be charged for 40 hours to "form," then it is partially discharged, and again charged, when it will be ready for use. The partial discharging may be done by short-circuiting the negative and positive terminals for a minute or so.

CAMARADERIE!

THERE is a wonderful "good fellowship" among wireless amateurs. It is a part of the game. We indulge our hobby for our own enjoyment, but are never happier than when helping our fellow amateurs. They find a deal of pleasure in helping us.

We can give a special point to that. The finest chance any amateur can have of passing on to his friends any little hint or kink that he has found of service is to send it to "The News." All his brother amateurs can benefit from it then. That is something worth remembering when an idea comes to you and you find by experiment that it works. Let us have it, that everybody may benefit.

On Inductances

INDUCTANCE is not a coil or spiral or wire; it is not wire or material of any kind whatever, but a property possessed by an electrical circuit. Given a unit—and one has been adopted—it is possible to measure the "amount" of this property possessed by a circuit, or, in other words, to measure the intensity of extent of its effect. Now, when a wire is coiled, its inductance increases considerably, and so, when referring to coils of wire, we often loosely speak of them as "inductances." But please note that a straight wire also has the property of "inductance."

A forty-gallon barrel has a capacity of forty gallons, whether it is full or empty; its property of being able to contain something depends upon itself only. But a so-called red flower is only red in the light; it has no colour in the dark. In fact, colour depends on wavelength, and, secondarily, upon our having eyes which are affected in different ways by different wavelengths, thus producing the various sensations to which we give the names of colours.

If you now grasp the difference between a property of a thing which belongs to that thing unconditionally, and a property of a thing which is manifested only by the action of something else, you will understand what is meant by the statement that an electrical circuit has inductance only when an electric current is associated with it. Or, to put it broadly, the inductance lies really in the current; that is, it may be considered as essentially a property of the electron. But when it is considered as such it is known by another name, relating it more to the electron than to the circuit. That name is "inertia," which is one of the properties of mass.

Inertia is that property of a body which tends to oppose the start of its—the body's—movement, and when the body is moving tends to oppose its stoppage, and also any increase or decrease in the velocity at which the body is moving. Common experience bears witness to the fact that when we begin to move a heavy truck from a position of rest we have to exert a considerable amount of force, and the truck attains only gradually its steady speed.

After the inertia has been overcome much less force is required to keep the truck moving, provided, of course, the resistance of the road does not even matters up. Finally, we know also that if while the truck is moving steadily we wish to stop it fairly suddenly, we again have to exert considerable force—in a backward direction—because the truck's inertia tends to keep it moving.

While the truck is moving steadily, too, we find that any attempt to decrease or increase its speed is opposed by inertia.

Very similar statements may be made of the inductance of an electric circuit, for inductance tends to oppose the starting, stopping, or acceleration of an electric current. Compare the following with what appears above relating to the truck. When an electro-motive force is applied to an inductive circuit, the current grows gradually to its full strength.

When the electro-motive force is removed, the current gradually dies away; it continues to flow for a certain time after the E.M.F. is withdrawn. These effects may be regarded as produced by the inertia of a crowd of electrons, which, before they will stop, energy must be taken from them.

When you study the matter in detail, you will learn of the machinery by which the opposition to the changes of the current in an inductive circuit is set up; the current which is induced in the turns of the inductance coil by the current flowing in the others, tends to oppose the current which produces it.

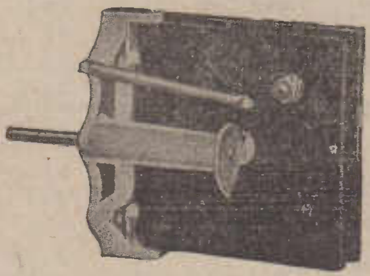
In a straight wire, such as an aerial, the inductance is distributed evenly—one reason why an open circuit aerial radiates well—but has not nearly so high a value as when a part of the wire is wound in a spiral. Depending upon its length, the straight wire has a "fundamental" or "natural" wavelength, a description which is applied to that wavelength to which it best responds or with which it is in syntony.

But an aerial which will tune to one wavelength only, would not be a practical or economical factor in a wireless equipment, and so, by joining to it in "series" a spiral of wire, associated with a device which enables us to switch in as many turns of the spiral as we please, we can vary artificially, so to speak, the wavelength of the aerial.

If an inductance coil is connected "in parallel," the inductance is lowered. This method is not commonly employed, and I mention it chiefly to illustrate the "series" and "parallel" connections.

Inductance is one of the two properties of an oscillatory circuit which governs the frequency—or, of course, the length—of the waves that circuit will radiate. Capacity is the other property. The greater the inductance, or the greater the capacity of the circuit, the greater the wavelength and the lower the frequency; or, to speak of the matter precisely, the wavelength of a circuit is directly proportional to the product of the square root of the inductance and the square root of the capacity. These are fundamental facts which should be thoroughly grasped.

AN EASILY MADE CONDENSER.



THE above is what is called the "book" form of condenser. The two plates open out from each other like the leaves of a book. A spring, seen at the top, pulls the plates apart, and the cam, below, has attached to the spindle end a dial, on twisting which the plates open and shut. The whole may be constructed of wood, the plates being 4 in. by 4¾ in. and are of tin, brass or copper foil, stuck down to the plates, with a sheet of mica covering one of them. If this condenser is well made it is equal to the best in performance. The complete condenser, beautifully made in ebonite, can be purchased from the Continental Radio Co., 215 Clarence Street, Sydney.

It is natural that one should inquire, after reading "the square root of the inductance," how we can extract the root of a "property of an electrical circuit." A unit of inductance has been adopted, so that we can examine the properties of an inductive circuit in a quantitative way. The unit of inductance is the Henry, named after a famous electrician, and as this unit refers to a very large quantity of inductance, a sub-unit, the micro-henry, or millionth of one henry, is also used.

The Spectrum

WITHOUT going into the question as to the nature of an electric charge or current, it is sufficient to say that it is believed to set up a strain in the ether, as the result of some effect produced by the flow of electricity, and thus to cause a wave of energy to spread out from the aerial in all directions. The message is thus delivered by a series of interruptions in the aerial current, corresponding to the Morse code.

According to the school which asserts that there is no ether, what happens is that the magnetic field set up by the charged aerial induced a corresponding current in the receiving aerial, the interruptions, of course, corresponding to those in the current oscillating in the transmitting aerial.

White light—sunlight—consists of a combination of all colours of the rainbow. If, to take a time-honoured example, we hold a glass prism, such as one of the triangular pendants from an old-fashioned glass ornament, in the sun's rays, the rays are refracted by it so that the different colour rays emerge on the other side at different angles, and appear on a shaded surface like a section of a small rainbow.

That is called the visible portion of the spectrum. But above and below that visible portion are many other rays, such as electro-magnetic, ultra-violet, and X rays, they do not directly produce the sensation of light. There are also big intervals between these known portions of the spectrum in which presumably there are other rays as yet unknown, the discovery of which may conceivably have an influence upon our present modes of wireless.

It is obvious to everybody that from the sun—that vast, seething mass of energy—we derive everything that makes life possible on earth—warmth, light, and other things, of some of which we are ignorant. These benefits, we assume, are conferred upon us by means of ether vibrations. and differ according to the wavelength of such vibrations. Thus, the different colours in the visible portion of the spectrum are the result of different wavelengths which affect the eye and brain differently and so cause the sensation of various colours.

BELOW ARE GIVEN THE PRINCIPAL AUSTRALIAN AND FOREIGN COMMERCIAL WIRELESS STATIONS. THIS WILL FORM A HANDY REFERENCE FOR THOSE EXPERIMENTING WITH LONG DISTANCE, LONG WAVE RECEPTION.

FOREIGN STATIONS.

Station.	Location.	Call.	Wave Length.
Abu Zabal	Near Cairo	S.U.C.	8,200, (10,000) C.W.
Nantes	France	U.A.	2,800, (9,000) C.W.
Eiffel Tower	France	F.L.	2,600, 10,000, 7,300 C.W.
			3,000, 5,000, 7,000
Bordeaux	France	L.Y.	18,940, (23,450) C.W.
Lyon	France	Y.N.	10,000, (15,400) A.R.C.
Fiume	Italy	I.Q.B.	2,600, (3,200), 4,100
Eilvese	Germany	O.U.I.	9,700, (14,600) C.W.
Nauen	Germany	P.O.Z.	4,900, 5,600, 6,300,
			8,700, 9,800, 13,000,
Oxford	England	G.B.L.	(18,050) C.W.
			8,750, 9,200, 12,300,
Clifden	England	M.F.T.	13,000 (15,500)
Carnarvon	England	M.U.U.	14,200 C.W.
Pear Harbour	Hawaiian Is.	N.P.M.	9,145, 9,800, 12,000 C.W.
Kahuka	Hawaiian Is.	K.I.E.	9,145, 16,975
Kotwijk	Holland	P.C.G.	6,250, 8,400, 12,500,
			16,800 C.W.
Funabachi	Japan	J.J.C.	4,000, 7,000 C.W.
Stavanger	Norway	L.C.M.	12,140
Tuckerton	America	W.G.G.	15 900 C.W.
Washington	America	N.S.S.	17,145

AUSTRALIAN LAND STATIONS.

Station.	Call.	Wave Length.
Adelaide Radio	V.I.A.	600 Metres
Brisbane	V.I.B.	600 Metres
Broome	V.I.O.	600 Metres
Cooktown	V.I.C.	600 Metres
Darwin	V.I.D.	600 Metres
Naval Office, Hobart	V.Z.D.M.	600 Metres
Esperance	V.I.E.	600 Metres
Flinders Island	V.I.L.	600 Metres
Geraldton	V.I.N.	600 Metres
Hobart	V.I.H.	600 Metres
K.ng Island	V.Z.E.	600 Metres
Melbourne	V.I.M.	600 Metres
Naval Staff Office, Adelaide	V.Z.D.G.	600 Metres
Naval Staff Office, Brisbane	V.Z.D.F.	600 Metres
Naval Staff Office, Perth	V.Z.D.J.	600 Metres
Naval Staff Office, Pt. Melbourne	V.Z.D.B.	600 Metres
Naval Staff Office, Sydney	V.Z.D.C.	600 Metres
Perth Radio	V.I.P.	600 Spark, 1,800-3,500 C.W.
Rockhampton	V.I.R.	600 Spark
Sydney	V.I.S.	600 Spark, 1,800-3,500 C.W.
Thursday Island	V.I.I.	600 Spark
Townsville	V.I.T.	600 Spark, 1,800-3,500 C.W.
Willis Islets	C.G.I.	600
Wyndham	V.I.W.	600

CAPACITY.—The property which a condenser has of receiving and holding a charge of electricity. Capacity is determined by the size of the plates, the distance between such plates and the nature of the substance filling the space between the plates (the dielectric). It is calculated by a formula based on these factors. Roughly, capacity is the electrical value of a condenser. The term is also used to indicate the total output from an accumulator or primary cell.

Keep all your wire bobbins; they come in for many odd jobs as well as being handy to wind on spare wire at times.

Calculating Resistance Tables

IN the following table all the necessary data for making calculations are given. The resistances stated refer to Eureka wire, which is the brand most commonly offered at wireless shops.

The column headed "Turns per inch" refers to enamelled wire with the turns wound so as to touch each other.

It must be understood that the figures in colums 2, 3 and 5 are approximate, since there are slight variations in any kind of wire. Those

1	2	3	4	5
S.W.G.	Yards per lib	Resistance per lb. Ohms.	Turns per per Inch Enamelled	Carrying Sapacity Amps.
16	26	5.6	15	6.0
18	46	17	20	4.0
20	83	56	26	3.0
22	130	150	33	2.3
24	210	400	42	1.5
26	320	900	50	1.0
28	475	1,970	61	0.75
32	900	6,900	83	0.50
30	680	4,000	73	0.60
34	1,250	13,200	98	0.40
36	1,800	28,000	116	0.30
38	2,950	72,800	143	0.20
40	4,590	180,000	180	0.15
42	6,200	368,000	211	0.13
44	10,100	900,000	253	0.10
46	18,900	2,845,000	307	0.07

values with large current consumption, such as "R," Ediswan, or ORA, are all rated at .75 ampere, but as they grow old their demands increase; we must, therefore, allow 1.5 amp. to be well on the safe side and to ensure that the rheostat does not heat up.

For this carrying capacity, No. 24 S.W.G. is suitable. This wire makes 42 turns to the inch or 31 when spaced with string. The ¼in. diameter former will give each turn a total length of ¾in.; we shall be quite near enough if we take the circumference as three times the diameter, and do not bother about it. Forty-two turns will thus go to a yard of wire.

Now 210 yards of No. 24 have a resistance of 400 ohms; hence the resistance per yards is $\frac{400}{210}$, or 1.9 ohm. Three yards will give a total resistance of 5.7 ohms, and will occupy rather under 4in. of the rod; a winding 4¼in. in length will give the required 6 ohms.

Next take the case of a 300-ohm potentiometer suitable for grid control use. Here the current passed (20 milliamps. with a 6-volt battery) is so small that we need take no account of it. We wish to use a rectangular former 1in. wide and ¼in. thick. In this case unspaced enamelled wire will be the most suitable.

The distance round the former is 1—1—¼—¼, or 2½in., which gives approximately 14½ turns to the yard. If we use No. 32 wire the resistance per yard will be

$$\frac{6,900}{900}$$

or 7.6 ohms; thus to obtain 300 ohms we shall need roughly 40 yards or 580 turns, which means that the windings will be 7in. long at 83 turns to the inch.

As this is too long to be convenient, we select No. 36, which works out as follows:—

Ohms per yard, 15.5.
Yards for 300 ohms (approx.), 20.
Yards per inch of windings, 8.
Length of windings, 2½in.

You can see "Southern Cross."

SHELLAC VARNISH.

SHELLAC varnish and French polish are one and the same, only that one is applied with a brush and the other with a rubber. Orange shellac may be purchased at any chemist's shop, and methylated spirits can be had at the same place.

To make shellac varnish or French polish, a wide-mouthed jar, preferably of glass, is half filled with orange shellac; the jar is then filled up with methylated spirit, and the whole shaken at intervals. After about an hour, the varnish will be ready for use. This is useful for varnishing cardboard tubes, baseboards for wireless sets, etc.

WHY WE NEED SECRET RADIO.

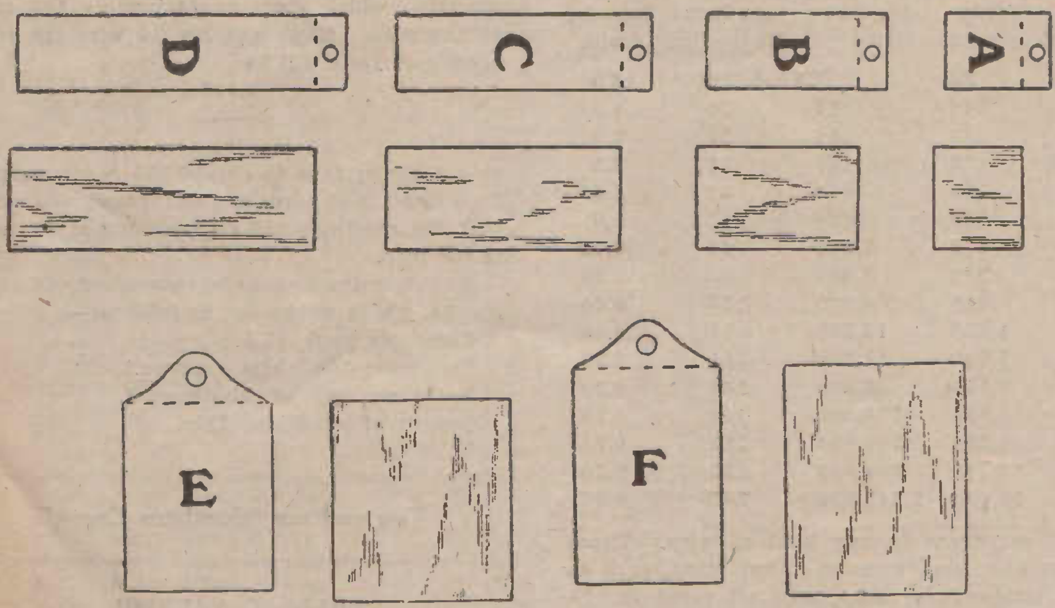
When the girls get to sending their kisses by radio, they musn't be too particular who all tunes in on them.

Templates for Fixed Condensers

TO make a template it is only necessary to cut out the paper pattern and paste it on one side of a sheet of zinc or tin-plate, which is then cut to form a rigid and permanent pattern, or in other words, a template. Diagrams A to F are templates for marking off the copper-foil plates of small fixed condensers, the mica templates being directly on the right of each foil. The approximate values of the made-up condensers are as follows:

Template	No. of Foils	Approx. Cap. in Mfds.
A	2	.0001
B	2	.0002
B	6	.001
C	2	.0003
C	4	.0009
C	6	.0015
D	2	.0004
D	6	.002
E	2	.0005
E	6	.0025
F	2	.0006
F	6	.003

Thus by means of the six sets of templates one can make up a dozen condensers of different values.



The shaded figures represent the actual size of the mica or waxed paper sheets. The clear figures with the letters on them give the actual sizes of the metail foil sheets. Tin, brass, or copper foil may be used. Foil may be procured at Danks & Co., Pitt Street, Sydney; mica at Noyes Bros., 115 Clarence Street, Sydney.

SECONDARY.—The inner wire-wound tube that slides inside the primary of a loose-coupler. It is usually wound with finer wire, and has a switch fitted at the end. It is connected in the crystal and telephone circuit of a crystal receiver, and is used as a reaction coil in some simple valve circuits. The term also refers to the output winding of transformers, induction coils, etc. Sometimes the windings of primary and secondary are very close together, at others they are a considerable distance apart. An instance of the former is the modern high-frequency transformer used in wireless, where both windings are wound together. In referring to the ratio of transformers, the terms 1 to 5 or 1 to 10 are used, indicating that the secondary has 5 turns to 1 of the primary or 10 to 1, as the case may be.

TABLE FOR WINDING HONEYCOMB COILS, GIVING THE SIZE OF WIRE TO BE USED, THE WAVE LENGTHS COVERED BY THE DIFFERENT COILS AND THE SIZES OF COILS TO BE USED, AS PRIMARY, SECONDARY, TICKLER AND TUNED ANODE.

BY using the following table in conjunction with the tables giving the particulars of windings for different sizes of inductances, and which are gauged for enamelled wire, corrections can be made as to the number of inches the winding tube must be in length, to accommodate the desired winding when wire with covering other than enamel is used.

TURNS PER INCH OF WIRE.

Size of Wire.	D.C.C.	S.C.C.	D.S.C.	S.S.C.	Enamel.	Enamel and S.S.C.	Enamel and S.C.C.
18	20.3	22.3	22.6	23.6	24.0	22.9	21.7
19	22.5	25.1	25.4	26.8	27.2	25.8	24.2
20	24.4	27.4	27.8	29.5	30.1	28.4	26.5
21	27.4	30.8	30.8	32.8	33.6	31.5	29.6
22	30.0	34.1	34.1	36.6	37.7	35.0	32.7
23	32.7	37.6	37.6	40.7	42.3	39.0	36.1
24	35.6	41.5	41.5	45.3	47.2	43.1	39.7
25	38.6	45.7	45.7	50.3	52.9	47.9	43.7
26	41.8	50.2	50.2	55.7	59.0	52.8	47.8
27	45.1	55.0	55.0	61.7	65.8	58.1	52.1
28	48.5	60.1	60.1	68.3	73.9	64.4	57.0
29	51.9	65.5	65.5	75.4	82.2	70.6	61.9
30	55.5	71.3	71.3	83.1	92.3	77.9	67.4
31	59.1	77.3	77.3	91.6	103.0	85.3	72.8
32	62.7	83.7	83.7	101.0	116.0	93.9	79.1
33	66.3	90.3	90.3	110.0	130.0	103.0	85.6
34	69.9	97.0	97.0	120.0	145.0	112.0	91.7
35	73.4	104.0	104.0	131.0	164.0	123.0	98.8
36	76.9	111.0	111.0	143.0	182.0	133.0	105.0
37	80.3	118.0	118.0	155.0	206.0	146.0	113.0
38	83.5	126.0	126.0	168.0	235.0	157.0	120.0
39	86.7	133.0	133.0	181.0	261.0	172.0	128.0
40	89.7	140.0	140.0	194.0	290.0	184.0	134.0

Gauge of Wire D.C.C.	Wave Length with Average Aerial.	Primary Turns.	Secondary Turns.	Anode Turns.	Reaction Turns.
24	130-375	25	35	35-50	35-50
24	180-515	35	50	50-75	50-75
26	240-730	50	75	75-100	50-75
26	330-1.030	75	100	100-120	75
26	450-1.460	100	150	150-200	75
26	660-2.200	150	200	200-250	75-100
26	930-2.850	200	250	250-300	75-100
26	1,300-4.000	250	300	300-400	75-100
28	1.550-4.800	300	400	400-500	75-100
28	2,050-6.300	400	500	500-600	100
30	3,000-8.500	500	600	600-700	100
30	4,000-12.000	600	700	700-800	100
32	5.000-15.000	750	850	800-900	100
32	6.200-19.000	1,000	1,100	1,100-1.200	150
34	7,000-21,000	1.250	1,350	1,350-1.450	150
34	8,200-25,000	1,500	1.600	1,600-1,700	200
		.001 m.f.d. in parellel.	.0005 in parallel.	.0003 in parallel.	

WAVELENGTH.—The distance travelled by a wireless wave while it increases from zero to its maximum value in one direction, reverses, attains its maximum value in the other direction, and falls to zero again.

VOLT.—The unit of electromotive force or electrical pressure, being that pressure which will drive a current of 1 ampere through a resistance of 1 ohm. The electromotive force of a single accumulator cell is about 2 volts.

HONEYCOMB COIL COMBINATIONS

SIZES OF COILS AND WAVE-LENGTHS.

No. of Turns.	Millihenries Inductance.	Wave-Lengths in Metres.
25	.040	170-375
35	.075	200-515
50	.15	240-730
75	.3	330-1030
100	.6	450-1460
150	1.3	660-2200
200	2.3	860-2850
250	4.5	1120-4000
300	6.5	1340-4800
400	11.	1860-6300
500	20.	2340-8500
600	40.	2940-12000
750	65.	3100-15000
1000	100.	5700-19000
1250	125.	5900-21000
1500	175.	7200-25000

COMBINATIONS OF COILS FOR VARIOUS WAVE-LENGTHS.

Wave Lengths.	Number of Turns of Coils for— Primary.	Secondary.	Tickler.
140-240	25	25	35
550-700	75	100	50 or 75
900-1,400	100	150	75 or 100
1,650-2,750	300	300	100
8,000-15,000	600	750	300-400 or 500
10,000-20,000	1,000	1,250	300-400 or 500
18,000-25,000	1,250	1,500	400-500 or 600

An alternative table of coil combinations is as follows:

Wave Lengths.	Number of Turns of Coils for— Primary.	Secondary.	Tickler.
145-350	35	25	35
305-710	75	50	35
635-1,660	150	100	75
854-1,970	200	150	100
1,420-2,850	300	250	150
2,550-4,250	500	300	200
4,200-6,300	500	400	200
6,250-14,500	1,250	1,000	400
13,600-21,000	1,500	1,250	500

From the above particulars the experimenter may devise numerous circuits for either the two-coil or three-coil mounting.

By the following table it will be seen that a set of fifteen coils will cover all wavelengths, and the table answers the question "What coils will provide the best complete set?"

Metres cov. by coils	Primary	Secondary	Tickler
140-250	25	25	35
250-600	35	75	50
600-2000	75	150	100
2000-5000	150	300	200
5000-13,000	500	750	400
10,000-25,000	1250	1500	1000

Wave-Length in Metres.	Aerial Circuit with Variable Condenser in parallel: .001 mfd.	Aerial Circuit with Variable Condenser in parallel: .0005 mfd.	Secondary Circuit with .0005 mfd. Variable Condenser in parallel	Tuned Anode Circuit with .0005 mfd. Variable Condenser in parallel	Reaction on: Aerial	Reaction on: Tuned Anode
300/400	25	35	50	50	75	75
400/500	35	50	75	75	75	100
900	75	100	150	150	150	200
1780	150	150	200	200	100	150
2600	200	250	300	300	200	200
3100	250	300	400	400	250	250
1100	100	100	150	150	150	200
1050	100	100	150	150	150	200
1050	100	100	150	150	150	200
1050	100	100	150	150	150	200
2200	200	250	300	300	200	200
2400	200	250	300	300	200	200
2800	250	250	300	300	200	200
2930	250	300	400	400	250	250
1800	150	150	250	250	100	150
1000	100	100	150	150	150	200
1100	100	100	150	150	150	200
1100	100	100	150	150	150	200
1650/2200	200	200	250	250	150	200
3200	250	300	400	400	250	250

Table Giving Wavelengths of Single-Layer Tuning Coils Wound with Enamelled Wire.

MAXIMUM WAVELENGTH OF COIL IN METRES.

Number Turns	Size of Wire S.W.G.	Length winding in ins.	2-in. diam.	2½-in. diam.	3-in. diam.	3½-in. diam.	4-in. diam.	4½-in. diam.	5-in. diam.	5½-in. diam.	6-in. diam.
	20	0.75	165	185	205	225	240	255	270	285	295
	22	0.56	175	195	210	230	245	260	275	290	300
20	24	0.44	180	200	215	235	250	265	280	295	305
	26	0.36	185	205	220	240	255	270	285	300	310
	28	0.3	190	210	225	245	260	275	290	305	315
	30	0.25	195	215	230	250	265	280	295	310	320
	20	1.1	205	235	265	290	315	340	365	390	410
	22	0.84	215	245	275	305	330	355	375	400	425
30	24	0.66	230	260	290	320	345	370	390	415	440
	26	0.54	240	270	295	325	350	380	405	425	450
	28	0.45	245	280	305	335	360	390	415	435	455
	30	0.37	260	290	325	350	370	395	420	435	455
	20	1.5	240	280	320	355	390	420	450	480	510
	22	1.1	255	295	335	370	405	440	475	505	535
40	24	0.88	270	310	355	395	430	465	495	525	555
	26	0.72	285	330	370	405	440	475	500	535	565
	28	0.6	300	345	385	420	455	490	525	560	590
	30	0.5	305	350	390	430	465	505	540	570	595
	20	1.8	275	325	365	410	450	490	530	570	605
	22	1.4	295	345	390	435	475	520	560	600	640
50	24	1.1	315	360	410	455	505	550	590	630	660
	26	0.9	335	385	435	480	530	570	610	650	680
	28	0.75	345	395	450	495	545	585	625	665	700
	30	0.62	360	415	470	515	565	605	645	685	725
	20	2.2	310	355	410	460	515	555	600	645	690
	22	1.7	335	385	440	495	550	595	635	690	735
60	24	1.3	355	410	470	525	580	630	675	725	770
	26	1.1	370	430	495	555	610	660	705	755	800
	28	0.9	390	455	520	580	635	685	730	780	825
	30	0.75	405	475	540	600	655	705	750	800	840
	20	2.5	335	395	455	515	575	620	670	720	770
	22	2.0	365	425	490	550	605	660	720	770	820
70	24	1.5	390	455	520	585	645	705	765	820	875
	26	1.25	415	480	550	615	680	745	800	855	910
	28	1.0	435	510	580	650	715	775	830	885	940
	30	0.87	455	530	605	675	740	800	855	910	965
	20	2.9	365	425	495	565	630	680	740	795	850
	22	2.0	395	465	540	605	665	725	790	845	905
80	24	1.8	430	500	575	645	710	775	840	905	965
	26	1.5	450	525	605	680	750	815	885	950	1010
	28	1.2	475	555	640	720	790	860	925	985	1045
	30	1.0	500	580	665	745	815	885	950	1010	1070
	20	3.2	390	455	535	605	680	740	805	965	925
	22	2.5	425	500	580	655	730	790	855	925	985
90	24	2.0	465	540	620	700	775	845	915	985	1050
	26	1.6	490	575	655	745	820	895	965	1035	1105
	28	1.3	520	605	695	785	865	940	1015	1085	1155
	30	1.1	540	630	720	810	895	970	1045	1115	1185
	20	3.6	415	485	575	650	730	795	865	935	995
	22	2.8	450	530	620	700	806	855	925	995	1065
100	24	2.2	490	575	670	750	835	915	990	1060	1140
	26	1.8	525	615	710	795	885	965	1040	1120	1200
	28	1.5	560	650	750	840	930	1015	1100	1175	1250
	30	1.25	585	685	785	880	970	1055	1140	1215	1290

Table Giving Wavelengths of Single-Layer Tuning Coils Wound with Enamelled Wire (Continued)

MAXIMUM WAVELENGTH OF COIL IN METRES.

Number Turns	Size of Wire S.W.G.	Length winding in ins.	2-in. diam.	2½-in. diam.	3-in. diam.	3½-in. diam.	4-in. diam.	4½-in. diam.	5-in. diam.	5½-in. diam.	6-in. diam.
	20	4.3	460	540	640	735	825	905	980	1060	1140
	22	3.4	500	595	695	790	880	965	1055	1135	1220
120	24	2.7	555	655	760	860	950	1040	1130	1210	1300
	26	2.2	590	700	805	905	1000	1095	1195	1275	1370
	28	1.8	630	745	855	960	1060	1155	1255	1345	1440
	30	1.5	660	775	895	1000	1110	1215	1315	1405	1500
	20	5.0	495	590	705	805	910	995	1085	1175	1260
	22	3.9	550	655	770	875	980	1080	1170	1260	1350
140	24	3.1	605	720	840	955	1060	1160	1260	1360	1450
	26	2.5	650	770	895	1010	1125	1230	1335	1435	1530
	28	2.1	695	825	955	1070	1185	1295	1405	1510	1615
	30	1.75	740	870	1000	1125	1245	1360	1470	1580	1690
	20	5.8	535	640	760	870	985	1080	1180	1280	1380
	22	4.5	595	715	835	955	1070	1180	1290	1390	1490
160	24	3.5	655	785	915	1040	1155	1280	1390	1490	1600
	26	2.9	705	840	970	1110	1225	1350	1460	1570	1685
	28	2.4	755	905	1050	1190	1305	1430	1545	1665	1780
	30	2.0	800	955	1100	1245	1370	1500	1625	1745	1860
	20	6.5	575	680	810	935	1060	1160	1280	1385	1490
	22	5.0	635	745	895	1025	1150	1270	1400	1505	1620
180	24	4.0	700	835	985	1120	1255	1385	1515	1625	1740
	26	3.2	755	905	1060	1200	1340	1470	1600	1715	1830
	28	2.7	820	980	1140	1280	1420	1560	1690	1810	1935
	30	2.25	870	1030	1190	1350	1490	1640	1770	1910	2040
	20	7.2	605	725	865	995	1125	1240	1365	1480	1595
	22	5.6	670	810	955	1090	1230	1360	1490	1615	1740
200	24	4.4	745	895	1050	1200	1350	1490	1620	1750	1880
	26	3.6	805	970	1130	1290	1440	1585	1715	1845	1975
	28	3.0	870	1050	1215	1380	1535	1685	1820	1955	2100
	30	2.5	925	1100	1285	1450	1610	1765	1915	2055	2200
	20	7.9	635	760	915	1050	1190	1315	1445	1575	1700
	22	6.2	705	855	1010	1155	1300	1440	1590	1720	1850
220	24	4.9	785	945	1110	1275	1430	1580	1730	1860	2000
	26	4.0	855	1025	1200	1370	1535	1690	1840	1980	2130
	28	3.3	925	1110	1310	1470	1640	1800	1955	2095	2245
	30	2.75	985	1175	1380	1555	1725	1885	2045	2200	2360
	20	8.7	675	800	960	1105	1250	1385	1525	1660	1790
	22	6.7	740	895	1060	1210	1375	1525	1670	1810	1955
	24	5.3	825	995	1175	1345	1510	1670	1830	1985	2130
240	26	4.3	895	1080	1270	1450	1625	1790	1955	2115	2260
	28	3.6	975	1170	1370	1560	1740	1910	2080	2240	2400
	30	3.0	1040	1240	1450	1650	1830	2010	2180	2340	2510
	20	9.4	695	835	1000	1145	1310	1450	1595	1740	1880
	22	7.3	775	940	1110	1280	1445	1600	1760	1910	2060
260	24	5.7	865	1040	1230	1415	1585	1760	1930	2085	2250
	26	4.7	940	1130	1330	1525	1710	1900	2070	2235	2400
	28	3.9	1020	1225	1440	1640	1835	2025	2200	2375	2540
	30	3.25	1090	1310	1530	1740	1935	2140	2315	2480	2660
	20	10.0	725	870	1045	1210	1370	1515	1670	1820	1970
	22	7.8	810	980	1160	1330	1505	1670	1840	2000	2160
280	24	6.2	900	1090	1285	1480	1660	1840	2020	2190	2360
	26	5.0	980	1180	1390	1595	1790	1980	2160	2340	2515
	28	4.2	1065	1280	1505	1720	1930	2130	2315	2500	2680
	30	3.5	1140	1370	1605	1820	2040	2240	2430	2620	2810

Table Giving Wavelengths of Single-Layer Tuning Coils Wound with Enamelled Wire (Continued)

MAXIMUM WAVELENGTH OF COIL IN METRES.

Number Turns	Size of Wire S.W.G.	Length winding in ins.	2-in. diam.	2½-in. diam.	3-in. diam.	3½-in. diam.	4-in. diam.	4½-in. diam.	5-in. diam.	5½-in. diam.	6-in. diam.
	20	10.8	750	900	1080	1250	1430	1580	1740	1900	2055
	22	8.4	835	1015	1200	1390	1570	1740	1915	2090	2255
300	24	6.6	935	1120	1340	1540	1735	1930	2110	2295	2470
	26	5.4	1020	1230	1450	1665	1870	2080	2275	2460	2640
	28	4.5	1110	1340	1570	1800	2015	2230	2435	2625	2820
	30	3.75	1190	1430	1680	1915	2135	2350	2560	2750	2950
	20	11.5	775	935	1125	1300	1480	1640	1810	1970	2130
	22	9.0	865	1050	1250	1440	1630	1810	1990	2170	2345
320	24	7.1	970	1175	1390	1595	1800	2005	2195	2380	2565
	26	5.8	1055	1275	1505	1730	1950	2160	2365	2560	2750
	28	4.8	1150	1390	1640	1880	2105	2325	2540	2750	2945
	30	4.0	1230	1485	1740	1990	2225	2460	2680	2890	3090
	20	12.2	800	965	1160	1340	1530	1695	1870	2045	2210
	22	9.5	895	1090	1290	1485	1680	1880	2070	2250	2435
340	24	7.5	1000	1215	1440	1655	1870	2080	2280	2480	2680
	26	6.1	1090	1325	1560	1790	2025	2250	2460	2670	2875
	28	5.0	1195	1440	1695	1930	2185	2420	2640	2855	3060
	30	4.25	1280	1540	1810	2070	2320	2570	2795	3010	3230
	20	13.0	825	995	1200	1385	1580	1750	1935	2115	2290
	22	10.0	920	1120	1340	1540	1740	1940	2240	2330	2510
360	24	7.9	1030	1255	1490	1710	1930	2155	2365	2565	2770
	26	6.5	1130	1365	1615	1860	2095	2325	2550	2760	2980
	28	5.3	1230	1490	1760	2010	2265	2510	2740	2970	3195
	30	4.5	1320	1595	1880	2145	2410	2660	2890	3130	3355
	20	13.7	850	1020	1230	1430	1630	1810	1990	2185	2360
	22	10.6	950	1160	1375	1580	1790	2005	2210	2410	2600
380	24	8.4	1060	1290	1530	1765	1995	2220	2440	2660	2865
	26	6.9	1160	1410	1670	1920	2160	2400	2640	2865	3090
	28	5.6	1270	1540	1810	2080	2345	2600	2845	3080	3320
	30	4.75	1365	1650	1950	2225	2500	2760	3010	3250	3500
	20	14.5	875	1050	1270	1470	1675	1860	2055	2240	2440
	22	11.2	975	1190	1410	1630	1840	2070	2275	2480	2680
400	24	8.8	1095	1330	1575	1820	2060	2290	2520	2740	2960
	26	7.2	1200	1455	1720	1980	2235	2480	2720	2950	3190
	28	5.9	1320	1590	1880	2160	2435	2700	2955	3195	3440
	30	5.0	1420	1700	2000	2290	2575	2860	3120	3365	3620
	20	16.2	925	1115	1350	1570	1790	1990	2190	2400	2605
	22	12.6	1040	1270	1505	1740	1980	2210	2415	2660	2880
450	24	9.9	1165	1420	1685	1950	2210	2460	2695	2945	3185
	26	8.1	1275	1550	1840	2120	2395	2670	2925	3180	3440
	28	6.7	1400	1695	2005	2300	2600	2880	3160	3430	3700
	30	5.6	1505	1840	2150	2465	2770	3080	3360	3640	3920
	20	18.0	970	1200	1430	1655	1895	2100	2320	2550	2760
	22	14.0	1100	1340	1595	1845	2100	2340	2590	2820	3065
500	24	11.1	1230	1505	1785	2065	2340	2620	2865	3140	3390
	26	9.0	1350	1640	1955	2250	2550	2840	3110	3400	3665
	28	7.4	1480	1795	2130	2455	2770	3075	3360	3660	3960
	30	6.2	1595	1940	2290	2630	2960	3280	3600	3900	4210

The foregoing tables enable the amateur experimenter to wind cylindrical coil inductances on any of the sizes of tubes in common use. It should be noted that the number of turns given, in each case, will bring in the wave length without a condenser. That is the inductance will act as though it were a coil tapped in tens and units, in which every single turn can be varied. With a condenser added in parallel, the wavelength will be greater, but as such a coil is tapped in fives or in tens the taps will compensate. Enamelled wire has been specified, but only for convenience, and if wires with other coverings are used the inductance of the coil will be slightly less but not sufficient to make any material difference. The number of turns per inch, however, will vary, with the kind of insulation used. Another table will give the turns per inch for wire with different coverings. This table should be consulted when computing the length of tube necessary for any given coil.

Australian Broadcasting

2.F.C.

FARMER'S BROADCASTING SERVICE.

Call Sign, 2.F.C. Wave Length, 1100 Metres.

Sydney Time.

Morning Session.

10.15 to 11.5 a.m.: "Sydney Morning Herald" News Service, Weather Information, Commercial Intelligence, Music, Domestic Talks (including Fashion, Beauty, Garden, and Health Hints). Reuter's and Australian Press Association Cables.

Midday Session.

12.30 to 2.0 p.m.: Time Signals, Coastal Farmers' Market Reports, Stock Exchange Information, "Evening News" Midday News Service, Sporting Information, Music.

Afternoon Session.

3.0 to 4.0 p.m.: Concert Programmes broadcast from various places of Entertainment and Studio Items, Sporting Information.

Early Evening Session.

6.30 to 7.30 p.m.: Children's Hour, Late Market Reports, Late Stock Exchange Information, Late Weather News, Shipping News, Late "Evening News" News Service, Reuter's and Australian Press Association Cables.

8.0 to 10.0 and 10.30 p.m.: Entertainments broadcast direct from Theatres, Concert Halls, Studio Concerts, Readings, Talks, Playlets, Etc.

Night Session.

Cables.

2.B.L.

BROADCASTERS (SYDNEY), LTD.

Meantime Wave Length, 350 Metres.

Sydney Time.

Early Morning Session.

8.0 a.m.: Early Morning News Service and Cables supplied by courtesy of the "Daily Guardian," Weather Report by courtesy of Mr. C. J. Mares (Govt. Meteorologist).

Morning Session.

11.30 a.m.: G.P.O. Clock Chimes, Talks each day by Mr. J. M. Prentice, O.C.B., C.-de-.G., Late News, Stock and Market Reports, suppl..d by the "Daily Guardian," Late Weather Report supplied by Mr. C. J. Mares Musical Programme from the Studio.

2.0 p.m.: G.P.O. Clock Chimes.

Afternoon Session.

3.0 p.m.: G.P.O. Clock Chimes, Songs and Music from the Studio, Jazz Orchestra from the Ambassadors (under the direction of Mr. Saatman), Serial Story.

SATURDAYS ONLY.—Football, Race and all Sporting Results will be broadcast after the clock has struck each hour.

Early Evening Session.

6.0 p.m.: G.P.O. Clock Chimes, Pavilion Orchestra (under the direction of Mr. Cec. Morrison).

6.30 p.m.: Children's Hour—Talks to the Kiddies by Uncle George and Uncle Jack.

7.30 p.m.: A Lecture each night on different codes of football.

7.45 p.m.: Pitt, Son & Badgery Market Reports (wool, wheat and stock), Fruit and Vegetable Market, Late Stock Exchange Information, Weather Report and Late Sporting News. (Saturdays only).

Evening Session—8.0 p.m.

Monday: Jazz Night, with Vocal Items from the Studio.

Tuesday: Classical Concert from the Studio.

Wednesday: Broadcasters' Popular Concert.

Thursday: Dance Night from the Ambassadors (Sydney), Dungowan (Manly), or Trocadero (Sydney).

Friday: Comic Opera Programme.

Saturday: Claissical and Operatic Concert.

Sunday.

Morning: Church Service from Palmer St. Church.

Afternoon: Classical Concert and Band Recital.

Night: Church Service from Chalmers St. Presbyterian Church, Classical Concert from the Studio.

3.L.O.

Wave Length, 371 Metres.

Melbourne Time.

Week Days.

10.57 a.m. to 2 p.m.: Midday Session.—Studio Orchestra, "Argus" News Service, Reuter and Aust. Press Assoc. Cables, "Herald" News Service, Weather Report, Stock Exchange.

2 to 5.15 p.m.: Afternoon Session.—Musical Programme, Fashions, Cookery, Infant Welfare, etc., News Service.

6 to 7.30 p.m.: Early Evening Session.—Children's Hour, News Service, Cables.

8 to 10.30 p.m.: Evening Service.—Theatrical Items, Lectures, Vocal and Instrumental Items.

Thursday Nights.

8.30: Carlyon's (St. Kilda) Dance Orchestra.

Saturday.

Same as week-days, with half-hourly sporting results added.

Sunday.

Church Services at 3 and 7 p.m., "News of the Week" at 9 p.m.

3.A.R.

ASSOCIATED RADIO

Wave Length: 480 Metres.

Melbourne Time.

Monday to Saturday.

11 a.m. to 12 noon: Morning Session.—Musical Items, Weather Report, Stock Exchange Information.

3 to 4 p.m.: Afternoon Session.—Musical Items, Weather Report, Afternoon Stock Exchange News,

7 to 10 p.m.: Evening Programme — Children's Corner, by "Uncle Rad" Closing Stock Exchange News, Weather and Latest Market Reports, News Bulletin, Vocal and Instrumental Concerts.

Sunday.

3 to 4 p.m.: Afternoon Session.—Musical Items.

7 to 9.30 p.m.: Evening Session.—Children's Corner, by "Uncle Rad," Vocal and Instrumental Items (Church Services announced).

6.W.F.

WESTRALIAN FARMERS

Wave Length, 1,250 Metres.

Perth Time.

12.30 to 1.30 p.m.: Midday Session.—Market Reports of The Westralian Farmers, Limited, News Service, Weather Reports, Gramophone Items.

3.30 to 4 p.m.: Afternoon Session.—Talks, Gramophone, Pianola, Westralian Farmers' Studio Orchestra.

7.5 to 8 p.m.: Early Evening Session.—Bedtime Stories, Market Report, Weather Report, News Cables.

Evening Session: Entertainment. See list hereunder:

Monday: 8.10, Lecture; 8.45, Wesfarmers' Orchestra.

Tuesday: 8.10, Professional Concert.

Wednesday: 8.10, Theatre or Hall Broadcasting.

Thursday: 8.10, Professional Concert.

Friday: 8.10, Concert Evening and Lecture.

Sunday: 7.20, Church Service.

Saturday: 8.15, Wesfarmers' Studio Orchestra.

Saturday.

12 noon to 1 p.m.: Midday Session.—Market Reports of The Westralian Farmers, Ltd., News Service, Weather Report, Gramophone and Pianola.

7.5 to 7.57 p.m.: Early Evening Session.—Bedtime Stories, Market Reports, Weather Report.

From 8 p.m.: Evening Session.—Time Signal, News Cables, Wesfarmers' Studio Orchestra.

7.Z.L.

ASSOCIATED RADIO

Wave Length, 390 Metres.

Hobart Time.

Monday to Saturday.

11 a.m. to 12 noon: Morning Session — "Mercury" News Service, Musical Items.

3 to 4 p.m.: Afternoon Session.—Weather and Market Reports, Educational Lectures as arranged.

7 to 8 p.m.: Early Evening Session.—Children's Stories by Uncle Nod, Latest Sporting News (Saturday).

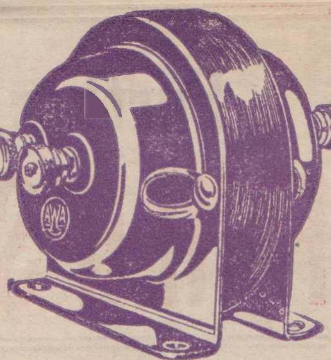
8 to 10 p.m.: Evening Session.—Vocal and Instrumental Concerts from Studio, Orchestral Music.

Sunday.

3 to 4 p.m.: Afternoon Session.—Musical Programme.

7 to 9.30 p.m.: Evening Session.—Church Services as arranged, Vocal and Instrumental Concerts from Studio.

Reasons why you will be satisfied with the AWA Transformer



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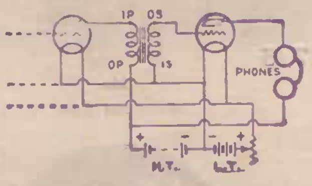
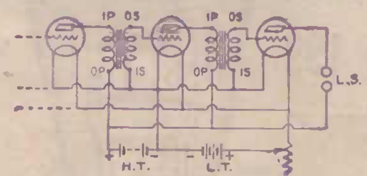


Showing arrangement of A.W.A. Transformer in one stage low frequency circuit.



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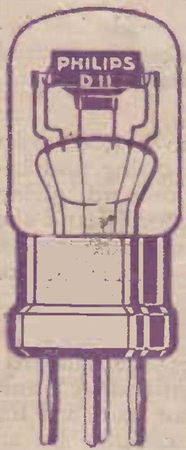

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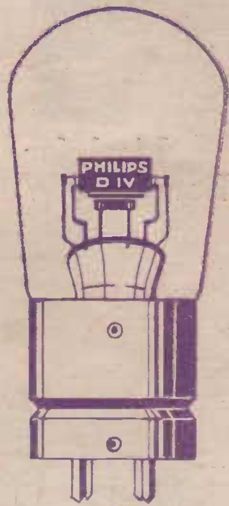

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