WIRELESS WEEKLY

Registered at the G.P.O., Sydney, for transmission by post as a newspaper.

VOL. 5. No. 22. 3D FRIDAY, MARCH 27, 1925.

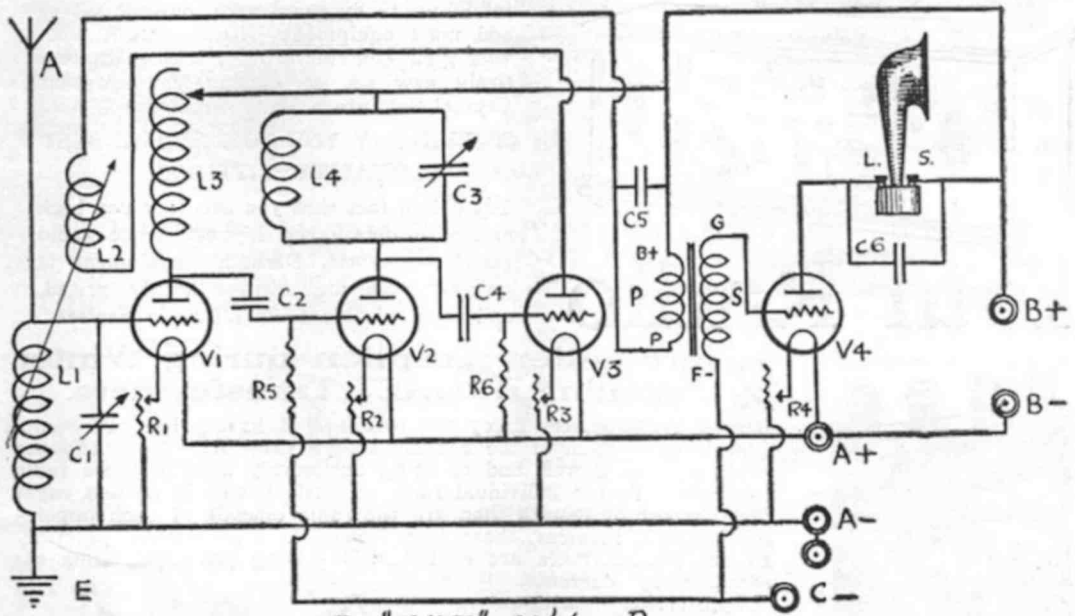
FEATURE:

The Construction of a Single Transmitter

The "T.A.T." 4 Valve Receiver

You Have My Word For It

IT'S A CULLEN CIRCUIT



The "T.A.T." 4-Valve Receiver.

The T.A.T. system—John Scott Taggarts latest. In this circuit two stages of Radio Frequency Amplification are employed. The first stage is apperiodic, second is tuned, ordinary tuned anode. It is claimed that this method overcomes the usual difficulties of self oscillation produced by using two stages of tuned anode, and is much more efficient than two stages of transformer coupled radio frequency.

Inductances L1, L2, and L4 may be ordinary honeycomb coils, L1 and L2 being coupled by a two coil holder, L4 being kept well away from the others. L3 is a choke, which is not critical.

A 250 turn H.C. Coil may be used or an ordinary 3½ inch former wound with 28 enamelled wire may be accepted.

Resistances—
R5, 100,000 ohms.
R6, .2 megohms.

Condensers—
C2 and C4 are .00025 mfd.
C1, .001 mfd.
C3, .0005 mfd.

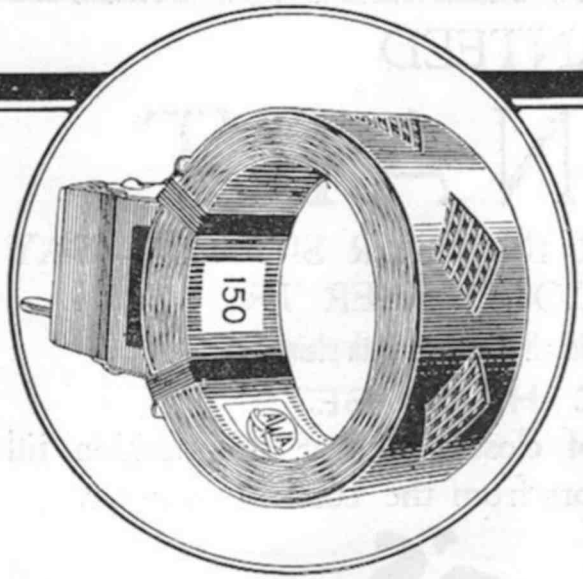
Materials required—
1 Bakelite Panel, 22 x 8 x 3/16, 18/4
1 2-Coil Holder (Medway) .. 7/6/-
1 .001 Master Condenser and Dial, £1/7/6
1 .0005 Master Condenser and Dial, £1/5/-
1 Remler Panel Mtg. Plug 3/-
4 Nutmeg Valve Sockets 14/-
4 Frost Rheostats £1/2/-
2 .00025 Wetless Condensers .. 3/-
1 .001 Wetless Condenser 1/6
1 .002 Wetless Condenser 1/6
1 .100,000 ohm Resistance 1/6
1 2-megohm Resistance 1/6
1 Jefferson Star Transformer £1/2/6
8 Black Bakelite Terminals .. 2/8
1 Single Circuit Jack 2/6

Necessary Coils, Batteries, etc.

Once again we recommend DV3 de Forest valves for those who wish to employ dry cells for filament lighting.

For Accumulator work UV201a, A.P. True Blue Valves are best.

Excellent reception of distant stations has been achieved by our Mr. Hamilton using this simply controlled receiver.



Tuning In

In thousands of homes people are tuning in on their radio sets.

Scarcely a sound; a slight turn, a faint noise; another adjustment, and then clearer and clearer comes music from the air.

Is your nightly "tuning-in" as simple as this?

If you want simple, quick and more selective tuning use,

A.W.A. Honeycomb Coils

No. of Turns.	Wavelength with .001 Condenser.	Price, Mounted.	Price, Unmounted.
20	50–260	6/9	2/–
25	100–375	7/–	2/2
35	150–525	7/6	2/2
50	190–675	7/9	2/4
75	240–925	8/–	2/6
100	340–1340	8/3	2/9
150	500–1960	8/6	3/–
200	650–2675	9/–	3/6
250	725–3575	9/9	3/9
300	1050–4200	10/6	4/3
400	1600–6000	11/8	5/–
500	2000–7500	13/6	7/–
600	3000–9000	15/6	9/–
750	4000–11000	16/9	12/–
1000	4500–16000	1/–/–	14/–
1250	6310–18240	1/4/–	16/–
1500	7635–22210	1/8/–	18/–

At all Radio Stores

A.W.A. Honeycomb Coils are mounted on de-luxe bakelite coil plugs with a black celluloid diamond strip, and then the shoulders are specially bound with black waxed thread, which holds the coil rigidly in position.

A.W.A. Coils are non-hygroscopic, offer very low radio frequency resistance, and self capacity is at a minimum. They may be used as tuning, loading, coupling, or wavemeter inductances, ensuring the highest degree of efficiency for your Set. Made in sizes to suit your requirements, each A.W.A. Honeycomb Coil is attractively boxed, and the wavelength table printed on the carton. Also supplied unmounted.

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Wireless Weekly

12-16 REGENT STREET, SYDNEY, AUSTRALIA.
'Phones: Redfern 964 and 930.

Official Organ of the New South Wales Division of the Wireless Institute of Australia, with which are incorporated the Affiliated Radio Societies and the Australian Radio Relay League.

Editor: A. W. Watt.—The Editor will be glad to consider Technical and Topical Articles of interest to Australian Experimenters. All Manuscripts and Illustrations are sent at the author's risk, and although the greatest care will be taken to return unsuitable matter (if accompanied by stamps), the Editor cannot accept responsibility for its safe return.

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Agents in Great Britain.—The Colonial Technical Press Ltd., Dudley House, Southampton Street, Strand, W.C. 2...

VOL. 5 No. 22 MARCH 27, 1925

Editorial.

THE BEAM SYSTEM.

SOME weeks ago we received a communication from the honorary general secretary of the Wireless Institute of Australia (Victorian Division) in which, among other things, we were assured that the majority of the members had no faith in the beam system of radio communication, and for that reason had no intention of trying it out. Despite this weighty assurance, two of the world's largest wireless concerns, the Marconi Company and Amalgamated Wireless (A/sia) Ltd., persist in carrying on the scheme for the installation of beam stations to maintain commercial communication between Australia, Canada, and Great Britain. By the irony of fate, the Australian stations are to be erected within hailing distance of the very city whose experts have no faith in the system. One would have imagined that in selecting this site the big Australian company would have thought twice before deliberately treading on the corns of those who, irrespective of the fact that they have never given it a trial, are credited with having no faith in the beam system. After years of experiment on the part of Marconi and other of the world's leading wireless scientists, during which the directional or beam system of communication was conclusively proved to be a practicable proposition over immense distances, and bearing in mind the fact that private concerns are satisfied to sink a lot of money in beam stations, no reasonable doubt can exist in the mind of any thinking person whose exercise of the grey matter with which Nature has provided him is further stimulated by a little light reading of the scientific principles underlying the beam system.

According to its own literature, the Victorian Division is established for the purpose of encouraging the scientific study of wireless telegraphy and telephony in Australia, but if the letter we refer to may be accepted as voicing the sentiments of the majority of its members, then they have defeated their own self-avowed objects by condemning a thing before it has even been tried.

It seems to us that, in pursuance of its stated policy of "aiding those interested in the subject of wireless with advice and instruction," the Victorian Division would have been well advised in making some scientific investigation of the beam system, which will have a direct and most beneficial effect upon the public of Australia.

The establishment of the beam stations will result in a very considerable reduction in the present rate per word from and to Australia, Canada, and England; and we are definitely assured of a minimum working speed of one hundred words per minute over the full twenty-four hours. Cheaper communication means more messages, more messages mean greater business, and greater business creates greater Australian prosperity. That is the position in a nutshell, and, so confident are they of success, business concerns handling thousands of pounds of shareholders' money are content to go to great expenditure to put the beam system into operation. It requires a broad vision to go into a venture of this kind, and when that vision is backed up by established scientific facts and the definite results of constructive experiments, then success is assured. There is no room for any but a broad vision in any Australian wireless affairs, and we have altogether too many ill-informed authorities whose outlook is obscured by an imperfect perception of the subjects they attempt to discuss. To express a lack of faith in anything without first having put it to the test is merely ridiculous.

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SYDNEY, N.S.W.

Wireless Institute of Australia

N.S.W. Div. Inc.

Incorporating the Affiliated Societies and The Australian Radio Relay League

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A.H. Perrett Publicity Officer.

Monthly General Meeting.

The Monthly General Meeting of the Wireless Institute of Australia, New South Wales Division, was held at the Royal Society's Hall, 5 Elizabeth Street, Sydney, on Thursday, March 19th, at 8 p.m. Mr. O. F. Mingay delivered a lecture on Wave Length and Frequency in relation to Selectivity and Tuning. He dealt more particularly with the aspect of broadcasting, and he propounded theories which caused a great deal of discussion in which many members took part.

Mr. J. G. Reed contributed a very enlightening exposition on wave length and frequency, explaining the reason for the difference between mellow and harsh tones from various stations by means of diagrams on the black board.

Mr. Mingay advanced the theory that the long wave lengths were the best, his personal experience being that they were receivable over longer distances in daylight.

Mr. M. Perry asked numerous questions and a number of contributions were made by other members. Altogether a most enjoyable evening was spent.

A plea was advanced for the more general use of the frequency in kilo cycles instead of wave length in metres. The use of this new unit is rapidly gaining ground in many quarters, and it certainly gives a much better idea of what is going on in wireless circuits than the mere mention of wave lengths.

Delegates' Council Meeting.

A meeting of the Delegates' Council was held at the Institute Headquarters on Friday, March 13. The most important business dealt with was the arrangement for the Maclurcan Cup. This cup s being presented by Mr. Charles Maclurcan, 2CM, for competition amongst the affiliated clubs. The winners will be entitled to hold the cup for one year and to have the names of their President, Secretary, and three most prominent members engraved on a small shield.

The rules which have been drawn up for this competition are comprehensive but yet simple in character. The annual presentation of the cup will be made at the annual dinner of the N.S.W. Division of the Wireless Institute. It is anticipated that a great deal of friendly rivalry will take place between the various affiliated clubs to secure this trophy.

The donation of this trophy is only another indication of the public spiritedness of Mr. Maclurcan, and serves to show that his whole heart is in the experimental movement.

New Zealand Tests.

Arrangements are being rapidly pushed forward for the New Zealand tests to take place from May 1st to 10th both dates inclusive. The working schedule is now practically completed and the conditions governing these tests have been drawn up. They will be published in these notes next week, but in the meantime all those wishing to take part are particularly requested to forward to Institute Headquarters particulars of their station, power, radiation, sizes, and type of aerial. These particulars are required most urgently as the time available is all too short for completing the arrangements. It is hoped to make these tests a complete success, and it is only with the prompt co-operation of transmitters that matters can be brought to a satisfactory conclusion.

Standard Frequency Transmissions.

For the first time the standard frequency transmissions of the Wireless Institute of Australia, N.S.W. Division, from station A 2CX were on the lower wave length band on Tuesday, March 17th. Transmission on 60, 80, 100 and 130 metres were made and Mr. Stowe is most anxious to hear from anyone who has heard his transmissions. Reports should be sent either direct to station 2CX or to Institute Headquarters. A request has been received from New Zealand experimenters that as far as possible tansmissions on the wave length band from 75 to 86 metres should be avoided. This is a most reasonable request as not only New Zealand but Australian stations are hampered in their efforts to receive U.S.A., by local stations operating on this wave band. An appeal is there-

fore made to all Australian experimental stations to keep above 86 metres or below 75 metres so as to avoid interference with U.S.A. stations, and it is confidently expected that the sporting instincts of the "Aussies" will bring about wholehearted response to this request. By way of setting the example the Wireless Institute of Australia, N.S.W. Division, will in future vary the standard frequency transmissions to comply with this request. The following alterations in the code of signals for the various wave lengths is notified and should be observed by all those using the standard frequency transmissions.

Wave length in metres	Frequency in kilo cycles	Code Signal
250 metres	1,200	— — — —
200 metres	1,364	— — —
200 metres	1,500	— —
170 metres	1,765	— . . —
150 metres	2,000	— . —
130 metres	2,308	. — .
100 metres	3,000	. — — .
86 metres	3,488	. . — — . .
75 metres	4,000	. . — . .
60 metres	5,000	. — — . .

It will therefore be seen that these standard frequency transmissions include the upper and lower limits of the American band, so that transmitters will be able to know exactly what range they should observe on their sets to comply with the wishes of other experimenters.

Annual Dinner.

The annual dinner of the N.S.W. Division of the Wireless Institute of Australia, has been fixed for Thursday, April 30, at 7 p.m. The function will be held at Sargent's Cafe, in Market St., and all members of the Wireless Institute and affiliated radio clubs are cordially invited to be present. Tickets will shortly be available from all club secretaries and from Headquarters at 10/- each.

It would greatly facilitate the work of the organising committee if those intending to attend this function would obtain their tickets as early as possible.

QRM.

2FA informs us that he is starting up again after a long period of quiescence.

2DJ is also active and can be heard at frequent intervals.

4BK, Mr. Randall, has been on a visit to Sydney, and was present at Institute Headquarters during the lunch hour on Thursday, March 19.

Tense moments were experienced at the last general meeting of the Wireless Institute of Australia, N.S.W. Division, when 2JR suddenly took off his coat and drew his sword. It was quite alright, however, he only wished to demonstrate on the black board with the aid of his slide rule.

What has become of 2BB? He has not been seen at Headquarters for a long time.

A. H. PERRETT,
Publicity Officer.

The N.S.W. List of Transmitting Licenses.

In the issue of March 13th, we published a list of N.S.W. Transmitting Licenses and have since been informed from various quarters that the list was incomplete. The reason for the omission of several transmitters may be explained as follows. Under the present regulations, applicants for transmitting licenses are required to pass an examination and to be in possession of an Amateur Operator's Certificate. Those having obtained licenses under the former regulations are required to qualify for the certificate before a renewal is granted upon expiry of their present licenses. A number of present holders of licenses have no intention of renewing after the expiration date. Summed up, therefore, it may be assumed that those names which were omitted were those whose renewal papers had not been completed at the time the list was issued.

Round the Clubs

The asterisk denotes clubs affiliated with the Wireless Institute of Australia (N.S.W. Division).

STRATHFIELD RADIO CLUB *

The ordinary weekly meeting of the above club was held at the Club Rooms on Monday Evening, 19th inst. The attendance was particularly good, and we were favoured also with a visit from members from various other Clubs, and Messrs. G. M. Cutts and C. D. Maclurcan from Institute Headquarters.

The reason for this unusual display of interest was the fact that Mr. J. G. Reed had the floor for the evening, and he gave a really excellent lecture on "Short Wave Experimental Transmission and Reception," which is, perhaps, the most discussed topic in local wireless circles nowadays.

The authorative way in which the subject was treated, combined with Mr. Reed's remarkable facility for expression of technical points in a manner comprehensible by the average amateur,

TESTS WITH AMERICAN FLEET

WATCH FOR N.R.R.L.

AT the request of the Navy Dept., U.S.A., which is desirous of testing the possibilities of short wave radio communication, F. H. Schnell, traffic manager of the American Radio Relay League, has been given leave of absence so that he may accompany the Pacific fleet during its forthcoming manoeuvres. He will be on active duty from the middle of April until about October 1st, with the rank of lieutenant.

The short wave transmitter which Mr. Schnell is to instal and operate for the period of the cruise will be used for communicating with amateur members of the A.R.R.L. in the United States and foreign countries, the object being to compare the efficiency of the short wave low power outfit with the regulation navy sets.

This formal investigation by the Navy Department through a civilian radio organisation of national scope is regarded as significant appreciation of the amateur development of short waves. The Navy thoroughly appreciates the economical advantages of the amateur short wave transmitter, and it now purposes to determine how its range and capabilities compare with high power sets.

The amateur radio transmitting stations in common use are prohibited from operating with more than one kilowatt of power while the Navy sets employed on shipboad sometimes go as high as 30 kilowatts. There is also a tremendous difference in the initial installation costs, the high power stations amounting to several thousands of dollars as compared with a few hundred required for setting up the average amateur station.

The short wave transmitter designed for use during the cruise, according to Mr. Schnell, has been given the call NRRL to identify it as the special navy station for communicating with the amateurs of the American Radio Relay League. While this set will operate on a wave length of 54 or 55 metres, Mr. Schnell will take with him two personal transmitters for use on 20 and 40 metres.

For a long time the Navy Department and the A.R.R.L. have been associated to a certain extent in an investigation of the short wave radio transmission. This was pronounced particularly during the transcontinental flight of the airship Shenandoah, on which was installed a special set for communication with amateurs. The result of this test was of such importance that navy officials commented upon it favourably and thanked co-operating amateurs.

The tremendous range covered by amateur transmitters with their one kilowatt of power has so impressed the navy department, that a thorough study of their operations under all kinds of atmospheric conditions appeared to be worth while. The fact that Mr. Schnell has had both navy and amateur experience, doubtless had considerable influence in his selection.

Mr. Schnell will listen for Australian amateurs on 20, 40 and 75 to 120 metres, but the transmitter on N.R.R.L. will operate only on 54 or 55 metres. The Fleet leaves San Francisco about April 12th, so watch for N.R.R.L. after that date. Will Aussies kindly forward to us records of transmission or reception results with N.R.R.L. so that we may have a complete file for Mr. Schnell on his arrival?

During the world war Mr. Schnell was connected for a time with the transatlantic control office of the Director of Naval Communications at Washington, D. C. He was also radio operator in charge on the U.S.A. George Washington, when it carried President Wilson to France. He entered the Navy in May, 1917, and was stationed at Great Lakes until October of that year. While in Washington, he copied the peace acceptance message from Germany and acknowledged its receipt.

He organised the transatlantic tests conducted by the A.R.R.L., as well as amateur long range tests between operators in this country and those in Australasia and South America. He is credited with having achieved the first successful two-way amateur communication with Europe.

(Continued from page 9)

helped to make an interesting lecture even more so, and it was greatly appreciated by all present.

At the conclusion of the lecture Mr. Reed answered a large number of questions, and proceedings terminated with a hearty vote of thanks to the lecturer, carried by acclamation.

All members of this club are hereby reminded the Monday, 30th inst., is All Club's Night at the Institute Headquarters, when a very attractive programme of motion pictures will be screened. As this date falls on our ordinary meeting night the meeting will be held on Tuesday evening, 31st inst.

At our next meeting, on 23rd inst. the draft rules submitted by Mr. Maclurcan in connection with his proposal to donate a very fine trophy for competition among the clubs, will be fully discussed by members.

The idea is an excellent one, and no doubt will be heartily taken up by all affiliated Clubs, as the nature of the proposed competition is such that healthy rivalry between clubs should be stimulated, and besides encouraging interest in the work of individual clubs.

Arrangements have been made for Mr. Geo. Apperley, the well-known radio engineer, to give a lecture, illustrated by lantern slides, before the club on Monday evening, 6th April. The subject has not been decided on yet, but members can rest assured of an excellent evening's entertainment.

The technical committee of the club are hard at work on the alterations and improvements being effected to the club's apparatus to make it more suitable for demonstration purposes, and are making satisfactory progress.

That interest in the work of the club is being maintained is shown by further applications for membership coming to hand, and we should soon be in a fairly strong position numerically.

Members can rest assured that the committee can always provide interesting entertainment for meeting nights, as we are fortunate in being able to secure the hearty co-operation of first-class lecturing talent when required, and interesting practical demonstration work will also be carried out at meetings in the near future.

Inquiries regarding the club's activities or conditions of membership addressed to the hon. secretary, 44 Bayard Street, Mortlake, will receive prompt attention.

SACRIFICE. One valve set without coils, valves, batteries—50/- or with, £5/10/-. New. Apply A.W., c/o Wireless Weekly.

CONSTRUCTION OF C.W. AND RADIOPHONE TRANSMITTERS

By Wireless Weekly.

EVERY "Wireless Weekly" reader who is contemplating building a C.W. or radiophone transmitter is undoubtedly acquainted with the vacuum tube as a detector and amplifier. We will, therefore, go straight to the heart of our subject and see how and why a vacuum tube can generate C.W. oscillations. Its ability to generate continuous oscillations is based directly on its ability to amplify. Every amplifier, if properly arranged in a suitable circuit, is capable of acting as a generator. The details of the principle of the production of C.W. oscillations by a vacuum tube are here given in detail, because we feel sure that they are not well known, even by some of the advanced experimenters.

Once the basic principle underlying theory is really understood, the practical applications become very much easier. The basic principle to be remembered is: Any amplifying system is capable of generating C.W. oscillations if the output and input circuits are suitably coupled together.

When the plate and grid circuits are coupled to each other and oscillations are produced, these do not build up indefinitely, because every valve has a certain limitation depending upon the valve elements themselves.

How Oscillations Start.

Every reader is familiar with the oscillations generated by his receiver; how the radio frequency oscillations are applied to the grid of the valve per primary and secondary in the three coil receiver, but the question may arise in his mind as to how oscillations are generated, when there are no oscillations first applied to the grid of the valve, as is the case with a standard C.W. oscillator. The switch is closed and oscillations are produced.

Fig. 1 shows the ordinary P1 circuit. The plate and grid coils are coupled together, and in this manner the energy from the plate circuit is induced back into the grid circuit. Now, when the filament is burning it emits electrons, but none of them flow to the plate when the key is not pressed. At the instant the key is pressed, a current flows between the plate and filament. The current in the plate coil has, therefore, changed from zero to the value of the plate current. This change of current induces a voltage in the grid coil, which is immediately applied to the grid. We have here our initial grid

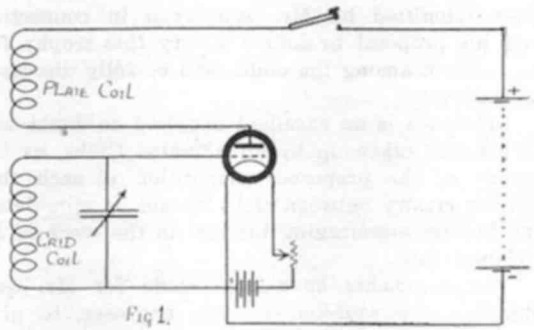


Fig 1.

disturbance, which is necessary to start oscillations (as is the case with receiving). This small grid voltage is again amplified by the valve, part of the amplified energy is fed back again per medium of plate and grid coils, amplified again, and so on, generating oscillations.

The tube is thus seen to be a generator of C.W. oscillations by virtue of the fact that it is an amplifier, and that the plate and grid circuits are so coupled that energy from the plate and grid circuits is fed back into the grid. Fig. 2 shows how a regenerative receiver can be used as a transmitter.

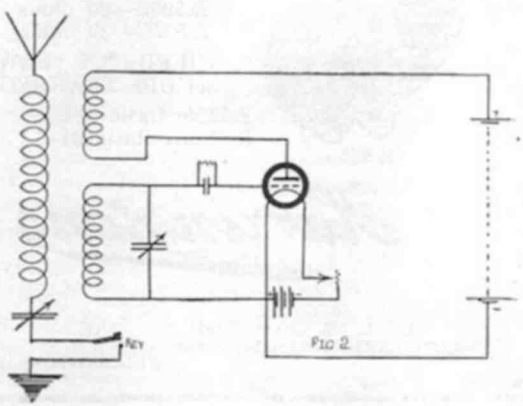


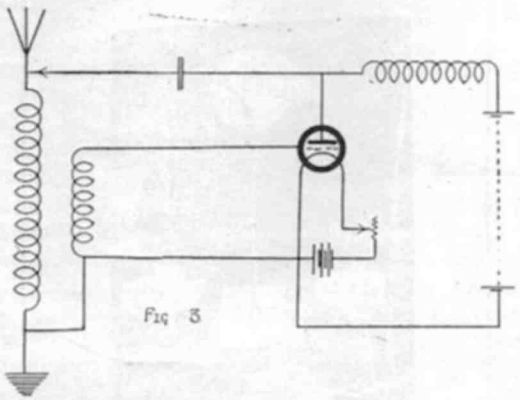
FIG 2

Transmitting Circuits.

There are a certain few transmitting circuits which are widely used, some of which were referred to last week. They are referred to by various names, viz., Colpitts, Meissner, etc., but we will consider here only those which are the most important and which the average amateur will probably use:

1. Shunt Circuit.

Various forms of this circuit are used, but they are all essentially the same. In this type the radio frequency circuit and the direct current power supply are connected in shunt across the tube as seen in Fig. 2. Fig. 3 illustrates the case where two sepa-



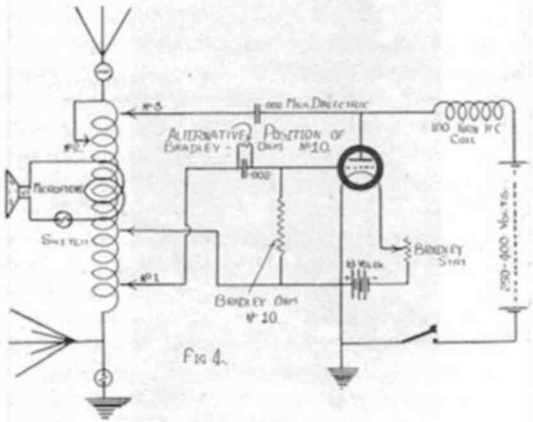
Shunt oscillating circuit. Separate coils are used here for antenna and the grid circuits.

rate coils are used for antenna and grid; it is seen that the plate coil is part of the antenna coil here, and that the grid coil is coupled. Where a separate plate coil is coupled to the grid coil and antenna, the circuit is called a Meissner Circuit. This was described last week.

Without going any more deeply into the theory of transmitters, we will now endeavour to instruct our readers how to construct a similar transmitter which will give them every satisfaction. The following materials are required:—

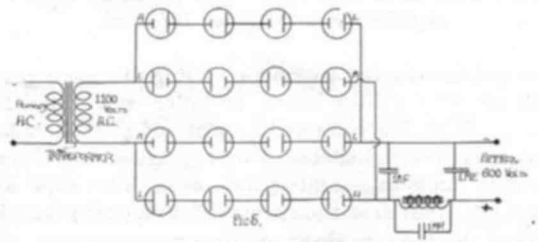
1 Bakelite panel, 20in. x 9in. x 3/16in.
1 Ebonite formor, 10in. x 5in. across.
40 feet 7/20 aerial wire.
1 Bradleystat.
1 Bradleyohm, No. 10.
2 .002 condensers (Mica Dielectric).
1 Valve holder (Crosley porcelain).
1 5-watt valve or 201A.
1 Hot wire meter or thermo meter, 0-1 amp.
1 8-volt battery or step-down transformer from A.C.
250-400 volt B battery or step-up transformer and rectifiers, and
1 100-turn H.C. coil and holder.

Fig. 5 shows the rectifier unit to obtain H.T. voltage for the plate of the valve from transformer as described in "Wireless Weekly" of February 20.

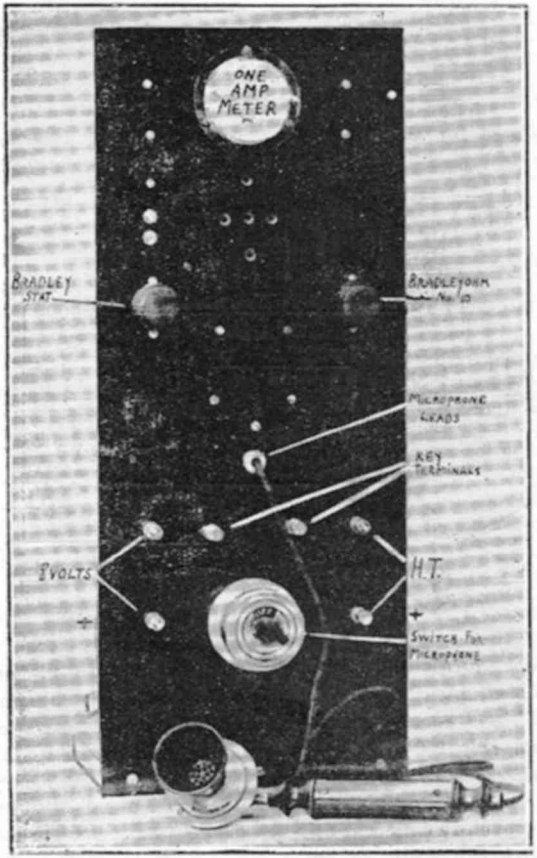


Shunt oscillating circuit. Grid and antenna circuits coupled, showing the circuit diagram used in the small C.W. and phone transmitter depicted in the photographs. With only 250 volts on the plate of a 201A valve, this little set was reported QSA 469 miles airline from Sydney.

The main tuning inductance consists of 30 turns of seven-twenty aerial wire placed into small slots, which can easily be cut in a lathe fitted with screw cutting device. The slots should be a little over one-eighth inch deep, and four slots cut to the inch. It is advisable to reduce the plate voltage when the set



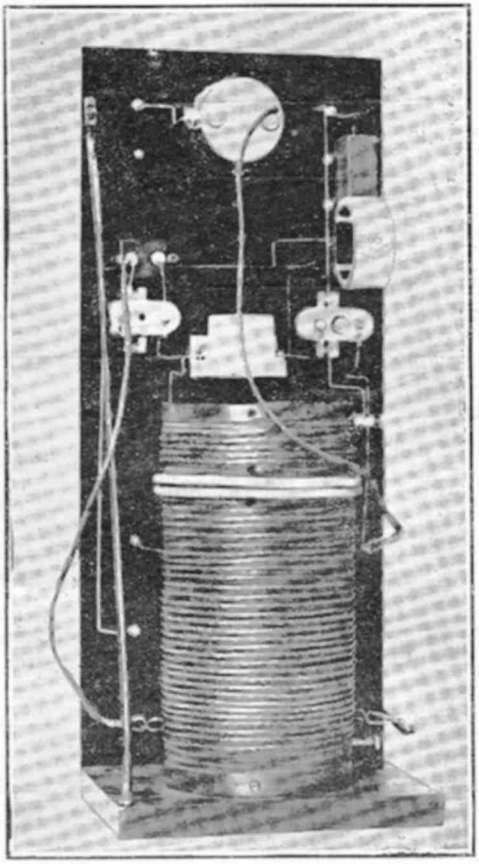
is being adjusted, so that the tube will not become overheated. The condenser in the plate lead is used to insulate the inductance from the positive plate power supply, in order to prevent a short circuit, and must therefore have a mica dielectric if high voltages are to be used. The radiation of the set shown in the accompanying photographs using 400 volts Columbia "B" batteries on a wavelength of



Photograph showing an actual 5-watt transmitter constructed on the lines laid down in this article. Excellent reports were received concerning telephony and Morse signals transmitted on this set. The positions for mounting the various parts are indicated.

200 metres was 700 milliamps. Using the same plate voltage with a 201A valve, radiation was 320 milliamps. With 250 volts on the plate of a 201A radiation was 250 milliamps. The approximate positions for the antenna, counterpoise, and plate clips are shown in the circuit diagram. The capacity of the ground acts as a shunt condenser across the grid filament portion of the transmitting inductance. For this reason it is necessary to use only a few turns of the inductance. Consequently the ground and filament clip will be placed about eight turns from the grid end of the coil. (The lower end in circuit diagram.)

With the grid filament circuit tuned to some definite wavelength, it is essential that the antenna-counterpoise and the antenna-ground be adjusted to the same frequency. This operation is a bit tricky, and a tap every two or three turns at a time is not close enough for locating the resonance point. It should be altered one turn or even half a turn at a time; in this manner a point will soon be found where the radiation will rise quickly. A low wavelength may not be best for radiation, but it is better for selectivity and range. Hence it should be the transmitter's ambition to get down as low as possible, especially for the very low power. A movement of even a single turn of clip No. 1 will upset the whole tuning, so that a readjustment of clip No. 2



Back view of 5-watt transmitter, showing the placing of the inductance and the two turns required for loop modulation. On the top right-hand corner is the honeycomb coil, with fixed condenser directly behind it. On the top centre is the one amp. meter. In the centre the valve socket, and to left and right of it respectively the Bradleyohm No. 10 and the Bradleystat.

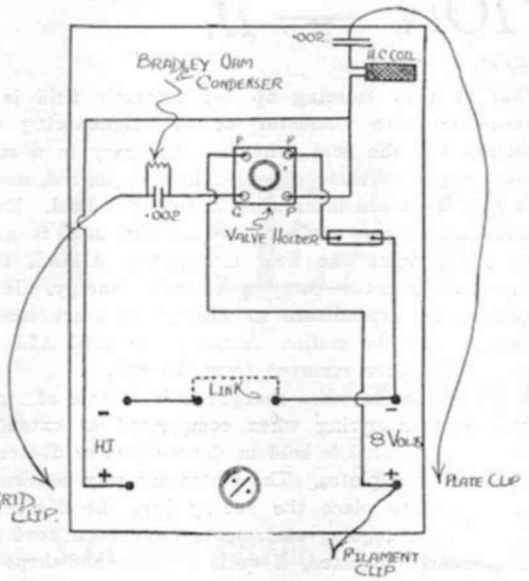


Fig. 7.

Back view of wiring with the tuning inductance removed. See Fig. 4 for wiring of switch to loop modulating coil.

will be necessary. It is best to put clip No. 1 as low down the coil as possible, although if it is too low the wavelength may be too short or oscillations cease. Clip No. 2 should then be tried further up. Next, clip No. 3 is moved down slightly until maximum radiation is again obtained. The modulation coils consist of two turns of heavy gauge, well-insulated wire, one end of which is taken to the single pole switch, which in turn makes or breaks the modulating circuit. When straight C.W. is required, the switch should be broken. For speech, make switch and link key terminals.

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ADD TO LIST PUBLISHED LAST WEEK.

7 BQ.—L. J. Crooks, 64 Frederick St., Launceston, Tasmania.

N. K. F.

WANDERING around the short waves, many amateurs have heard signals from NKF (Washington, D.C.) The following particulars kindly sent us by Chris A. Cullinan (A3XW), and which he obtained from Dr. A. Hoyt Taylor of NKF, will be interesting to readers.

The main transmitter radiates about 9KW on 71.3 metres. It is controlled by a quartz crystal, the antenna current being about 20 amperes. The transmitter is located approximately ½ wavelength from the aerial, details as follows:

Antenna: 55 feet 2½in. pipe and star shaped counterpoise consisting of eight 2 1/4in. pipes (iron), about 40 feet long radiating from a central link immediately under the vertical pipe. Another transmitter, details of which are not given, puts 1KW into the antenna on 87.3m.

The third set has been converted to crystal control on 54.7 and is being installed on one of the ships of the Pacific fleet. It is expected that it will go to Australia with the Battle fleet and will be available for work with amateurs. An A.R.R.L. representative will probably be in charge of this set. NKF will begin a new series of tests on high power on 71.5m, some wave near 40, and another between 20 and 32 metres (dates unknown). The 71.5m. set is now handling traffic nightly betwen 8 p.m. and 2 a.m. (probably EST) with NBA, NPL, NPG, NPM. Anyone wishing to arrange tests with NKF should communicate with Dr. A. H. Taylor, Radio Director, U.S. Naval Research Laboratory, Bellevue, Anacostia, D.C., U.S.A.

The quartz control mentioned is probably as follows: A thin piece of quartz of the required frequency is placed in the grid circuit of the oscillator in place of the grid condenser leak, the set being a Master Oscillator.

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"DEAD SPOTS."

For some time past the research department of the American Bell Telephone Co. has been investigating the mystery of the "dead spots" that are known to exist, and which, in some cases, prevent the reception of wireless signals. It is hoped ultimately to record these areas in the form of a chart, which, in connection with details of local geological strata, may throw considerable light on a subject that at present is somewhat obscure.

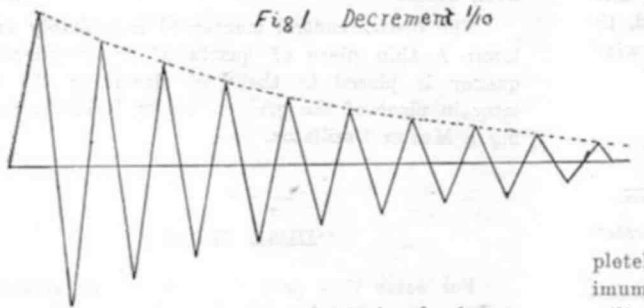
REGENERATION — II.

By E. JOSEPH

NEGLECTING various small irregularities, it is quite easy to calculate the lengths of the swings or excursions if we observe two of them. Thus, let the first swing be 100 units (any unit will do) long, and let the second be 90. Then the decrease is 1/10, and this applies to all succeeding excursions. I have prepared a few rough diagrams illustrating to scale how the decrease occurs. These diagrams indicate only the limits of the swings, and not the varying velocity which must occur. Note in Figs. 1, 2 and 3 how increasing the loss causes the rapid dying away of the oscillation, and in Fig. 4 how at a certain critical value of the loss no oscillations can occur.

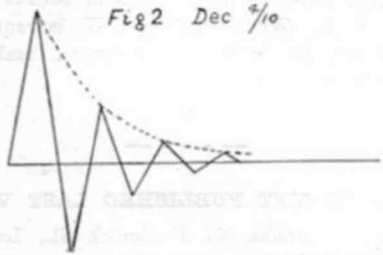
The above will well repay study. Try to ascertain where the energy is carried at different times during an oscillation. Draw a curve showing the oscillations. Then think out and draw another showing the velocity of motion, and note that the energy is always stored in the mass at the centre of a swing and in the spring at the ends. Consideration of the above will explain many happenings in everyday life, and will make clear the behaviour of the electrical circuits now about to be dealt with. All natural laws are immutable. Nature itself slavishly obeys every law it has made. "Mechanical oscillation is oscillation of a body as a whole; electrical oscillation is that of the ultimate particles." Therefore the laws regulating mechanical oscillation apply to and are obeyed by electrical oscillation also.

Any conductor offers resistance to the passage through it of an electric current, therefore energy



is absorbed—transformed into heat—in forcing a current through it. If the conductor takes the form of a coil, the passage of a current through it will cause a magnetic field to be built up in the space inside and surrounding it. Energy is used in building up this magnetic field. If the current ceases the magnetic field collapses and disappears. The energy used in overcoming resistance is irretrievably lost, but that used in building up the magnetic field is returned to the conductor—or to neighbouring conductors—as the field collapses. Contrary to a statement which recently appeared in this journal, energy is NOT absorbed in creating a magnetic field. Every scrap of energy used to produce the field is given up again when the field disappears. A coil, then, can—like a mass—carry a store of energy. It requires the expenditure of energy to start electric motion, and the motion cannot cease until ALL the energy has been removed from the coil.

A condenser when charged is in a state of strain, just as is a spring when compressed or extended; the energy stored is held in the medium or di-electric separating its plates. The plates are only convenient conductors to place the energy into the di-electric. If all my foregoing statements have been read and intelligently digested, I quite expect—and hope—to get numerous letters objecting to this explanation of a condenser's method of storing energy. This will give me an opportunity of describing a few simple experiments which are a proof of my statement. A circuit consisting of a coil and a condenser possesses the necessary qualifications for the sustaining of oscillations. The coil has the equivalent of mass, the condenser of elasticity, and resistance represents the friction. If the condenser is charged it has energy stored in it, which, when discharged through the coil, sets up an electric current in the circuit. If the resistance does not absorb all the energy, the balance will be stored by the coil in the form of a magnetic field. When the condenser is com-

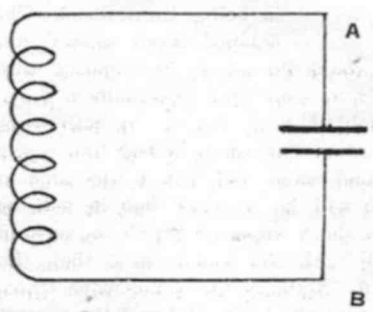


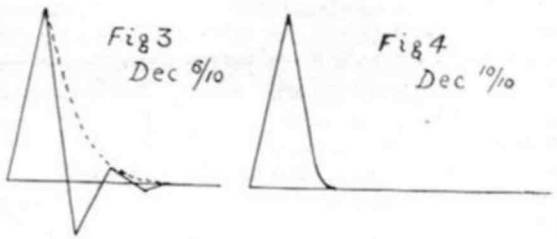
pletely discharged the field will be at a maximum and will start to collapse. In so doing it will induce a current in the coil which will charge up the condenser in the reverse direction. (Note the similarity to a spring first extended, then compressed.) When the field has all disappeared the current will cease, and the condenser will be charged with the remaining energy. It will therefore again discharge through the coil, and so on and so on.

The energy not "used up" in overcoming re-

sistance is passed backwards and forwards between condenser and coil, getting less each passage until finally, when no more energy is available, all current ceases. The time required for each swing is, as before, controlled by the dimensions of the mass (inductance) and of the spring (capacity), and is, of course, very small, as in nearly all electrical phenomena. It may, however, be made sufficiently long to be closely observed, and it is then found that the decrease follows exactly the same laws as the mechanical oscillations, so that the diagrams may be taken as referring to electrical oscillations also. In a resistanceless circuit an oscillation once started would go on for ever. If I can supply to the circuit little "puffs" of energy sufficient to supply the losses due to resistance without depleting the original supply, then the oscillations will continue with undiminished amplitude for just so long as the "puffs" are administered. If the "puffs" are too powerful, then the amplitude will increase until the increased losses (due to the increased current) exactly equals the supply. Again note the exact similarity between the mechanical and electrical cases.

The valve may be used to control and supply these little "puffs" of energy to the oscillatory system. The circuit oscillates. The VALVE DOES NOT. The hand supplies "puffs" of energy to a swing. The swing oscillates. THE HAND DOES NOT. The valve has, of course, various other functions with which it is not proposed to deal here. Essentially a three electrode valve consisting of a filament, grid, and plate is a device in which all variations of electrical pressure or potential between filament and grid are exactly reproduced on a magnified scale between filament and plate. As we cannot create energy we must have a reservoir from which the neeessary supply may be drawn. This is the function of a "B" battery. In an oscillatory circuit one effect of oscillations is to cause a periodic variation of potential of the junction between coil and condenser. (See diagram.) The periodic differences of potential occur at the points A and B. If A and B are connected to the grid and filament of a valve, these periodic variations will produce periodic variations of exactly the same rate, but of much greater amplitude in the plate circuit. These latter variations will cause a varying current—of the same rate—to flow in the plate circuit, and if a coil is included in the plate circuit a magnetic field will exist in the space within and surrounding it, which field will also vary in strength at the same rate. If part of this field is allowed to enter the oscillating circuit, it will, as it pulsates, induce currents in the circuit, the energy of which acts as before explained to "make up" for the losses. If the field passing into the oscillating circuit is strengthened by putting the coils closer together, then the oscillations will "build up" until the losses become equal to the input. As long as the increments of energy are supplied by the plate coil, so long will the circuit continue to oscillate. There is a very slight difference between the mechanical and electrical systems which must here be touched upon. The pushes given to a swing are in no way controlled by the swing unless we include the fact that the "swinger" uses his eye as a means of judging the timing and strength of the impulses, but the impulses given by the plate coil to the oscillating circuit are directly controlled by the latter. Therefore, the greater the oscillation, the more powerful the impulse or the input of energy. The greater the input of energy, the greater becomes the oscillation, and so it goes on "building up" until it reaches a limit imposed by the fact that the losses increase very rapidly.





Resistance always causes a loss of energy, but there may be other losses in addition. We may connect an aerial system to the circuit, and induce currents in it which will cause it to radiate electric waves. These waves represent energy, which must be supplied from the oscillating circuit, and which, if the impulses given to the latter are of insufficient strength, may prevent it from oscillating at all. A transmitting station is one in which care is taken that the impulses are of sufficient strength to keep the circuit oscillating, although it is being robbed of considerable amounts of energy by the aerial. There are numerous methods of effecting the transfer of the requisite amount of energy from the plate to the oscillating circuit and of controlling their amount, but these methods cannot be gone into at this stage. If a mechanical oscillatory system is left free we have seen that the oscillations will cease

after a certain number of excursions depending upon the decrement of the system. If I impart to the system impulses which are insufficient to supply all the losses, the system will come to rest, but will make a greater number of excursions before doing so. I have, in effect, lowered the decrement or reduced the resistance.

An exactly similar effect may be produced in a valve circuit. If the energy passed from plate to oscillatory circuit is insufficient to cause persistent oscillation, we have a state which we may call regeneration without oscillation. The result is that an incoming signal does not have to expend so much of itself in overcoming the losses, it being able to draw on the plate coil for this, that a greater proportion is available for use in the valve in the production of 'phone signals, and which may be amplified in the same or in subsequent valves. The amount of regeneration which may be used is strictly limited by several factors, two of which are of importance, especially in telephony. A single impulse received by an aerial will set up an oscillation in a receiver. The various combined circuits have a combined decrement which determines the number of waves or excursions which will occur before their amplitude becomes too small to be of use. For a given wave length or frequency it determines the time during which the oscillations last and the rate at which they die away.

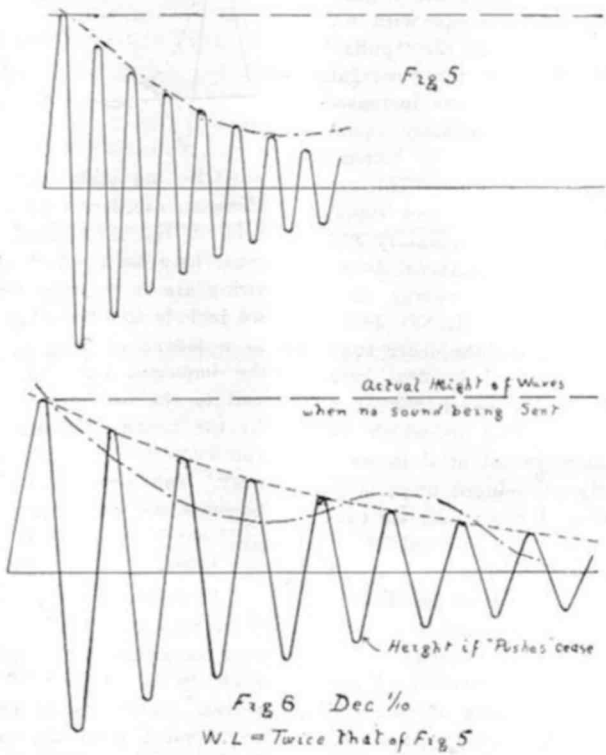


Fig 6 Dec 1/10
W.L = Twice that of Fig 5

Sound is also an oscillatory motion, amplitude representing loudness and frequency, pitch. The frequency of sound is very small when compared with that of the oscillations used in radio. The quality of a sound or its "timbre" is determined by a large number of smaller oscillations of higher frequency which are, so to say, mixed up with the main oscillation or fundamental. These higher frequency oscillations are called "harmonics," and it is due to them that there is a difference between the same note played on a piano or a violin. The frequency of these harmonics is sufficiently high to have an effect on both transmission and reception of music. Transmission of music consists of generating by means of valves oscillations of uniform amplitude, and then, by absorbing part of the energy or diverting it, of causing the amplitude to vary in such a way that its rise and fall accurately delineates the sound wave it is desired to transmit. If the decrement of an aerial is small and the wavelength long, it may happen that it is impossible to force down the amplitude of an oscillation in it sufficiently rapidly to enable a correct representation of a sound wave. The lower the decrement the longer the wavelength, and the higher the pitch of the sound the more likely is this to occur.

In exactly the same way an incoming wave must affect a receiver, and if too much regeneration is used it may be impossible to reproduce an accurate "image" of the received signal. Either of these effects will cause distortion. Both occurring together give a hopeless noise. From this we may derive certain conclusions. First, at a transmitter, it is easier to accurately modulate short waves than long ones. Second, at a receiver more regeneration may be used on short waves than on long ones. That is, louder signals may be obtained on short waves given no greater strength of received signal. Diagrams 5 and 6 are an attempt to illustrate this. The horizontal dotted line represents the actual height of the waves when no sound is being transmitted. The damped wave shows how the aerial current would die out if the impulses were to cease. Fig. 5 is to scale and represents a wavelength, which is half that of Fig. 6. In both cases the decrement is 1/10. The chain dotted line represents part of a sound wave, and this is the same in both diagrams. It will be evident that it will be easier to force the short wave of Fig. 5 to vary in amplitude to agree with the sound wave than the long wave of Fig. 6. Actually the sound wave transmitted will lie between the horizontal and the correct (chain dotted) curve, but will be nearer the latter

in Fig. 5 than in Fig. 6. To accurately transmit the sound the wave should agree exactly with the chain dotted line.

This may explain why it is difficult to receive long wave telephony in Sydney without distortion, which becomes more marked owing to an exactly similar effect being produced in the receiver by regeneration when we attempt to increase volume. An aerial radiates best at wavelengths not far removed from its own natural frequency or wavelength. This is approximately four times the distance from "earth" to free end. Thus, to radiate 2000 metres at maximum efficiency an aerial should be about 400 or 500 metres long. That is about 1500 feet, which is impracticable in many cases.

The loss of energy due to radiation is at a maximum under these conditions, and it is this loss which is the only useful loss. It represents the energy sent out into space. "Loading" up an aerial to increase its wavelength reduces the decrement, and so tends to cause the effects I have tried to illustrate unless at the same time the resistance or useless loss is increased to avoid reducing the decrement.

CALIFORNIA AND ONTARIO LISTEN-IN.

Two very interesting letters have been received by Farmer & Company, Limited, from the Continent of America. The first one, written by Mr. William Crews of Timmins, Ontario, Canada, says:—

> "On January 7th, at 1.30 a.m. Eastern-Canadian time I picked up 2FC and listened in with great pleasure to one instrumental and two vocal numbers. At first it was faint, but, later on I could get the call quite plainly."

The second letter comes from Mr. E. V. Regan, 1650 Bancroft Way, Pasadena, California, U.S.A. and states that on February 1st, at 2 a.m. Pacific-Standard time, he picked up very plainly a call and afterwards a dance number that was transmitted from 2FC. Mr. Regan asks for a list of Farmer's Broadcasting times as he wishes again to tune in on 2FC.

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LIFE'S LITTLE TRAGEDIES.

Worried Wife (over telephone to husband): "Sam, please come home—I've got some connection wrong in the house—and the radio set is all covered with ice, while the electric refrigerator is singing 'Red Hot Mamma'"!

BEAM WIRELESS

DIRECT SERVICES TO ENGLAND AND CANADA. SITES SELECTED IN VICTORIA.

AFTER a careful survey over a large area of New South Wales and Victoria, made by the experts of Amalgamated Wireless (Australasia) Ltd., sites for the new beam stations have been selected in the vicinity of Melbourne.

One site is situated in the Parish of Yaloak, about six miles south of the town of Ballan, which is on the main road between Melbourne and Ballarat, and on the main Melbourne - Adelaide railway line. On this site two of the new Marconi beam transmitters will be erected. One transmitter will send a concentrated beam of wireless waves direct to a station in England, and the other will send a similar beam direct to a station on the St. Lawrence River, near Montreal (Canada).

On another site, about 15 miles from Melbourne, near the towns of Keilor and Sydenham, and close to the main roads and to the railway line between Melbourne and Bendigo, the company will erect two new Marconi beam receiving stations. One receiving station will be designed to catch the beam of waves coming direct from the transmitting station in England, and the other will be arranged to catch the waves coming from the beam transmitter, near Montreal.

Mr. E. T. Fisk, managing director, Amalgamated Wireless (A/sia) Ltd.

In addition to these main oversea stations, the company will erect feeder stations in all the other capital cities, so that each State will have a complete wireless service from its capital to and from London, and another complete wireless service to and from Montreal.

These stations will provide communication direct with England and Canada for the full 24 hours of every day in the year, and they will be capable of working automatically at high speed. The company will establish collecting and delivering offices in each capital city, from which the wireless stations will be operated by distant control.

Messages at very much reduced rates will, it is officially announced, be accepted from the public for despatch to Great Britain and to all parts of Europe through the London beam, and to all parts of North and South America through the Montreal beam.

For the first time in the history of Australia private messages will be sent to and from Great Britain at a charge as low as sixpence per word (which will be the rate for week-end telegrams). Daily deferred messages will be reduced to one shilling per word, and business messages in code will be reduced to two shillings per word, whilst press messages will be dealt with at the very low rate of fivepence per word.

In selecting the sites, provision has been made for future extension of the service to other parts of the world.

The work of erecting the masts, buildings, wireless plant, and connecting lines will be proceeded with at once, and it is expected that the service will be in full operation in the early part of next year.

The new beam stations are guaranteed to have a speed and capacity far in excess of anything previously attained over so great a distance.

A beam sent from the Australian station to England, or from the English station to Australia, will cover the distance in less than one-fifteenth of a second, and the operating speed between the two countries will reach at least one hundred words per minute; and, since it will be possible for the new stations to handle four messages simultaneously, the total speed will reach at least four hundred words per minute.

Beam wireless marks a very definite step forward in commercial wireless.

:: EUROPEAN AND AMERICAN TRANSFORMERS AND TELEPHONES ::

By E. G. BEARD

PERHAPS the main reason why radio forms such an attractive hobby for so many intelligent people is that so many factors have to be considered in the design and construction of receivers. These various factors can be combined in an unlimited number of combinations, and therefore the experimenter is always in the hope that he can continually improve the efficiency of his receiver by trying new combinations. Some of these new combinations are not always successful, and very often a perfectly innocent part or valve is blamed, whereas the real fault is that some factor which should be considered has escaped attention.

It is proposed to draw attention to a few of these factors, which are often overlooked, in this article, and then perhaps some experimenters will see they have been a little rash in condemning some transformer or valve, and will realise that it has been used wrongly. Practically every circuit used employs some type of audio amplification, and it is the audio side of the receiver which is affected by the ensuing notes.

Much has been said and written about the use of a C battery as a means of preventing distortion. Practically every experimenter has heard of it and knows the reasons for its use. However, its importance varies with the type of valve used. With a 199 or 201a valve the filament emission is so great that a C battery hardly affects the tone, but, on the other hand, if a Dutch or bright emitter English valve is used it is essential. Consequently the users of American valves often think the C battery useless, while those experimenters who use Dutch valves regard it as essential. Thus there is a difference of opinion about a matter which is quite well known. Similarly many experimenters say a Dutch valve is very inefficient, or alternatively an American transformer is not much good. I want to explain the reasons for these differences of opinion, and also draw attention to another matter which must be considered if maximum efficiency is to be obtained out of a receiver.

At present valves and parts from both America and the European Continent are on the market in Australia, and this fact is the origin of a pitfall into which many an experimenter has fallen. How many experimenters have built a set to use a 201a valve, and then after burning out a valve replaced it with a Cossor or Phillips Dutch valve because of the latter's cheapness, and then failed to get satisfactory results. Such experimenters have most probably blamed the valve. Others have perhaps purchased English sets and then changed to American valves, and been disappointed with the results obtained.

It is impossible to say from such experiences that a particular make of valve or transformer is the best. Look at the matter in a reasonable way. It is absurd to imagine that the English and Continental manufacturers ignore the productions of American manufacturers. In quite a large number of cases reciprocity agreements exist. Thus, if America produced some startling design it would be immediately copied by the other side of the world. Thus the rash statement that the American valve is much better than the English does not give much credit to the intelligence of the English manufacturer, and he must have intelligence or he would not be a large manufacturer. In England quite satisfactory reception of broadcasting is achieved with English valves, and a similar condition exists in America. Therefore, the valves must be equally efficient.

Then why the differences found in Australia? It is merely a matter of the internal impedance of the valve and the suitable design of the transformers or telephones used with it. We would not dream of condemning a 480 volt electric lamp because it did not give much light when used with a 240 volt electricity supply. Using an American transformer on an English valve is exactly the same in principle.

Perhaps first of all it is necessary to explain what is meant by the internal impedance of a valve. It is the effective resistance of a valve which causes a decrease in current when the plate voltage is varied slightly. To be acurate, a valve must be regarded as a battery opposing the plate voltage and a resistance in series with the plate battery. Varying the voltage of the grid varies the voltage of the opposing battery, while the resistance remains constant. This resistance is the internal impedance (which is really an alternative name for resistance) of the valve. Now, for maximum efficiency it is essential that the impedance of the intervalve transformer, loud speaker, or telephones be equal to the internal impedance of the valve.

America is universally recognised as the home of amateurs and low wavelengths. When wavelengths were allotted in America the amateurs were placed on wavelengths in the neighbourhood of 200 metres. They were using these waves during the development of the valve. Radio frequency amplification on these wavelengths is by no means a simple matter, and therefore the amateur pinned his faith to a regenerative receiver and obtained volume by using audio amplification to make the weak signals loud. The maximum volume from such a receiver depends on the maximum power which the last valve can handle. Therefore their receiving valve developed into what is really a small power valve designed to have a large plate current with a moderately high voltage B battery. Incidentally the adoption of this type of valve worried the American amateur very much, indeed, when he tried to copy the radio frequency amplification systems which were developed in England and on the Continent during the war, and such systems as the neutrodyne and super hetrodyne had to be developed to overcome the large self capacity which this type of valve was bound to have.

The American 201a valve may be regarded as typical. Its plate current can easily be made as large as 15 milliamps with a 100 volt B battery. Normally it is of from three to six milliamps, and the internal impedance generally lies between 10,000 and 25,000 ohms.

In England and on the Continent the chief development of the valve took place during the war, when the amateur on short waves was non-existent. Radio engineers in England were not very much interested in working loud speakers. They had two big problems to solve. First they had to increase the range of reception of receiving stations as an alternative to increasing the power of the transmitting stations. After that they had to make the receiving stations so sensitive that the power of the transmitting stations could be reduced so as to make it difficult for enemy directional stations to plot the positions of our ships, etc. Theoretically, radio amplification was far more efficient for this purpose than audio amplification. Therefore they concentrated on radio amplification. This was not such a very difficult problem on the longer waves which it was found desirable to use, particularly if the self capacity of the valve was small. Also with radio amplification the benefits gained by resonant circuits rendered it undesirable to use step-up radio transformers. Telephone reception was desired, and thus there was really very little need for valves which would handle large power. In cases where large power was required, a high voltage B battery was used to give it and a step-down transformer used to convey the energy to the loud speaker. Thus the English valves such as the V24 were developed for radio amplification, and they had a high internal impedance. The Q valve, for instance, had an internal impedance of about 250,000 ohms. The English or Dutch valve of to-day usually has an impedance somewhere between 50,000 and 100,000 ohms. When broadcasting started valves of these types were quite common, and therefore most of the telephones, transformers, and loud speakers had a very high impedance also. Later power valves were developed for loud speaker work, and some of these have an impedance as low as 7,000 ohms.

Thus the difference between the usual Dutch or English valve and the American valve lies in internal impedance, and not in efficiency. Provided they are properly used, very little difference will be found in the respective efficiencies. Thus if an American valve is used for radio amplification it is essential to neutralise its self capacity by some such system as the Hazeltine neutrodyne. On the other hand, if we desire to use a Dutch valve to work a loud speaker, a very high B battery should be used in conjunction with a C battery, and the loud speaker must have a high impedance also. Again, if the well-known ST100 circuit is used with English valves, a damping resistance of about 100,000 ohms is required, while if used with an American valve this damping resistance may have to be as low as 10,000 ohms.

These differences must be remembered in the design or construction of a receiver. If an English or Dutch valve is used, the telephones or transformer should have a high resistance. Most of the American transformers have an internal impedance of about 12,000 ohms, more or less, and therefore will not work at maximum efficiency. On the other hand, an English loud speaker will not work at maximum efficiency with an American valve. Telephones and transformers from England or the Continent, unless of special design, will also not be suitable for use with American valves. You would not expect a 480 volt motor to run at full speed on a 240 volt supply.

Perhaps the safest plan is to use English and Continental telephones, transformers, and loud speakers, with European valves and American accessories with American valves. Up to the present the signal audio transformer is the only one which has come under my notice, and this is apparently designed for American valves. I understand that the makers of it are preparing a similar transformer suitable for Dutch valves.

In addition to this matter of efficiency, the matter of tone is also affected by these different impedances. Very little has been published up to the present about this view of the problem. When the current through the valve is varied by means of the grid voltage, the anode voltage also changes and partially counteracts the effect of the variation. This effect is felt the least when the two impedances are equal as has been stated before. If the anode resistance is higher or lower than the internal resistance of the valve and only due to resistance, a loss of efficiency will be the only result. On the other hand, if the plate circuit impedance be inductive, as is the case with a transformer, loud speaker ,or pair of telephones, the result is more complicated. This is because the changes of anode voltage will not take place at the same instant as those of the grid. In such a case if the impedance of the transformer is lower than that of the valve, the straight portion of the valve characteristic will be curved and in addition to a loss of efficiency the tone of the reproduction will also be impaired. On the other hand, if the impedance of the transformer or speaker be higher than that of the valve, loss of efficiency will result, but the tone will be slightly improved. Most transformers have a primary impedance slightly higher than that of the valve they are intended to be used with due to this fact. If we use an American transformer with a Dutch valve the impedance will be much too low, and besides lack of efficiency the tone will be slightly impaired. On the other hand, the use of an English high impedance transformer with an American valve will result in comparatively weak signals, but slightly improved tone. The same applies to both loud speakers and telephones. Thus it is best to use like with like.

Now, with regard to obtaining the same volume from—say—a Dutch valve as is obtained from a 201a. It is all a matter of making sufficient power available. Nearly every amateur knows how to calculate the power available in a circuit. We can either multiply the resistance of the circuit by the square of the current or alternatively divide the square of the voltage by the resistance of the circuit. In this case the latter method is the easiest. Suppose we use a B battery of 100 volts and a 201a valve with an impedance of 15,000 ohms. Then the available power is 100 x 100 divided by 15,000 watts, which works out to approximately .6 watts. The Dutch valve has an impedance of, say, 100,000 ohms. Then to find the necessary voltage to give this power we have to find the square root of .6 x 100,000, which gives approx. 250 volts. Thus it will be necessary to use 250 volts on the Dutch valve, and, of course, a suitable C battery is essential. That may look as though the Dutch valve requires a larger expenditure in B batteries, but such is not the case. The current in the Dutch valve will be less than half that in the 201a, and therefore smaller capacity B batteries may conveniently be used. With the Dutch valve the voltage is the highest, but the current is highest with the 201a, and it is the current which runs down the B batteries.

The loud speaker with the Dutch valve should have an impedance of about 100,000 ohms also. Such speakers are rare at present, but a step-down transformer can be used. A good substitute can be made for use with an American loud speaker by using a signal 3½ to 1 audio transformer the wrong way round. The secondary should be connected in series with the plate of the valve and the primary connected to the loud speaker. Both the speaker and the transformer primary are designed to have impedances equal to that of an American valve, and would therefore suit each other. Certain English firms make a special transformer for this purpose, but they, too, seem rare; but the above combination can be recommended as a good substitute.

The figures given in the above do not pretend to be precise, but they are sufficiently so to indicate the vital points concerned.

Another matter of design also enters into the efficiency of telephones and loud speakers. Many makes use types in which the B battery current flows around the magnet system. With these it is essential, for best results, that the currornt flows in such a direction as to strengthen the magnet system, and allowance is made in the design for this additional magnetism. Thus if an American speaker of this type is used with a Dutch valve, this currrent will not be so large as anticipated by the designer, and consequently the magnetism will be weak and signals weak. On the other hand, if an English speaker of similar design be used with an American valve, the currents will be much larger than anticipated, the magnetism much larger, and probably the diaphragm will rattle against the magnet poles. Very often this will happen even when used with the proper valves, and in such a case the trouble can usually be cured by connecting up the speaker the wrong way for a short time so as to slightly weaken the magnet system. These speakers will also be affected if used with a step-down transformer, because then no current will flow round the magnet system, and if the original designer has allowed for it the magnet system will be slightly weaker than he anticipated, and consequently signals will be slightly weakened. These little points apply in a large degree to American telephones. With a valve set care

(Continued on page 26)

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All the latest publications on Crystal and Valve Construction.

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(Continued from page 23)

should be taken that they are connnected up so as to strengthen the magnet system. If used with Dutch valves or with a crystal (unless of special crystal design) the magnet system will be weak, and the receivers may not be quite as sensitive as Continental receivers.

Thus the absurdity of any statement as to a valve, transformer, etc., of particular nationality being inefficient is apparent. Most probably it is the method of use or application which is inefficient. If you change from one valve to another, just think of the various parts of your receiver which will be affected, and see that they are correct before judging the valve.

The whole matter may be summed up briefly in the following short statements:—

A Dutch valve of usual design needs a high B battery if it is to handle large power, and a C battery is essential.

A Dutch valve requires high impedance telephones, transformers, and loud speakers.

An American valve uses large plate currents with a comparatively low B battery voltage, and a C battery is not quite so essential.

An American valve requires low impedance accessories.

Loud speakers and telephones should be connected in the correct direction, which can be found by trying for loudest signals.

To be quite safe, use accessories of similar origin to the valves, unless the manufacturer of an article states its impedance.

Don't jump to conclusions about any respective efficiencies unless you are sure that every detail of operation has been considered.

— . . . —

EXPERIMENTS AT SOUTHAMPTON.

A WIRELESS telephone service between ships and the shore, which may be linked up with the General Post Office land telephone lines, is now undergoing experiment at Southampton, and has reached such a stage that a perfect commercial service could be undertaken if suitable wavelengths could be allotted free from mutual interference between the service and existing broadcasting and other commercial wireless stations.

The experiments are being conducted by the Marconi Company in conjunction with the General Post Office and the Southern Railway Company, whose cross-channel steamer "Princess Ena" is being used for the purpose.

A "duplex" wireless telephone set has been specially designed by the Marconi Company for these experiments, and the technical problems connected with duplex telephony between ships and the shore, and the linking of such a system with the Post Office land telephone lines, have been solved. Further experiment is still necessary, however, in order to fit in a service of this nature amongst existing wireless services without mutual interference.

By the courtesy of the G.P.O. the land station for these experiments has been established at the Sectional Engineers' Office at Millbrook, Southampton, where all necessary accommodation and every other facility have been provided.

Under good conditions perfectly good simplex telephone communication has been obtained between the "Princess Ena" at sea and Southampton up to a distance of about 200 miles, and reliable duplex communication can be assured up to 100 miles, except at moments of exceptionally strong jamming. Satisfactory commercial communication from city offices to the ship over long land lines—such as from offices in London by Post Office telephone lines to Southampton, and thence by wireless to the ship—have been obtained when the "Princess Ena" has been 50 miles from the shore.

A problem still awaiting solution is the elimination of interference from spark telegraph stations. It is a remarkable fact that it is easier to eliminate the jamming from a C.W. transmitter installed on the same table, alongside the receiver of the duplex telephone set on the ship, than to eliminate the spark jamming from other ships dozens of miles away. When this difficulty is overcome the duplex wireless telephone service will be of great value to shipping companies. Messages concerning the docking of vessels can be handled with great rapidity, and it is possible that, if the Post Office agree to such a service, additional facilities will be placed at the disposal of the travelling public.

ADVERTISING TESTIMONY.

DOES it pay to advertise? This question is eloquently answered by the following copy of a letter received by our London agents (Messrs. Colonial Technical Press Ltd.) from Autoveyors Ltd., whose advertisement appears elsewhere in this issue:—

84 Victoria Street, Westminster,
3rd February, 1925.

The Colonial Technical Press Ltd.,
Southampton Street,
Strand, W.C.2.

Dear Sirs,—We have much pleasure in tendering our keen appreciation and acknowledgment of the incredible response we have experienced consequent to the several advertisements arranged for us by your good selves in the colonial and foreign technical press.

The enquiries and orders we have received, which are definitely attributable to the foregoing advertisement, have very greatly exceeded our most sanguine anticipations. Very many thanks.

Yours faithfully,
AUTOVEYORS LIMITED.
H. E. CHAPMAN,
Technical Director.

WITH OUR READERS

To the Editor.

Dear Sir,—Please allow me, as a constant reader of your valuable little journal, to express my approval of your editorial of March 6th. While heartily complimenting 3BQ, 2CM, and other experimenters in various parts of the world on their successful efforts to work two-way communication over half the circumference of the globe by means of short wave C.W. Morse signals, I am of the opinion that there are wonderful opportunities for the enthusiastic experimenter to improve transmission of 'phone messages and music.

It is in this department of the radio science that most improvement is necessary. A critical person has only to turn the dials, etc., of his receiver to realise the difference in the quality of the speech and music coming in from the various stations and the amount of improvement necessary with most of them.

Even the various broadcasting stations have their own particular defects, though, as with the amateurs, some are much better than others.

I would suggest that most amateur transmitters and broadcast station engineers should occasionally tune in 5Don N, as the quality of transmissions from this station is something which the owners should be very proud of, and this station might well be taken as a model by experimenters and other broadcasting stations.

While being fully alive to the necessity of C.W. Morse for commercial and long distance communication, I am convinced that genuine amateur experimenters would be rendering a greater service to themselves and the public by intelligently investigating the many causes of imperfect modulation of speech and music, and making the much needed improvements in this direction, than they would by communicating continuously with Yanks, etc., except on such occasions, of course, as when there is something really valuable to be learned from such communications.

Another point I would like to touch on is the proposed alteration of the wavelengths of 3LO and 2FC referred to in your columns. I am situated about 200 miles fom 3LO, 250 from 5DN and 5CL, and 500 from 2FC. I have tried and tested many receiving sets of all makes and sizes, and on all kinds of aerials in different parts of the N.W. of Victoria, and in every case I find that transmissions on the medium wavelengths, such as used by amateurs, 2BL, 5DN, 3AR, etc., have a marked tendency to fade, while those from 2FC, 6WF, and 3LO are steadiness itself. This leads me to infer that transmissions on wavelengths of from, say, 100 to 500 metres have an inherent tendency to fade, while those on a higher wavelength have not, and it is questionable whether the increase in the normal strength and range of 3LO and 2FC gained by increasing the frequency would compensate for the annoyance caused by fading.

It is interesting also to note that the American broadcasting stations, which also transmit on medium wavelengths, are experiencing the same trouble with fading; in fact, this phenomenon is considered in America to be the greatest defect broadcasting has, even greater than static.

Yours, etc.,

H. TREVAN.

Nyah, Victoria, March 15, 1925.

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To the Editor.

Sir,—While agreeing to a certain extent with some of the remarks of Mr. S. A. Macrow on the subject of amateur experimenters in your issue of the 13th inst., one must certainly take exception to one or two dogmatic statements he makes. For example, he states that there is no need to try out "dodges" for the advancement of wireless, and that it can all be worked out mathematically. Certainly inductance and capacity can, but these factors do not constitute a transmitter. A very prominent scientist, Hiram Maxim, proved conclusively and mathematically that heavier than air machines could not fly under their own power. About twelve months after this proof of Maxim's, through trying out "dodges" the Wright Brothers flew a machine under its own power. It all depends on what Mr. Macrow terms a "dodge." For instance, putting the grid in the two electrode valve was a "dodge," the tetrode valve is a "dodge," the neutrodyne-receiver is a "dodge," and presumably Mr. Macrow's own mysterious receiver has several "dodges" incorporated in it if it does what he claims for it. These dodges may or may not have been worked out mathematically, but until a "dodge" is tried out practically it should not be condemned. Would Mr. Macrow dare to assert positively that since Marconi first sent his signals across the Atlantic,

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wireless has not been benefited by various "dodges"?

From a purely impersonal viewpoint, seeing that Mr. Macrow writes with such authority on wireless, it would seem that his knowledge would be better employed in assisting amateurs instead of using destructive criticism with such freedom—unless he has time for none but professionals.

Yours, etc.,

T. K. ABBOTT.

Wingen, N.S.W., 15.3.1925.

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To the Editor.

Sir,—Kindly allow me space in your valuable journal in regard to the criticism recently of amateurs transmitting gramophone selections and musical items.

It appears that because it does not please a few, they desire that all other listeners-in should be debarred from the pleasure of hearing these experimenters transmitting their musical items.

Surely if these few objectors do not desire to hear these items they can tune them out (if their sets are as selective as they make out) and try their ability at some other sphere of wireless. I consider these experimenters are to be congratulated on their success, and should be encouraged to improve their transmitting instead of being howled down by a few "narks."

Carry on the good work, 2YI, 2UE, 2UW, 2ZN, 2YG, and others.

Yours, etc., W.T.M.

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To the Editor.

Sir,—I beg to hand you a few details of last night's work with the Reinartz receiver published by Mr. Stewart. I made a few modifications which improved the receiver slightly, but it has done excellent work without them. I used two valves, Philips D1 and D11.

Time.	Call.	Strength.
2258	5JC	R3
2300	5BN	R3
2303	3BD	R5
0020	3JU	R3
0022	5LO	R4
0023	9DAW	R3
0027	5BG	R6
0031	6CTO	R4
0045	6BUR	R3
0053	5AH	R4
0000	5BB	R4

Opened up for DX at 2230 and closed down at 0100.

I also received a number of local amateurs, whom I have not included, but have them logged.

I heard a call, 6XO, who was working with PKX. The transmission was composed of a number of V's, with the two call signs given about every ninth V. Would be pleased if you could give QRA of this.

Might I through your paper thank 2CX for his standard wavelengths, which have proved of very great value.

Yours, etc.,

B. WATSON.

Bent Street, Lindfield, March 11, 1925.

(Editor's Note.—PKX, Malabar Radio, Dutch East Indies. 6XO is listed as the Radio Specialty Shop, Oakland, Cal., but may be used by a testing station in Holland. We believe these tests are carried out frequently.)

Mr. Alexander Whitson, whose baritone voice has been frequently heard over the air from 2FC.

THE LEICHHARDT AND DISTRICT RADIO SOCIETY.

On Tuesday, March 17th, members of the Leichhardt and District Radio Society held their 123rd General Meeting at the club-room, 176 Johnston Street, Annandale.

The attendance was all that could be desired, and the main business of the evening was the third of a series of "Sale and Exchanges." A considerable amount of gear was disposed of amongst the members present, and the evening was pronounced a very successful one. Prior to the commencement of the "Sale and Exchange", Mr. H. F. Whitworth, B.Sc., gave a brief resume of the business transacted at the last meeting of the Delegates' Council, and at the conclusion of the sale of gear on hand, he dealt with a series of questions on wireless matters, those present gaining much useful information from Mr. Whitworth's explanation of the questions mentioned.

Next Tuesday evening, the Society will hold its 125th General Meeting, which will take the form of a demonstration of sets belonging to members, and as it is known that members have amongst them a number of excellent pieces of work in the way of apparatus, it is expected that the demonstration will be highly successful.

Persons interested in the activities of the Society are invited to communicate with the Hon. Secretary, Mr. J. W. Zech, 145 Booth Street, Annandale, who will be pleased to supply any information required.

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ILLAWARRA RADIO CLUB

Very QSA!

Station 2UI has put the I.R.C. on the air, and incidentally on the map as far as practical club work is concerned—the results of the past two or three weeks' transmitting tests being very satisfactory indeed. Although practically only a fortnight has elapsed since we actually got on the air—(the first week was devoted to a fuse-blowing orgy and other uncalled for pyrotechnical displays on the part of fractious "electrolytics")—our transmissions have got well away and are bringing in good reports all round, and in that time we have worked two-way traffic with no less than four States and New Zealand. Some of the stations worked include 3YY, 3JU, 3CB, 3TM, 3XF, 3EF, 3AP, 5JC, 5LO, 5BG, 4EG, 4CM, Z4AA, 2GQ, 2CR, 2HM, and other locals. The transmissions have included two lengthy Relay League messages on Institute business which were cleared with despatch through the medium of 3JU and 4CM respectively.

The local postman has of late been a frequent visitor to the club-room, with numbers of those weird little missives bearing a conglomeration of heiroglyphics and red letters which to the layman are mysteries, but to the budding transmitter are his very meat — to wit, QSL cards. These are coming in from all directions—N.S.W., (country); Queensland, Victoria, South Australia, Tasmania, and New Zealand, and all invariably report our sigs. very QSA, the C.W. being noted as stable and not good. The cards went the rounds at the last meeting and created no small amount of interest. We are proud of the fact that we are one of the very few clubs on the air at present and to make the occasion congratulatory messages were recently exchanged with 2BV (Waverley Radio Club) when we expressed the hope that inter-club transmitting work would play an important part in future club activities. The Concord Club (2GD) have also been worked. The results which have attended the transmissions from station 2UI to

> The attention of experimenters is drawn to the "All Club's Night", at the Royal Society's Hall, 5 Elizabeth Street, at 8 p.m., March 30th.

date have been very gratifying to officers and members alike, who evince a keen interest therein and in the fact that the club has at last entered the practical field. The credit for this success is due solely to the work and energy of our star op., Mr. C. A. Gorman, who has burnt much midnight oil (or should we say A.C. in view of the alarming activity of his meter), in making 2UI something more than a mere item in the N.S.W. call list.

Transmitters Please QSL.

We are working on a wavelengtn of 88 metres (per permission of P.M.G's Department) for the most part, but may occasionally be heard above 100 metres, and we would appreciate QSL cards from any transmitters hearing us, not merely to decorate the walls of the "shack" but for record purposes. 2OB, Mr. L. W. Mashman, a member of this club, has started on the local either with tonic train sigs, using a spark coil for plate energy and he is to be heard with good effect these nights. We congratulate him on his debut and hope he will go far!

Last Meeting.

The last meeting held at club room on Tuesday, 10th March, was responsible for another great

roll-up and a packed house. The membership continues to grow, six new members being admitted at this meeting, and more to follow at next which is a very satisfactory state of affairs. The Secretary reported that work on the new quarters was duly proceeding towards completion. Mr. Gorman reported progress with the transmitter, and explained some interesting details in connection therewith. The resignation, through pressure of work, of Mr. C. D. Cuthbert, the club's President since its inception, was received with regret, as was also the resignation of Mr. W. T. Walkin-Brown from Delegate' Council, owing to his contemplated move from Sydney.

Low Power Transmitters.

The lecture by Mr. G. Maxwell Cutts (under Wireless Institute roster) on this subject was the feature of last meeting, and evoked a lively and attentive interest from the large audience present. Mr. Cutts said he would call it not a lecture, but a "yarn," and a very good yarn it was too. He stated that all transmitting circuits were modifications of one or other of the three standard fundamental circuits—the Hartley, the Meissner, and the Colpitts. One of the first things which occupied the attention of the prospective transmitter was the choice of circuits, which was governed by the class of work to which the transmitter was to be applied, that is to say, C.W. or phone, or both.

For the purpose of illustrating the various points of the transmitter, a typical circuit (the grid coupled Hartley) was chosen and the method which Mr. Cutts adopted to emphasise the various points of importance, was an excellent one. This was done by gradually building the transmitter in circuit diagram on the blackboard right from the antenna to the power supply, so that all component parts—aerial, earth, counterpoise, inductances, condensers, keys, tubes, chokes, rectifiers, transformers, etc., were each described in turn, as they were placed in circuit on the board, so that the position of each unit and its function in the general scheme was readily grasped. The oscillatory circuit was first dealt with at length, with some remarks on earth and counterpoises, after which the power supply, rectifier and filter circuits were described and various modulation systems were explained. Mr. Cutts dealt with a difficult subject in a most able and lucid manner, so that the principles involved were easily understandable to junior and senior members alike. The lecture was liberally interspersed with tips and hints and constructional details, and a number of questions were dealt with. On the whole Mr. Cutt's effort was thoroughly enjoyed and appreciated by all present, who gained much insight into an interesting subject and at the conclusion he was acclaimed with a hearty vote of thanks. In responding, he invited members to visit his station, 2GM, which invitation is being availed of. Incidentally, Mr. Cutts made some "cutting" remarks anent recent references to the mast at 2GM, which had been described as the "leaning tower of Pisa." He, however, assured members that the said mast was quite safe and they were in no danger of being felled to the ground by the collapse thereof in the event of a visit.

Next Meeting — Important Business.

At the next meeting to be held at the club room, 75 Montgomery St., Kogarah, on Tuesday next, 24th March at 8 p.m., the important business of electing a new president and delegate under Rule 6, in consequence of the vacancies caused by the above resignations, will be dealt with. In view of the importance of this, all members are particularly asked to attend. The next lecture on the syllabus, viz., "Telephone Receivers," by Mr. F. H. Kirkby, will also be given.

Despite the fact that our membership thermometer is continually on the rise it is not near bursting point yet, and (like Oliver Twist) we still want more. Our aim and object is to help, and have the support of the largest possible number of local experimenters and we again repeat that anybody interested is entirely welcome to attend our meetings or to have any information concerning the Club, which will be promptly supplied on application to the Hon. Secretary, 44 Cameron Street, Rockdale. Now, come along some of you local "hams"! Don't hang back—let's hear from you about joining up!

W. D. GRAHAM,
Hon. Sec. and Publicity Officer.

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BRIGHTON SECTION OF THE WIRELESS INSTITUTE OF AUSTRALIA.

At a meeting of the Brighton Radio Club held in the new club rooms, Higinbotham Hall, Brighton Library Bulidings, Bay Street North Brighton,, on Thursday last 12th inst., there was an extra large attendance, the reason being the Question and Answers night as arranged by the technical committee. A number of interesting questions were asked and answered between the members. One of the most interesting for the evening being a debate on the use and operation of the Grid Bias battery. This subject was very ably treated by the Hon. Secretary, Mr. W. Kerr, who has for some

time past been conducting a number of interesting experiments on grid control.

The Intelligence Officer of the Club, Mr. P. K. Trood, gave an interesting talk on the new apparatus that has been manufactured here and abroad. This talk by the intelligence officer was the first to be given and Mr. Trood intends to follow it up with a short talk each week. Traders have been asked to forward particulars of new apparatus so that members may have the full knowledge of what is doing in the radio world. Several samples of new apparatus have been received for testing from Messrs. L. McMichel Ltd.

It has been decided by the committee that the official opening of the new club rooms, which will take place vrey shorlty, will be marked by an exhibition of members apparatus. Listeners-in who are desirous of becoming members should communicate with the Hon. Secretary, Mr. W. Kerr, at the club office, 241 Bay Street, North Brighton. X 4861

Publicity Officer. R. SURRIDGE.

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THE CROYDON RADIO CLUB.*

The usual weekly meeting was held on Saturday, March 14th, at the club rooms, "Rockleigh," Lang Street, Croydon, Mr. C. W. Slade presiding. There was a very good attendance of members. Mr. Thrum. who met with an accident on March 7th, is still in hospital, but progressing favourably. During his enforced stay in bed, we understand he is studying the subject of frame aerials. After disposal of the club business and hearing the delegates' report, a sale and exchange evening was conducted. Most of the members were short of some gear, and practically all the offerings were sold. A spirited fight was put up for the possession of three microphones. The beginners' Morse class is still held at 7 p.m. every Saturday. All enquiries and applications for membership should be addressed to the hon. secretary, G. Maxwell Cutts, 25 Malvern Avenue, Croydon.

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RAILWAY AND TRAMWAY RADIO ASSOCIATION. *

The usual weekly meeting of the above association was held in the Club Room at the Railway Institute on 18th March, 1925. The evening was set aside for general discussion. Many questions were asked by those present and everybody went away knowing something that they did not know before the meeting commenced. Two new members, were admitted to the Association.

On Wednesday, April 1, a debate will be held with the Waverley Club at the Railway Institute. The subject has not been definitely fixed as yet. All members are asked to make a special effort to be present on this night.

The Hon. Secretary, Mr. W. L. Carter, c/o Solicitor for Railways, 139 Phillip Street, Sydney, would be glad to hear from anyone who is thinking of joining the Association.

C. H. CLARK. Publicity Officer.

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MALVERN SECTION.

At a special general meeting held in the Malvern Town Hall on Thursday, March 12th, the Malvern Section was completely reorganised, and the following office-bearers were elected for the year:—President, Mr. B. Jermyn Masters; vice-president, Mr. H. J. Cohen; secretary-treasurer, Mr. A. H. Buck; committee, Messrs. Maughan, Cameron, and Braim; press correspondent, Mr. Snell.

It was resolved that meetings should be held on the second and fourth Thursdays in every month, and the subscriptions were fixed as follow:—Students 5/- per year, associates 10/- per year, and fellows 15/- per year. A committee was elected to immediately devise means for and arrange for the installation of a receiving set in the club rooms, to give members a practical demonstration of the wiring up of various circuits.

Some very interesting lectures have already been promised for the coming year, and the committee hopes to see all the old members at future meetings, as well as anyone in the district who is at all interested in radio phenomena. The secretary's address is A. H. Buck, 759 Glenhuntly Road, Glenhuntly.

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SPECIAL NOTE.

Please note that the correct call sign of Chris A. Cullinan, "Bayview," Diggers' Rest, Vic., is 3XW, and not 3DR, which has been published in several lists.

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CHANGE OF ADDRESS.

Messrs. Edison Swan Electric Co. Ltd., have completed the renovation of their premises at 58 Clarence Street, Sydney, and have fitted up modern showrooms for the selection of all types of radio apparatus. From now on business will be conducted from that address.

INTERSTATE NOTES

VICTORIA.

Mr. W. H. Grove, B.C.L., &c.

READERS of these notes may remember reference being made to Mr. Grove as one of those excluded from the Institute by its ill-contrived grading scheme. Mr. Grove took umbrage at the term B.C.L. being applied to those who display an intelligent interest in broadcasting and refuse to become a mere experimenter on low wavelengths. This last, considering his characteristics, may be termed an Outcast Listener or O.C.L., as distinct from a B.C.L. The O.C.L. after his evening meal forsakes the bosom of his family and adjourns to some dismal shed or abandoned washhouse or other secluded structure, and becomes an Ishmaelite of the Ether. This sort of life does not intrigue Mr. Grove. He has a wife and family whose company he enjoys. His wireless set is as much part of the family circle as the piano or gramophone. During broadcasting hours his family and himself find ample range for tuning in from 3LO to 5CL, while their after-supper amusement to date has resulted in the logging of at least sixty stations, from every Australian State, from the U.S.A. and from New Zealand. Mr. Grove constructs his own set to his own liking. During the K.D.K.A. tests he followed the programme each evening with a loud speaker, and shared the excitement with his family. He has since built a most interesting low loss set out of the ordinary groove with the aerial coil not only aperiodic, but immovably wound over the secondary, the only tuning adjustments over a wide wave-band being the turning of the "tickler" coil and the condenser and the regulation of the filament rheostat. To be able to do all these things, and yet not forsake his duties and pleasures as head of the house, marks out Mr. Grove as somewhat remarkable among amateur experimenters, although, of course, the interest displayed by the rest of the family goes a long way toward making wireless a bond instead of a division in the home.

Amateur Telephony.

Exactly why some otherwise impeccable young men spend a lot of time, money, and intelligence either of their own or other people's time in installing a transmitting set and then indulge in the vapid and inane nonsense nightly transmitted over the ether of late, is a question to be asked on behalf of those whose ears are afflicted thereby. Apparently only those who are Scotch and jest wi' deeficulty nowadays take to Morse and leave the hist o' whustles to the lighter-headed of the fraternity. Occasionally if one listens-in after midnight the last shreds of a conviviality either real or all-too-well assumed are to be heard polluting the all-pervading ether and occasionally at an hour much less secluded amateurs who shall be nameless wander up and down and across the wave-band like a reprobate monopolising the footpath, and like him, too, sometimes, sing most tunefully when their steps are most erratic. Gentle hints have been dropped to these gentlemen that more decorum would be welcome. One does not have to listen to them, but then again there is no point in such performances, and if an amateur indulges in foolish and gutteral observations and at the end is just enough discreet not to give his call-sign, he is merely shifting the discredit from his own station on to all stations of the same wavelength, which is not playing the game. Such questions also as "What is my wavelength?" rather disclose a queer notion of one's first duty in transmission, namely, to have one wavelength only and cleave to that as the knights of old did to their damsels. It is a wise amateur that knoweth his own wavelength, and an extremely foolish one who answereth that it is "about 180!" when he obviously hath no means of getting the measurement thereof.

Wireless and Wifeless.

The question "What shall we do with our wives?" is fast becoming a matter for acute consideration among certain wireless enthusiasts. In the early days of the craze, when a young man interested in wireless found that a girl was taking up too much of his spare time, he usually solved the problem by marrying her and building in the back yard of his new home, a wireless gunyah where he could play Bluebeard and forbid her to enter. With the elimination of obedience from the marrage service, however, the modern wife has her own ideas about Bluebeards. If she has been chosen from a host of competitors owing to her proficiency as an entertainer or genial companion, she does not feel disposed to hide her talents under a napkin in return for one desirable bijou suburban villa and appurtenances, but naturally expects to entertain that young man still and retain his company even though

(Continued on Page 40)

(Continued from Page 38.)

he does not bid her a long and tender farewell at night on the front doorstep as the clock strikes twelve. Speaking with the utmost sincerity, one cannot look up at many a suburban aerial without reflecting that beneath its slender shadow many a heartbreak lies hid, while a young wife goes about her home routine bitterly envious of this craze for wireless that has vamped her husband from her side. Many remedies have been tried or suggested. Some of them are drastic or even heroic, ranging from going out at night to hacking the old thing up with a meat axe. Exactly why wives should not be as interested in wireless as husbands are is not at all clear, and it is quite on the cards that in some homes of the future the man of the house will be found sitting in the deserted parlour with a smokeless pipe and an expressionless face, while his lawful wedded wife experiments with low loss tuners in the kitchen or attic and ignores his well-meant offers of assistance or futile remonstrances. In the ideal home, however, there is little doubt that wireless, like everything else worth while, is bound to be merely another link between husband and wife.

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THE RADIO DRAMA.

FOR many months American broadcasters have been endeavoring with great success to popularise the radio drama. Entirely different methods must be used than when the players are facing an audience. Lighting effect now plays an important part in the production of the studio drama at KGO.

No longer is the dramatic studio brilliantly lighted. Just two stand lamps, casting a circle of light about ten feet in diameter, is all that is used. Within the circle sit the KGO players. In the centre is the microphone, a mechanism no larger than a tomato can, suspended in a small metal loop atop of a pedestal. Back and slightly above the microphone is the signal box, with one red and one green light.

Seated within the circle, bounded in by darkness, radio players have the feeling of being alone with the microphone. Every second of the time the play is being produced they are conscious of the microphone. But in a fully lighted room players are conscious of each other, and incidentally aware of the microphone. For the best results it has been found that players should be strictly microphone conscious.

When keeping constantly the thought in mind that the microphone is the thing, players use intervals of silence with better effects. That is, intervals between speeches, or between a speech and the sound of a door or some other object. As an example, assuming that the scene of the play is in a room, and that one of the characters of the story is required to leave the room, time enough must elapse to traverse the distance between his speech before the microphone and the sound of the door opening and closing. Judgment on the part of the player is here required constantly. He must always keep in mind the time required to do certain things which radio listeners are imagining. One or two distractions during the course of a play are sufficient to cause many listeners to lose interest or fail to keep the thread of the story. While not always conscious of the trouble, listeners, it has been found, are aware of the slightest error in judgment of radio players as to intervals of time.

The true psychology underlying radio listening is that of the eavesdropper. Real life is being unfolded into his ears from out of the mysterious somewhere. Audio players know this and keep constantly in mind the fact that they are not acting their parts on a stage. They are simply characters come to life in the story, acting out what the author requires of them.

The audio drama director may flash a red light in the face of a player when he is too loud, or a green one when he is too soft; but it is the aim of Wilda Wilson Church, director of the KGO players, to teach each one of her radio actors to stand on his own responsibility before the microphone. That the radio player must do a lot of thinking while he is acting is evident. Within the circle of light, with its atmosphere of exclusiveness, the actors before the KGO microphones keep their minds free from all distracting influences, and are better able to do the right thinking at the right time.

Not only the distance at which he stands from the microphone must be kept in mind by the player. He must also remember how loud or how soft he is speaking, and, worst of all, the technique of his speech. In low tone parts lip and mouth noises must be avoided. Sucking of breath, even so faintly, between the teeth is likely to carry the microphone actor "off character," making a villain out of an angel at a critical place in the story.

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THE WIRELESS INSTITUTE AND THE TARIFF.

(To the Editor).

Sir,—It is regrettable that the Wireless Institute saw fit to oppose the impost of a protective duty on wireless goods competing with those made in Australia. It was done hurriedly and without taking a referendum of the members, and no confirmation of it by a mere majority of the delegates

should be taken to represent the views of a majority of the members themselves. Delegates are not elected on their political views, and have no right to commit their clubs on such questions. The fact that a man is a diligent student of wireless to some extent unfits him to be a good judge of political questions as he may not have devoted his time equally to both subjects, and the published opinion of the popular president of the Victorian Division that the Tariff Board can at one and the same time prevent flooding of the local market by foreign goods and also bring in greater profit to the Commonwealth Government is merely evidence that he knows a great deal less about tariffs than about wireless. No duty can at the same time present dumping and yet bring in revenue any more than an additional stage of audio frequency will prevent static and increase signal strength. The statement ought to be withdrawn in the best interests of the Institute, and in deference to the protection members who believe in the settled policy of the country.

Still another aspect of the anti-Australian inclinations of the Institute is that it now actually proposes to import wireless parts for its members and seek a remission of the duty, which is surely about as far as insouciance could well go. No enquiries have yet been made by the Institute as such, into the possibilities of wireless goods being made well and cheaply here. There is no doubt that if concerted action on the part of a united body of amateurs were concentrated on a demand for local products the making of them here would be greatly stabilised. There must be large numbers of buyers, for example, of A.W.A. 99, or the factory in N.S.W. would not be turning them out even now, but the Institute has not accorded this valve any recognition whatever except by way of opposing any tariff on similar imported valves. Last year, the present writer had occasion to enquire into the use of Australian-made ebonite in wireless sets, and was astonished to find that while the Australian Navy and some few local dealers were content to accept it, yet the Australian amateur with a fine sense of superiority and fair play, treated it with contempt. Tests at the University and elsewhere went to prove that the local ebonite was at least equal to the best imported and its price, in spite of limited output, is no higher, yet dealers find it discreet to advertise their stocks as the best imported ebonite even to-day when "made in Australia" is assumed to be a popular slogan. It is true that the Australian amateur pores so closely over American text books on wireless that he hurriedly assumes that all American apparatus must necessarily be the best, but he has not absorbed that admirable American spirit that asserts that nothing but what is made in one's own country is good enough for its people. The curious point is that the Australian amateur is quite sure he is superior to any American amateur, and yet he denies the same superiority to Australian goods. The consequence is that at night he seeks and often attains a pre-eminence in the wireless world and by day sinks into himself and becomes a mere tool, a counter-jumper, a supernumerary salesman of foreign traders who dump here their second-class goods. It is high time the Institute woke up and become true to the name of Australia that it now seeks to belittle.—Yours etc.,

ERNEST FYSH.

Canterbury, Victoria.

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AMATEUR CONTEST.

The amateur radio operator who handles the greatest number of radio telegraph messages for three consecutive months will receive a valuable plaque, suitably engraved with the name of the winner, it was announced lately by the American Radio Relay League Traffic Department. Only members of the A.R.R.L. who hold an amateur operator's license and operate a transmitting station are eligible to compete.

The individual who offers the award is himself an amateur, but as he does not wish his name to be known his identity will remain anonymous. The object of the gift is to stimulate the amount of message traffic on the short waves and to allow for improvement in the quality of the messages handled. None of the so-called "rubber stamp" messages will be accepted.

F. H. Schnell, traffic manager, stated that the contest will start with the beginning of the March operating month in each of the A.R.R.L. divisions. The leader for each month will be announced for all concerned.

The provision is made that all messages must be transmitted in accordance with the usual A.R.R.L. practice with respect to prefix, number, and date. Abbreviations will not be permitted, and messages held more than 48 hours for relay cannot be counted. Contestants will be permitted to send "applause messages" for broadcast listeners.

It was announced at the American Radio Relay League that Ralph Barnett, of St. Louis, Mo., operator of amateur station 9ACI, had handled 335 private radio messages during December, which is the best individual record of any amateur operator for that period.

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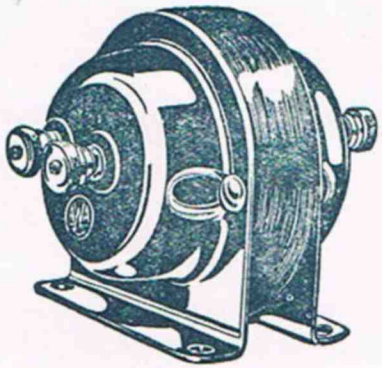

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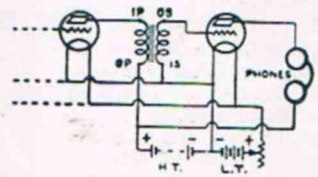

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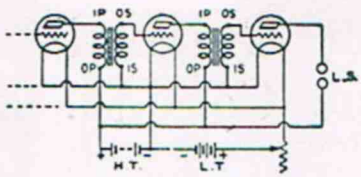

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