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Incorporating "Sea Land and Air"

VOL. I. SEPTEMBER 5, 1923 No. 12

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97 Clarence Street, SYDNEY. :: 422 Chancery Lane, MELBOURNE.

RADIO
IN AUSTRALIA & NEW ZEALAND
Incorporating "See Land and Air"

Managing Editor: S. E. TATHAM. Associate Editor: M. DIXON.

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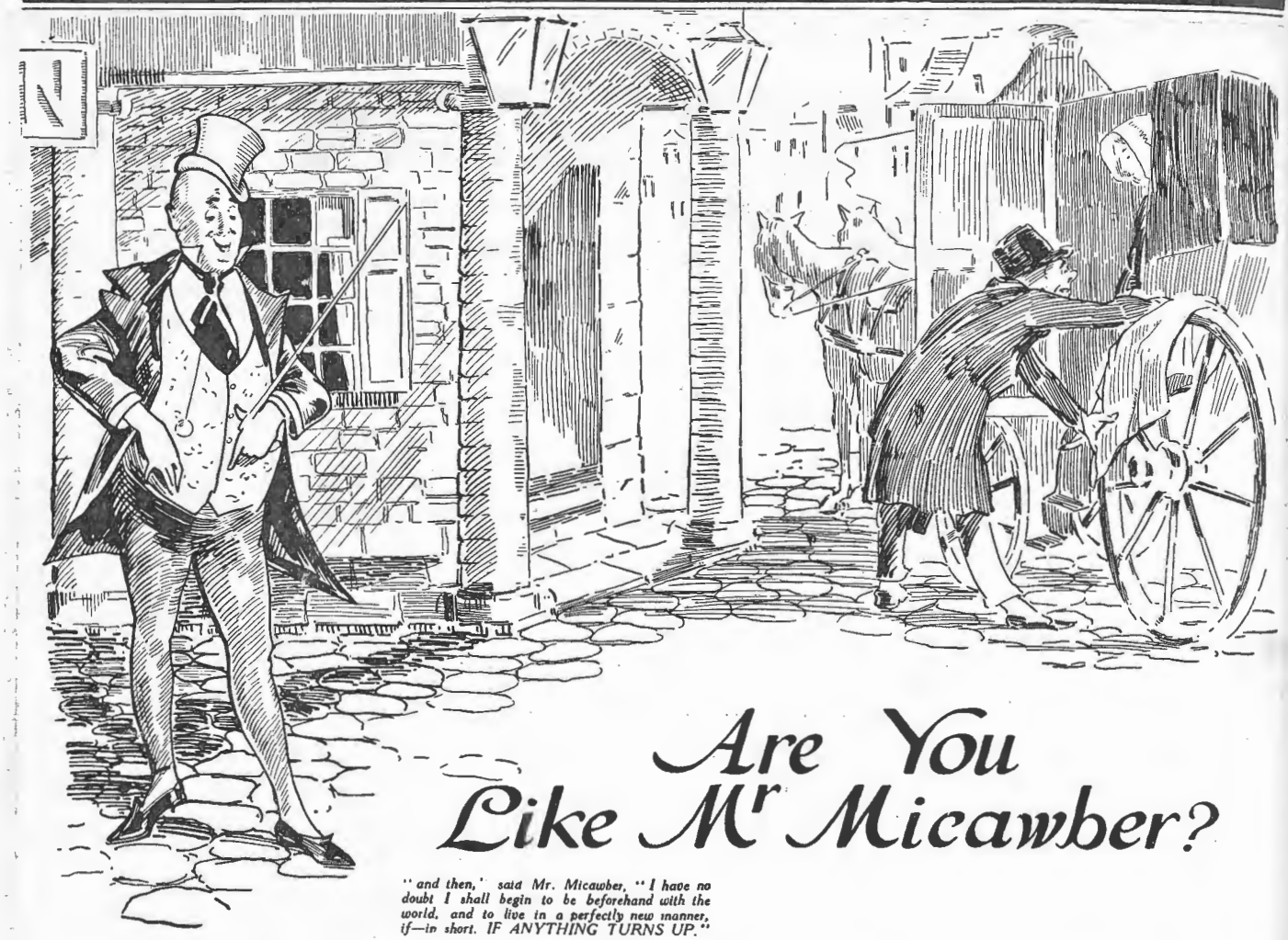

Are You Like Mr Micawber?

"and then," said Mr. Micawber, "I have no doubt I shall begin to be beforehand with the world, and to live in a perfectly new manner, if—in short, IF ANYTHING TURNS UP."

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.....

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Public Interest in Broadcasting

THE keen interest in radio broadcasting now being evinced by men prominent in the public life of Australia is a healthy sign.

THE lack of knowledge and understanding surrounding it up to the present has been more or less inevitable.

WIRELESS was something which the ordinary man considered must ever remain far above him.

NOW, however, the science has stepped down from the high level of the technical man to a degree which places it at the disposal of practically every home throughout the length and breadth of the country.

AS a force in consolidating our continent, radio broadcasting is probably without a peer.

IN the early days the sailing vessels which connected Australia with older countries were hailed as "the links that bind." To-day the cable is the all-important link in the chain of world-wide communication, but in the near future it will be challenged by wireless.

WHAT is true of world affairs applies equally forcibly in Australia's domestic concerns.

A CONTINENT of wide area and scattered settlement must needs look to her means of communication if the men and women who pioneer our great outback are to receive the treatment they richly deserve.

MUCH has been accomplished in recent years in linking up the country districts of Australia with the big centres of population, but much more remains to be done.

IN the course of evolution bullock-teams replaced the lonely sundowner who carried all his worldly possessions on his back, then railways began to invade the inland areas, and in later years the motor has helped materially to destroy the isolation which is inseparable from great distances.

ALL the time this change was going on postal, telegraphic and telephonic facilities were being extended to country districts, and life there became tolerable in comparison to what it was a few years previously.

NOW we are on the brink of a new era in speedy communication which holds promise of wonderful things.

THERE are many parts of Australia where postal facilities are hopelessly inadequate, and, under the present state of settlement, must ever remain so.

IT is obvious that in such places life must be more than ordinarily dull. If one were to go amongst these people and offer them a means whereby they could receive nightly in their homes a summary of the daily news of the world, weather and market reports, and a programme of musical entertainment, the prospect would surely dazzle them.

AND yet that is exactly what will be done, before the present year is out.

MATTERS are moving rapidly in the radio world, and in the near future thousands of people who are eagerly awaiting the commencement of broadcasting will have their expectations realised.

Where Patience is a Virtue

SINCE the gazettal of the regulations, public interest in broadcasting has manifested itself in a more or less extensive enquiry for receiving sets which radio dealers are, at the present moment, unable to supply.

THE position is analagous to a theatrical firm, which announces that it intends opening up in a certain city with a splendid repertoire of plays.

PUBLIC interest is at once awakened, and a demand for seats begins, but when the company points out that before staging its plays it must first build a theatre its would-be patrons realise they must exercise just a little patience.

BROADCASTING companies are in exactly the same position.

THE amount of preliminary work that precedes the erection of an up-to-date station is considerable.

IT is only a few weeks since those who purpose undertaking this work ascertained their exact position. It may be taken for granted that no unnecessary delay will now occur, but even under the most favourable circumstances some months must elapse before a beginning is made.

HOWEVER, this should occasion no dismay.

THE public may rest assured that the broadcasting companies will not hide their light under a bushel when they have something worth while to offer.

THEY are not in the game for philanthropic reasons, and it may safely be assumed that just as soon as they are in a position to "deliver the goods" they will do so.

THE delay which the public has to endure in the meantime will be amply compensated for later on.

Wireless Broadcasting to Begin

Farmer & Co. Enter the Field

"This will be a Radio Xmas"

THE first great step in the history of wireless broadcasting in Australia was recorded some months ago when a conference representing the various interests concerned assembled in Melbourne at the invitation of the Postmaster-General (Mr. Gibson) to formulate regulations for the control of radio entertainment services in the Commonwealth.

The work of that Conference is now well-known.

It is sufficient to say here that its collective wisdom was responsible for the best set of regulations for the control of broadcasting that has yet been devised in any country in the world.

Only a few months have elapsed since the Conference terminated its labours, but in the meantime much has been done. Within the last few days an important announcement has been made by the directors of Farmer and Company, Limited, of Sydney, to the effect that in the very near future they will undertake the transmission of wireless entertainments, stock and weather reports and news matter to subscribers within a radius of 500 miles of Sydney.

This marks the second great step in radio broadcasting in Australia.

In their preliminary announcement, Farmer and Company indicate that they will be able to provide subscribers with a service which, for quality and variety, will at least be equal to anything that is being transmitted over the radiophone in any part of the world.

In laying such an excellent foundation for their broadcasting service, Farmers have taken a step upon which they are to be sincerely congratulated. They have rightly recognised that whatever is worth doing is worth doing well, and to this end have completed arrangements with Messrs. J. C. Williamson, Limited, and J. and N. Tait for the transmission of entertainment items from their circuits. A morning news service from the "Sydney Morning Herald" will be supplemented by an evening service from the "Evening News," and, in addition, market reports, including fluctuations in the price of wheat, wool, stock, and butter will be supplied by Messrs. Dalgety & Company, Limited, and quotations from the Sydney Stock Exchange have been arranged for.

It is not difficult to imagine the feelings of satisfaction with which Farmers' announcement will be received throughout New South Wales, and even in a number of adjoining States.

So much has been heard in recent years of the part which radio entertainment services will play in the home life of, primarily, the country districts of Australia, that the public have been encouraged to expect something really worth while.

It is a happy climax to the period of waiting to know that they will not be disappointed.

A boundless faith in the possibilities of Australia is one of the foundations upon which the future greatness of this country will be built. To this end there must be united action on the part of all who hold a prominent place in our commercial life to weld the various interests of our wide Continent into a community working for the common good.

A high-class radio broadcasting service operated upon the basis laid down by Farmer and Company will play a by-no-means inconsiderable part in achieving this aim. To that end alone the enterprise they have displayed must be commended for the spirit of national well-being, which it evinces.

Full details as to the subscription fee, cost of receiving sets and wavelength to be used are not available at the moment of writing, but will be published in due course.

In the meantime, Farmer and Company will proceed with the task of making receiving sets available to patrons through their own store, and also through licensed radio dealers in practically every centre. The Company has indicated that it intends issuing licenses through various radio dealers—a fact which will no doubt be greatly appreciated by the trade.

This will prove a decided convenience to prospective subscribers throughout the country, and the firm is to be complimented on its determination to render the best possible service in this new phase of business it is about to undertake.

It is expected that the transmitting station will be ready in about three months time. In the interval the organising work necessary to secure maximum efficiency will be proceeded with, and the date on which Farmers transmits its first broadcast programme will mark the third great step in the history of radio in Australia.

The Xmas of 1923 will be known as our first radio Xmas.

Super-Heterodyne Reception

By JOSEPH G. REED

IN a previous issue of "Radio," the writer described the construction of an amplifier for the direct amplification of oscillations of very short wave-length, for use in connection with the Experimental Trans-Pacific Radio Tests. The impression at the time was that the American stations would transmit on a fairly restricted wave-length band, but this was found not to be the case for the waves varied from 150 to 250 metres for the general and in the neighbourhood of 375 for the special stations. For use over a narrow wave band the previously mentioned amplifier proved very successful after the preliminary adjustments as regards resonance between the various circuits and damping to prevent self oscillation had been made. Changing from one wave to another necessitated the retuning of all the intermediate circuits, and if many valves were employed, the sought for station was likely to be missed during this process owing to its sharpness of tuning.

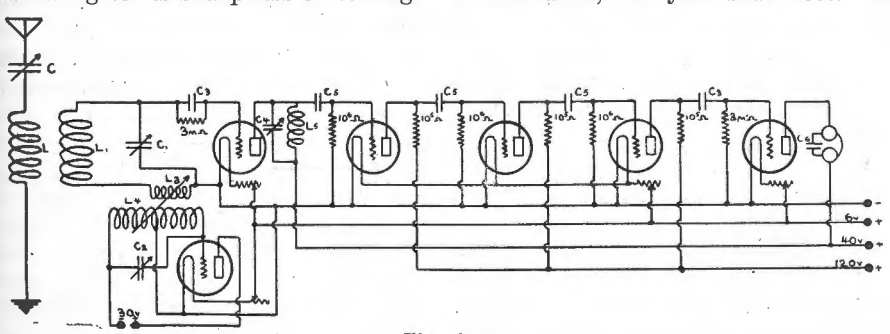


Fig. 1.

L1—35 turn honeycomb coil.
C3—0.0003 m.f. fixed.
L3 and L4—Heterodyne coils.
C1, C2 and C4—0.0005 m.f. variable.
L5—500 turn honeycomb coil.
C5—0.0005 m.f. fixed.
C6—0.001 m.f. fixed.

The solution to this trouble is the use of an amplifier requiring minimum of adjustment, and in the Armstrong Super-Heterodyne or frequency changing amplifier this much desired condition is obtained. This method consists in lowering the frequency to some pre-determined value, and then handing it on to a fixed frequency amplifier where the amplification is carried out prior to being detected in the usual manner.

A diagram of connections for the simplest type of this amplifier is given in Fig. 1. The values of inductance and capacity for the primary and secondary circuits are the same as in any short wave receiver. Closely coupled to the secondary circuit is a short wave heterodyne which is adjusted to such a frequency that the beat frequency created between it and the incoming wave is equal to that for which the fixed frequency amplifier is designed. For example, suppose the signal to be received has a frequency of 1,500,000 cycles per second—corresponding to 200 metres—and the fixed frequency amplifier has been designed for amplification of a current varying at 50,000 cycles, then the external heterodyne will have to be adjusted to either 1,550,000 or 1,450,000 cycles (approx. 193 or 207 metres). Exactly as in the case of the production of a heterodyne note of audible frequency, there will appear in the first detector plate circuit a 50,000 cycle beat note. To extract the maximum amount of energy from this circuit a tuned combination consisting of an Inductance L5 and a Capacity C4 is included which is coupled to another inductance in the grid circuit of the first valve of the fixed frequency amplifier. The condenser can be either fixed or variable, and the inductance any type of concentrated winding such as honeycomb coils or the radio frequency transformers described in the article dealing with "Radio and Reflex Amplification" in No. 5 issue of "Radio." Between the valves, resistance coupling is employed. The plate resistances are 100,000 ohms, and the grid leaks in the case of the amplifier valves one megohm, while that for the detector is 2 to 5 megohms. The coupling condensers between the amplifier valves have a capacity of 500 micro-micro farads, and that in the detector circuit need only be about half this value for best operation. A simple and easy way in which to make the fixed high resistances for the plate and grid circuits is to obtain a length of thin glass rod about 1/8in. in diameter, and cut it up into pieces about two inches long.

These pieces of glass rod must now be roughened on the surface either by rubbing against an emery wheel, or immersing in Hydroflouric Acid. For 3/8in. at each end the roughened surface is thickly covered with a layer of graphite from an HB pencil. Around this is now bound with No. 26 gauge wire, several layers of tinfoil to ensure good contact, and between each are drawn lines with the same pencil until the resistance reaches the desired value. The resistances can be measured either on a megger or adjusted in situ until best signals are obtained. In place of the glass rods, acid etched photographic "ground" glass cut into narrow strips may be used.

For the amplifier valves in whose plate circuits the 100,000 ohm resistances are connected a plate voltage of from two to three times the normal value will have to be applied. The writer has found that when using V24 valves this voltage can be as high as 240 volts, but after passing 120 volts the increased amplification obtained is not worth the extra outlay on the additional batteries. A voltage of 40 is applied to the detectors when using hard valves, but if an "Expanse B" or "UV200" is employed for the short wave detector, the applied potential will have to be altered accordingly. Common high and low tension batteries are employ-

ed, and to guard against any auto coupling in the former, it is shunted with a two microfarad condenser.

If the transmitting station is employing spark or modulated wave apparatus the signals will be audible in the telephones connected in the super-sonic detector circuit without any change in their original characteristic note. The change in frequency introduces no appreciable distortion into a speech modulated wave so long as the valves are operated clear of their saturation point.

To receive continuous wave signals, a second process of heterodyning must be provided which is capable of oscillating in the neighbourhood of the special beat frequency.

As this amplifier is of a special type it is not recommended that it be fitted up in cabinet form. The best layout is that in which a base board 12ins. wide and about four to six feet long is employed, and upon which is mounted—well spaced—the component apparatus of the amplifier. Insulation being of paramount importance in any kind of radio work, this base board should be treated with an insulating compound. The writer got over the difficulty of treating such a large base board in the following manner:—Cut the board up into pieces 12ins. square, and treat them with a layer of thin shellac varnish to which a small quantity of Nigrosine dye has been added to impart an intense black colour. The sections are now soaked in hot paraffin wax which has been melted in a large baking dish. Terminals and wires may now be passed through the base board without fear of leakage. Support the boards at least one inch clear of the table with small insulators at the four corners.

The resistance amplifier is not a very sensitive instrument compared with other types available. By using tuned radio frequency intermediate circuits in the amplifier equal results with three valves will be obtained as compared to five or six with the resistance pattern.

Figure 2 gives the complete connections for an amplifier of this type employing in all six valves. A separate heterodyne is used for the short wave portion and an autodyne coupling of the detector in the amplifier for the production of audio beats. The inductance for the short wave heterodyne consists of a cardboard tube 3in. diameter, wound with 60 turns of No. 30 D.C.C. wire with a tap taken off at the centre. A shunt condenser of 500 micro-micro farads gives a tuning range of approximately 150 to 450 metres. For ordinary heterodyne work where a beat frequency within the audible limit is desired the coupling to the receiver due to the stray field of the oscillator will be found sufficient, but in super-heterodyne work a much stronger coupling is required owing to the great difference in frequencies. Coupled in variometer fashion to the main winding of the oscillator is a coil of four turns of No. 26 D.C.C. wire. This is included in the grid circuit of the short wave detector.

The tuning inductances for the primary, secondary, and reaction windings of the short wave receiver are honeycomb coils. The primary will vary according to the aerial used, but for the other two coils, a 35 and 50 turn coil respectively will be found suitable. Resonance with the aerial circuit can be determined by placing the telephones in the plate circuit of the first detector, bringing it into oscillation and tuning until a click is heard. During preliminary experiments with this amplifier, the writer employed the orthodox wire-up wherein the valve was used as a plain detector. Its efficiency as compared to a good crystal detector was low so reaction was tried, with a marked improvement in signal strength.

After the short wave detector has been fitted up and tested out, proceed with the construction of the fixed frequency inter-valve coupling transformers. A suitable frequency is in the neighbourhood of 50,000 to 75,000 cycles (6000 to 4500 metres). The transformers are wound on formers of the dimensions given in Fig. 2 of the article on Reflex amplification in a previous issue. The primaries consist of 600 turns of No. 36 D.S.C. wire and the secondaries of 1000 turns of No. 40 D.S.C. Across the primaries is shunted a fixed condenser of 500 m.m.f. Each of these transformers must be adjusted to the operating frequency. Using the same valve and socket as will be employed in the amplifier, connect up each transformer as in Fig. 3. The outside wire of the secondary goes to the grid and the plate current must go through the primary winding in such a direction that oscillations are generated. Now take the short wave heterodyne circuit and adapt it temporarily for use as a long wave oscillator. The inductance L3 in Fig. 4 is a 500 turn honeycomb coil; the two fixed condensers C1 and C2 are of 300 m.m.f. and C3, 100 m.m.f. For the tuning condenser C, use about two-thirds of the capacity of a 500

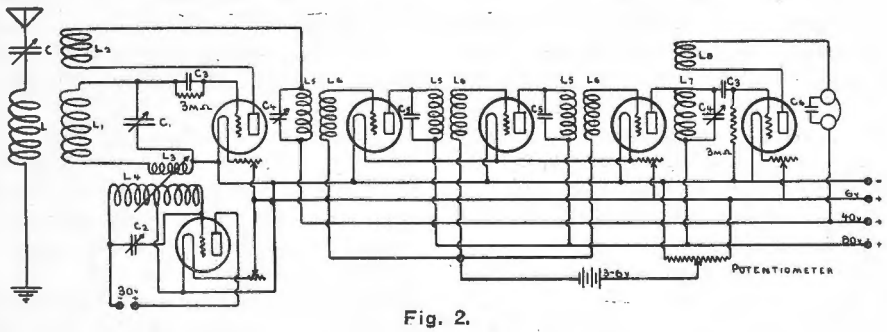
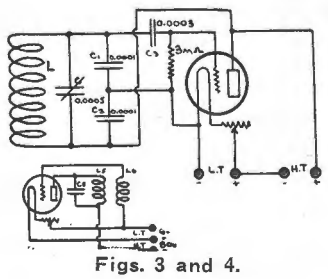


Fig. 2.

L1—35 turn honeycomb coil.
L3, L4—Heterodyne Coils.
L7—600 turn honeycomb coil.
C1, C2 and C4—0.0005 m.f. variable.
C3—0.0003 m.f. fixed.
L2—50 turn honeycomb coil.
L5, L6—Radio transformers.
L8—400 turn honeycomb coil.
C5—0.0005 fixed.
C6—0.001 m.f. fixed.



Figs. 3 and 4.

m.m.f. or 23 plate variable condenser.

By listening in in a telephone in the plate circuit of the capacity coupled oscillator, it is possible to tune in and heterodyne the wave generated by the "Transformer" oscillator. Determine which transformer tunes to the lowest wave-length and adjust the others to equal it by removing turns of wire until an audible note from each is obtained in the master oscillator without having to retune Condenser C. When the secondary winding of the transformer is transferred to the following valve no appreciable change in tuning will result if all the valves are of the same make. One type of valve must be used throughout, because interchanging of V24's, R's, and Radiatrons will upset the tuning balance.

The superheterodyne detector valve is choke coupled by means of a 600 turn honeycomb coil shunted with a variable condenser of 500 m.m.f. In the plate circuit is an aperiodic reaction coil of 400 turns. This combination of inductances when tuned and oscillated slightly different to the normal frequency produces a beat note of audible frequency in the telephone receivers.

It will be noticed that across the primary of the first radio frequency transformer a variable condenser is used. This must be used to balance up any variation in distributed circuit capacity caused by using different makes of detector valves or reaction coils. The radio transformers are mounted at right angles to each other, and kept well spaced, although if the amplifier tends to oscillate of its own accord, the mutual coupling between the first and third transformer can be arranged to give negative reaction. Another method of controlling the self oscillating property of the amplifier is to connect a very small variable condenser between the grid of the first super-sonic amplifier and the plate of the third amplifier valve. This gives rise to a capacitative neutralisation. The use of a positive grid bias as a control should be the last alternative owing to its inefficiency. With 80 volts on the plates of the amplifier valves a negative grid bias of from 3 to 6 volts gives maximum amplification. This battery consists of four small cells from flashlight batteries worked in conjunction with a potentiometer across the low tension supply. Shunt the potentiometer with a 0.001 microfarad condenser if it is of high resistance, to guard against auto coupling.

To carry out the final adjustments, and calibrate the amplifier, set up a buzzer driven wave meter about five feet from the receiver, and with the telephones in the plate circuit of the short wave amplifier, determine the settings of the various tuning condensers for resonance at the waves to be received. Now remove the wave meter about fifty feet away, and switch the complete amplifier into operation. Tune the short wave detector to minimum wave, and then vary the wave-length of the heterodyne above and below this value. Repeat this operation over the entire range of the receiver or until a signal is tuned in. Slight alteration of the circuit L5 C4 will be needed at first, but when once adjusted it should be locked in position. Circuit L7 C4 must also be tuned to resonance with the supersonic beat frequency before hand. After the minor operations to determine best grid potential, etc., have been carried out, reaction coils L2 and L8 should be carefully adjusted. Be careful and do not allow the short wave circuit to oscillate. For the reception of continuous wave signals circuit L7, C4, and L8 must be adjusted to give rise to the beat frequency desired.

These instructions may seem simple at first, but it will require several weeks of operation to thoroughly familiarise oneself with the many preliminary adjustments of this receiver. Once set, however, it does not vary, and the experimenter can get down to the loop reception of interstate stations and other very interesting experimentation as will suggest itself from time to time.

Correction Note

In Fig. 9 of the article dealing with "Radio and Reflex Amplification" in issue No. 5 of Radio there appeared two small errors which we now take the opportunity of correcting. "The free end of the filament lead from No. 2 valve should connect to the negative wire of the low tension supply. The lead from the secondary of the audio transformer in the plate of No. 2 valve shown connected to the reflex wire of the detector transformer should go instead to the negative lead of the low tension battery."

RADIO RALF AND HIS FRIENDS---

By Jack Wilson

Overseas Broadcasting News

RADIO LISTENING HAILED AS CURE FOR BALDNESS.

"Listen in if you want long hair."

London hairdressers are giving this advice to customers threatened with baldness. Hair experts realise that the electrical disturbances in the air which wireless messages cause have a remarkable effect on the hair.

MUNICIPAL RADIO.

Receiving conditions in Dundee, Michigan, U.S.A., are unusually good. You don't need any aerial or ground. You don't even require a radio set. In fact, you can hear programmes on nothing but 1.50 dollars (approximately 7/6) a month and a loudspeaker.

Municipal radio is the answer; and Dundee, a little farming village of less than a thousand inhabitants, proudly boasts the first working system of its kind in the United States. This village, named after the Scottish community renowned for its marmalade, is located in the rich farming district of Monroe county, Michigan, along the banks of the River Raisin. There the tired farmer goes in from work, closes a switch, and without any tinkering with instruments may listen to a perfectly tuned concert from almost anywhere in the country.

BROADCASTING TRANSMISSIONS.

England.

London.—2LO, 369 metres. Usually 5.30-11 p.m.

Newcastle.—5NO, 400 metres. Usually 5.30-11 p.m.

Manchester.—2ZY, 385 metres. Usually 5.30-10.45 p.m.

Birmingham.—5IT, 425 metres. Usually 5.30-11 p.m.

Glasgow.—5SC, 415 metres. Usually 5.30-11 p.m.

Cardiff.—5WA, 353 metres. Usually 5.30-11 p.m.

Croydon.—GED, 900 metres. Throughout day. (Aeroplane traffic).

All the British broadcasting stations transmit in the afternoons, usually between 3.30 and 4.30 p.m., with the exception of 2LO—11.30-12.30 in the morning, and on Sundays 8.30-10.30 p.m.

Belgium.

Brussels.—Brussels, 1100 metres. Between 12 noon and 6 p.m.

Holland.

The Hague.—PCGG, 1050 metres. 3-5 p.m. (Sunday), 8.40-9.40 p.m. (Monday and Thursday).

The Hague (Laboratorium Heussen).—PCUU, 1050 metres. 7.45-10 p.m. (Tuesday), 9.40-10.40 a.m. (Sunday).

The Hague (Velthuyzen).—PCKK, 1050 metres. 8.40-11.40 p.m. (Friday).

Ymuiden (Middelraad).—PCMM, 1050 metres. 8.40-11.40 p.m. (Saturday).

Amsterdam.—PA5, 1050 metres. 8.10-11.10 p.m. (Wednesday).

France.

Levallois-Perret (Radiola).—SFR, 1780 metres. 2-10.30 p.m. (daily), Sundays 2-3 p.m.

Paris (2) Eiffel Tower).—FL, 2600 metres. 6.20 p.m. to 10.10 p.m.

Ecole Superieure des P.T.T. Radio-Riviera (Nice).—450-460 metres. 11 a.m. to 10 p.m.

Germany, Czecho-Slovakia and Switzerland.

Berlin (Konigswusterhausen), LP, 2800 metres. 11 a.m. to 7 p.m.

Prague.—PRG. 1800 metres. 7 a.m. to 9 p.m.

Geneva.—HB, 1200 metres. 6-7 p.m.

Transmitter Outfit enclosed in a globe.

The transmitter inside the globe is in use at the new headquarters (WJZ) of the Westinghouse Electric Co. in New York.

Call Signs

Experimental Transmitting Stations

New South Wales.

2AJ Short, W., Queenscliff Road, Manly.
2AL Cooper, A. E. C., "Edale," Cecul Street, Ashfield.
2AR Hudson, W. H., 1 Terrace Road, Dulwich Hill.
2BB Crocker, E. B., 14 Roseby Street, Marrickville.
2BF Forsythe, L. E., Sailor Bay Road, Northbridge.
2BM Vears, E. T., "Pipitea," Cross Street, Leura.
2BV Waverley Am. Radio Club, 42 Evans Street, Waverley.
2BY Arnold, E. C., Carthage Street, Tamworth.
2CA Bonwill, E. W., Cowra.
2CI Charlesworth, R. H., 173 Parramatta Road, Haberfield.
2CJ Sewell, P. L. H., 12 Dillon Street, Paddington.
2CL Caletti, G., c/o. P. L. Stonewall, 83 King Street, Newtown.
2CM Maclurcan, C. D., "Namanula," Agnes Street, Strathfield.
2CR Todd, L. V. G., Dennison Street, West Tamworth.
2CS Swain, L. T., 49 Everton Street, Hamilton.
2CZ Exton, C. W., Lismore.
2DH Mawson, E. R., "Daisydale," Wonga Street, Campsie.
2DK Whitburn, R. P., 7 Hatheon Street, Leichhardt.
2DN Blanchard, G. E. H., 60 Bligh Street, Newtown.
2DS Davis, R. R., Fisher Avenue, Vaucluse.
2EC Gorman, C. A., 31 Segenhee Street, Arncliffe.
2FA Colville, S. V., 10 Rowe Street, Sydney.
2FF Western Suburbs Radio Assn., 77 Park Road, Auburn.
2GQ Barlow, E., Faulkner Street, Armidale.
2GR Marks, J. S., Ritz Flats, Salisbury Road, Rose Bay.
2GY North Sydney Radio Club (G. McClure), Cnr. High and Alfred Streets, North Sydney.
2HH Wireless Institute (N.S.W. Div.), Queen's Chambers, Dalley Street, Sydney.
2HP W. J. Maclardy, 46 Murdoch Street, Cremorne.
2HY Bongers, G. S., "Marmora," Lawson Street, Rockdale.
2IJ Gray, A. H., Florence Street, Killara.
2IX Burwood Radio Club, 203 Burwood Road, Burwood.
2JM Marsden, R. C., Victoria Road, Edgecliffe.
2JN Wireless Electric Co., Aquarium Buildings, Coogee.
2KC Fry, R. H., Brighton Street, Croydon.
2LI Cooke, F. B., 23 Lang Street, Sydney.
2MA Amalgamated Wireless, Ltd., 97 Clarence Street, Sydney.
2MB Amalgamated Wireless, Ltd., 97 Clarence Street, Sydney.
2MC Amalgamated Wireless, Ltd., 97 Clarence Street, Sydney.
2MD Amalgamated Wireless, Ltd., 97 Clarence Street, Sydney.
2MJ Newman, W. H., Cooney Road, Artarmon.
2MR Stewart, J. E., Garrick Street, Mayfield, Newcastle.
2MU Nangle, J., Tupper Street, Marrickville.
2SO Newcastle Radio Club, 25 Winship Street, Hamilton.
2SP Evans, R., "Garth Craig," 6 Flood Street, Clovelly.
2SX Slade, H. C., "Rockleigh," Lang Street, Croydon.
2UI Illawarra Radio Club, 75 Montgomerie Street, Kogarah.
2UR Creamer, A. H., 10 Hereford Street, Glebe Point.
2UU Roberts, R. G. C., 9 Church Street, Ashfield.
2UW Sandel, O., Mooramie Avenue, Kensington.
2VX McIntyre, D. G., Livingstone Avenue, Pymble.
2WU Morley, W. H., Rangers Avenue, Watersleigh.
2WV Burgin Electric Co., Kent Street, Sydney.
2YP Bergen, M. W., "Keera," West Maitland.
2ZA Keagh, W. G., 11 Victoria Square, Summer Hill.
2ZB Balmain District Radio Club, 29a Ballast Point Road, Balmain.
2ZC Lavington, E. M. E., 7 Blandford Avenue, Waverley.
2ZD Brain, S. F., 85 Bland Street, Ashfield.
2ZE Laker, F. J. F., Harfleur Street, Deniliquin.
2ZH New Systems Telephones Co., 280 Castlereagh Street, Sydney.
2ZJ Simpson, A. W., Durl.
2ZL Otty, W., Killingworth.
2ZK Marsh, S., Carrington Street, West Wallsend.
2ZFI Newtown District Radio Club, 83 King Street, Newtown.
2ZGT McIntosh, R. E., Burns Bay Road, Lane Cove.

Victoria.

3AM Dohrmann, G. S., 2 Hopetown Avenue, Canterbury.
3AP Morris, R. D., 6 Bealiba Road, Caulfield.
3AY Jenvy, W. W., 12 Lord Street, East Caulfield.
3BD Cox, E. H., 5 Gibson Street, Elesternwick.
3BG Osborne, L., Terang.
3BH Whitelaw, C. R., Mooroolbark
3BL Fitchett, J. C., Salisbury Street, Balwyn.
3BM Love, H. K., "Lindum," Ferncroft Avenue, East Malvern.
3BP Hood, J. H., 6 Alexandra Street, East St. Kilda.
3BQ Howden, W., Hill Street, Box Hill.
3BU Connelly, D. A., "Larnokk," Balaclava Road, East St. Kilda.
3BY Holst, H., 27 Bambra Road, Caulfield.
3CC University of Melbourne, Melbourne.
3DB Hobart-Duff, 27 Westgarth Street, East Malvern.
3DL Fells, L. C., North Road, Caulfield.
3DV Beattie, H. S., 1 Bishop Street, Box Hill.
3DX Van Cooth, J. R., Wattletree Road, East Malvern.
3EC Y.M.C.A. Am. Wireless Society, Cr. Short and High Streets, Bendigo.
3EM Doudney, H. W., Holy Trinity Vicarage, 7 Dickens Street, Balaclava.
3EP Gwens, J., 19 Logan Street, Canterbury.
3FM Decrespyny, R. C., 20 Black Street, Middle Brighton.
3HQ Good, E. J., "Rock Grove," Private Mail, Glenrowan.
3JU Hull, R. A., 38 Charnwood Road, St. Kilda.
3LQ Downey, W. E., Hopkins House, Hopkins River, Warnambool.
3LW Heam, C., 222 Carlisle Street, St. Kilda.
3MA Amalgamated Wireless, Ltd., 422 Little Collins Street, Melbourne.
3MB Amalgamated Wireless, Ltd., Koo-wee-rup.
3MC Amalgamated Wireless, Ltd., Canterbury.
3MD Amalgamated Wireless, Ltd., in the vicinity of Melbourne.
3ME Amalgamated Wireless, Ltd., in the vicinity of Melbourne.
3MF Amalgamated Wireless, Ltd., in the vicinity of Melbourne.
3MP Hosken, S. V., 42 Melville Street, Hawthorn.
3OK Conry, W. H., 32 Irving Avenue, Armadale.
3PO Roberts, A. H., 103 Bent Street, Northcote.
3RF Cordingley, C. H., 77 Bank Street, E. Ascot Vale.
3RG Humberg, S. G., Waverley Road, East Malvern.
3SM Gay, A. H., Warragul.
3SX Steane, G. W., Earle Street, Mont Albert.
3UI Dalton, R. M., San Mateo Avenue, Mildura.
3VR Abbot, R. N., "Fleu-de-Lis," St. Elmo Avenue, Alphington.
3VS Philpott, O. J., 26 Lumeah Road, Caulfield.
3ZA Bardin, W. F., 226 Station Street, North Carlton.
3ZB Dixon, R. H., 1 Hopetoun Avenue, Canterbury.
3ZC Brock, H. E. E., 8 Ngarveno Street, Moonee Ponds.
3ZD Taylor, C. F., 133 High Street, Kew.

Queensland.

4AC Waters, L., Rankin Street, Innisfail.
4AE Wireless Institute (Qld. Div.), Edward Street, Brisbane.
4AK Milner, J., Kelvin Grove, Brisbane.
4AN Gibson, E. McL., Greenslopes, Brisbane.
4AU Finney, W., Arthur Terrace, Red Hill, Brisbane.
4BI Junction Park Radio Club, St. Leonards, Yeonga, Brisbane.
4BW Cooper, A., Byrne Street, Mareeba.
4CC Isles, C. W., Charlton Street, Ascot, Brisbane.
4CH Dillon, A. E., Brown Street, New Farm.
4CM McDowall, V., Preston House, Queen Street, Brisbane.
4CS Geraghty, J. A., Christian Bros. College, Townsville.
4CV Husband, N. E., Aland Street, Charters Towers.
4EH Miller, H., "Broadway," Kitcheners Road, Ascot.
4EI State Engineer, G.P.O., Brisbane.
4EZ Institute Radio Engineers, Bowen Terrace, Brisbane.
4FA Bright, W. H. H., Hume Street, North Toowoomba.
4FE Y.M.C.A., Edward Street, Brisbane.
4FJ Price, J. C., Bardon Estate, Paddington Heights.
4FK Mathews, F. T., 57 Anne Street, New Farm.
4GC Maryborough Wireless Club, Richmond Street, Maryborough.

South Australia.

5AC Cook, V. R. P., 37 Johns Road, Prospect.
5AD Snoswell, A. R., Harris Street, Exeter.
5AE Honnor, J. H., Alpha Road, Prospect.
5AH Williamson, F. L., 25 Dequetville Terrace, Kent Town.
5AV Wireless Institute (S.A. Div.), 20 Grange Road, Hindmarsh.
5AW University of Adelaide, Adelaide.
5BD Earle, F. E., 321 Fifth Avenue, St. Peters.
5BF Miller, F. G., Murray Bridge.
5BG Kauper, H. A., 20 Gurney Street, Dulwich.
5BI S.A. School of Mines and Industries, North Terrace, Adelaide.
5BN Austin, H. L., 8 Parade, Norwood.
5BP Caldwell, W. A., 53 Hughes Street, Unley North.
5BQ Jones, L. C., Carlisle Road, Westbourne Park.
5FT Fitzmaurice, J. S., St. Andrews Street, North Walkerville.

Western Australia.

6AB Cecil, C., 75 Duggan Street, Kalgoorlie.
6AC Spark, J., 23 Mount Street, Perth.
6AK University of West Australia, Perth.
6AM Kennedy, P., 210 Wolcott Street, Mt. Lawley.
6AQ Mathews, V. J., Beechboro Road, Bayswater.
6BG Technical School, Perth.
6BH Burrows, F. H., 9 John Street, Claremont.
6BP Stott's Business College, St. Georges Terrace, Perth.
6BR Wireless Institute (W.A. Div.), St. George's Terrace, Perth.
6BT McNail, N., Perth Boys' School, Perth.
6BU McNail, N., Perth Boys' School, Perth.
6CJ Darley, E. J., Darley Street, South Perth.
6DA Law, F. W., Cr. Bedford and Bunbury Roads, Annadale.

Tasmania.

7AA Watkins, W. T., 146 Warwick Street, Hobart.
7AK Deegan, S. C., St. Virgil's College, Hobart.
7AQ McCabe, W. B., Clarence Point, West Tamar.
7BK Preston, T. A. C., Railway Row, Queenstown.

International Call Letters

The International Bureau has allotted to signatories of the Convention a list of combination of letters to be used as call signals for stations proper to the respective countries. The letter limitations of these lists are given in this section, together with the names of countries with which they are connected.

AAA to AMZ Germany.
ANA to APZ Netherland Indies.
AQA to AWZ Norway.
AXA to AXZ Poland.
AYA to AYZ Venezuela.
AZA to AZZ
B Great Britain.
CAA to CEZ Chili.
CFA to CKZ British Possessions and Protectorates.
CLA to CMZ Spain.
CNA to CNZ Morocco.
COA to COZ Great Britain.
CPA to CPZ Bolivia.
CQA to CQZ Monaco.
CRA to CRZ Portuguese Colonies.
CSA to CUZ Portugal.
CVA to CVZ Roumania.
CWA to CWZ Uruguay.
CXA to CXZ Spain.
CYA to CZZ Mexico.
DAA to DSZ Germany.
DTA to DTZ Danzig (Free Town of).
DUA to DZZ Germany.
EAA to EHZ Spain and Colonies.
EIA to EZZ Great Britain.
F French Colonies and Protectorates.
G Great Britain.
HAA to HAZ Hungary.
HBA to HBZ Switzerland.
HCA to HCZ Ecuador.
HDA to HEZ Holland.
HFA to HFZ Serbs, Croates and Slovenes (Kingdom of).
HGA to HHZ Siam.
HIA to HIZ Dominican Republic.
HJA to HKZ Columbia (Republic of).
HLA to HNU Spain.
HNV to HNZ New Hebrides.
HOA to HZZ France and Colonies and Protectorates.
I Italy and Colonies.
J Japan and Colonies.
KAA to KAY Germany.
KAZ Danzig (Free Town of).
KBA to KBZ Germany.
KCA to KCZ Lettonia (Latvia).
KDA to KZZ U.S.A.
LAA to LHZ Norway.
LIA to LRZ Argentine Republic.
LSA to LUZ Great Britain.
LVA to LVZ Guatemala.
LWA to LWZ Norway.
LXA to LZZ Bulgaria.
M Great Britain.
N U.S.A.
OAA to OBZ Peru.
OCA to OFZ Great Britain.
OGA to OIZ Denmark.
OJA to OJZ Finland.

OKA to OKZ	Czecho-Slovakia.
OLA to OMZ	Holland.
ONA to OTZ	Belgium and Colonies.
OUA to OZZ	Denmark.
PAA to PIZ	Holland (Home).
PJA to PJM	Curacao.
PJN to PJZ	Surinam.
PKA to PMZ	Netherland Indies.
PNA to PPZ	Brazil.
PQA to PSZ	Portugal.
PTA to PVZ	Brazil.
PWA to PWZ	Cuba.
PXA to PZZ	Holland (Home).
Q	Reserved for abbreviations.
RAA to RQZ	Russia.
RRA to RZZ	
SAA to SMZ	Sweden.
SNA to STZ	Brazil.
SUA to SUZ	Egypt.
SVA to SZZ	Greece.
TAA to TEZ	Turkey.
TFA to TFZ	Ireland.
TGA to THZ	Greece.
TIA to TOZ	Spain.
TPA to TUZ	Norway.
TVA to TZZ	Holland.
UAA to UMZ	France and Colonies and Protectorates.
UNA to UNZ	Serbs, Croates and Slovenes (Kingdom of).
UOA to UOZ	Austria.
UPA to UZZ	Italy.
VAA to VGZ	Canada.
VHA to VKZ	Australian Commonwealth.
VLA to VMZ	New Zealand.
VNA to VNZ	Union of South Africa.
VOA to VOZ	Newfoundland.
VPA to VSZ	British Colonies and Protectorates without autonomous Government.
VTA to VWZ	British Indies and Persian Gulf.
VXA to VZZ	British Colonies and Protectorates.
W	U.S.A.
XAA to XDZ	Mexico.
XEA to XMZ	Great Britain.
XNA to XSZ	China.
XTA to XZZ	Great Britain.
Y	Great Britain.
Z	Great Britain.

Australian Land Stations

VIA	Adelaide.
VIB	Brisbane.
VIC	Cooktown.
VID	Port Darwin.
VIE	Esperance Bay.
VIF	Woodlark Island.
VIG	Port Moresby (British New Guinea)
VIH	Hobart.
VII	Thursday Island.
VIJ	Samarai (British New Guinea).
VIL	Flinders Island (Tasmania).
VIM	Melbourne.
VIN	Geraldton.
VIO	Broome, W.A.
VIP	Perth.
VIQ	Macquarie Island.
VIR	Rockhampton.
VIS	Sydney.
VIT	Townsville.
VIU	Kieta (Solomon Islands).
VIV	Madang (British New Guinea).
VIW	Wyndham.
VIX	Misima (British New Guinea).
VIY	Mount Gambier.
VIZ	Roebourne, W.A.
VJZ	Rabaul (New Britain).
VKT	Nauru (Marshall Islands).
VQK	Ocean Island.
VQJ	Tulagi (Solomon Islands).
VSB	Nukualofa (Friendly Islands).
VZE	King Island.
VZK	Morobe (New Ireland).
VZO	Manus (Admiralty Islands).
VZR	Kaewieng (New Island).
VZX	Eitape (British New Guinea).

New Zealand.

VLA	Awanui.
VLB	Awarua.
VLC	Chatham Islands.
VLD	Auckland.
VLW	Wellington.
VMR	Rarotonga.

Radio entertainment for the weary traveller.
A radio entertainment in the woods at Arrowhead Lake, a popular resort in California, affords entertainment for the weary traveller who may "listen in" while resting.

Victorian Notes

(By Our Special Correspondent.)

EXPERIMENTERS who have noticed the difference in tonal effects of 3DP transmission will be interested to learn that Mr. Culliver's station is now "damped." By following the broadcasting practice of draping the room and adding an awning drape from the ceiling, still further improvement in modulation has been effected.

An illuminated dial sign has also been constructed for the guidance of singers and the many notable artists who enquire timidly over the telephone if the ether is really capable of transmitting their voice, or, if the vibrations of this instrument can really be kept under the limit of audibility. This curiosity provides Mr. and Mrs. Culliver with many pleasant evenings, and the hundreds of "listeners in" are particularly appreciative of the stage management displayed.

However, it is not all with the artists. That mysterious microphone at 3DP is entitled to a good share of credit. Not knowing its name or construction, only abstract commendations can be accorded it here. With the aid of this dark horse, 2GQ of Armidale, N.S.W. (900 miles) receives 3DP telephony even to the closing down hum.

Brisbane is the next citadel to be captured by 3DP, after which Mr. Culliver intends closing down for a holiday.

It will no doubt be of interest to experimenters in other States to know how their transmission is received in Victoria. It is proposed to give, from time to time, a list of calls heard in and around Melbourne. The co-operation of Mr. G. W. Steane, secretary of the Victorian branch of the Wireless Institute, is promised, and he will be pleased to receive regular fortnightly lists.

To set the ball rolling, his own list is printed herewith:—3UX has heard 2ZG, 2CM, 2GR, 2FA, 2DS, 2ZE, 2JM.

AUSTRALIAN ARTIST SCORES.

A DAILY press cable announced last week that Miss Gertrude Johnston, the well-known Melbourne soprano, had signed a twelve months' contract to sing at the concerts of a broadcasting company in England.

The announcement is of particular interest, firstly, because it emphasises the high value placed upon the artistic services of an Australian singer, and, secondly, it indicates that broadcasting companies are looking well to the future when they sign up their artists for such a considerable time ahead.

Lastly, it establishes beyond doubt that talented performers will find lucrative business in selling their services to broadcasting companies.

Wireless in the West

(By Our Special Correspondent.)

MR. KINGSTON, of Nicholson's, Ltd., Perth's big music warehouse, when interviewed early in August regarding the firm's proposed scheme for broadcasting, stated they were in a position to commence operations upon arrival of their broadcasting license, which was expected in a few days.

Mr. John Stoddart, junr., secretary of the firm, stressed the point that the music it was intended to broadcast would be high-class, and in keeping with the rest of the firm's activities.

Amateurs and professionals alike therefore can look forward to something well worth listening to in the immediate future.

The appointment of an additional radio inspector for Western Australia was recently approved. This has been rendered necessary by the large increase of work in connection with wireless development in the West within the last few months. It is now impracticable for one inspector, necessarily located at Fremantle, to cope with all phases of the work.

Local licence holders are asked to do their best to facilitate the periodical inspection of their stations by having their licence, together with other necessary details, always available.

This is but a small thing to do, but it will materially assist the inspector.

Perhaps the most forcible proof of the progress of radio in the Golden West is the display of apparatus and accessories now exhibited by numerous establishments both in and around Perth. Some few months ago one might have scoured the whole of Perth without being able to procure a condenser plate, but now, owing to the interest displayed by the public, several of the larger city firms are importing big shipments of apparatus.

Western Australia is not without merit in regard to the construction of apparatus. Several radio engineers with considerable experience, and employing assistants, are now well established.

The locally-made long and short-wave sets used so successfully by the Wallal Solar Eclipse Expedition for receiving time signals from VIP and American stations speak eloquently of the good work these manufacturers are doing.

Mr. Peter Kennedy, State engineer, is a great radio enthusiast. He possesees a set which, if not excelling in appearance, does so in efficiency. "Too many amateurs devote their time to making their sets look pretty," remarked Mr. Kennedy recently. "The object to be aimed at is not beauty, but efficiency."

Items of Interest

2CM TO MEASURE WAVE-LENGTHS.

Arrangements have been made by Mr. J. Malone, Controller of Wireless, for Mr. Charles Maclurcan (2CM) to measure the wave-lengths of the various transmitting stations in N.S.W.

The job is, of course, a departmental one, but as Mr. Crawford (N.S.W. Radio Inspector) has not had time to get his station ready, Mr. Maclurcan has kindly consented to carry on in the meantime.

2CM's heterodyne wave-meter has been calibrated from Mr. Crawford's standard instrument and is within one per cent. of accuracy.

All wave-lengths will be measured at the receiving station of 2CM, and any licensee requiring his transmitted wave-length to be measured need only call up 2CM by radio or land 'phone and make arrangements with Mr. Maclurcan for the checking.

Should it be found that two or more stations on the same wave-length are close enough to interfere or heterodyne each other, Mr. Maclurcan will explain the matter to the Radio Inspector, who will arrange for slight alterations to be made within a metre or two, so as to rectify the trouble.

If any experimenter is interfered with in this way, he is requested to notify Mr. Maclurcan.

Mr. Malone is anxious to see all licensees avail themselves of this opportunity, and trusts cordial co-operation will be given.

The radio authorities and Mr. Maclurcan are to be congratulated on taking this timely and practical step to minimise confusion and interference in the ether. Orderliness is practically impossible if transmitting stations guess at their wave-length or measure it inaccurately.

LADY "LISTENERS-IN."

Many people still cling to the belief that technical skill must always be available if results are to be secured from a radio receiving set.

This belief is all wrong.

Quite recently Mr. W. J. S. Perdriau, secretary of the Manly Radio Club, in company with a number of others, visited the experimental transmitting station of Amalgamated Wireless (Aust.), Ltd., at Sydney.

Before leaving home Mr. Perdriau asked his wife and children, who are all radio enthusiasts, to "listen in" during transmission time.

During the evening he spoke over the radiophone a message to "listeners in," conveying fraternal greetings from the Manly Club.

Scarcely had the evening's programme concluded when Mrs. Perdriau rang up on the landline and stated that she and the children had heard and enjoyed the whole entertainment, including Mr. Perdriau's message.

Simple as the incident was, it shows that the pleasures of radio entertainment are not by any means confined to the male sex.

Of course, no one ever doubted that women would be enthusiastic "listeners in," but there certainly was some question as to whether they could successfully manipulate a set.

That should now be dismissed.

"WIRELESS HOUSE" DANCE.

An enjoyable dance under the auspices of the Wireless House Social Club was held in the Women Painters' Hall, Sydney, on August 16.

The head office and works staffs of Amalgamated Wireless (Aust.), Ltd., combined to make the function a great success.

The Company's managing director, Mr. E. T. Fisk, accompanied by Mrs. Fisk, was present, and also Mr. J. F. Wilson (assistant manager) and Mrs. Wilson, Mr. and Mrs. Macdonald, Mr. F. W. Larkins and Mr. S. M. Grime.

The music was supplied by Cyril Coy's jazz orchestra, and the social committee was responsible for the catering and decorations, which were of a high order.

During the evening Mr. Theodore Atkinson, the well-known English baritone, sang "The Corporal's Ditty" and "The Yeomans' Wedding Song." Both were received with enthusiasm.

Some wonderful creations in jazz caps were worn, and the credit for designing them goes to the young ladies of Wireless House.

The committee intends to conclude the winter season early in September with an annual ball. which the staff and friends of the Company are expected to liberally patronise.

The Experimenters' Corner

SPIDER WEB INDUCTANCES.

THIS form of inductance is becoming more popular with experimenters every day, because of its low losses and highly efficient tuning properties.

The usual method of construction is to mark out with a pencil and compass on a piece of stout cardboard a circle and cut it out with a pair of scissors. With a pair of dividers the circumference is now marked out into an odd number of divisions, and radial slots about 1/16 in. wide cut in to within about an inch of the centre. The appearance now resembles a multi-pole armature core with very deep slots.

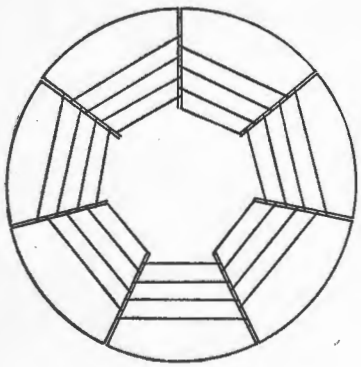


Fig. A.

Commencing at one of the slots, the wire is wound alternately to the right and left, with the result that an inductance of the appearance shown in Figure A. is produced.

In place of the cardboard—which should be treated with paraffin wax for insulation purposes—sheets of thin fibre or hard rubber can be used. An excellent and cheap former can be purchased from most music stores in the form of miniature gramophone records known as Little Wonders. These are six inches in diameter. When cutting these records, as well as thin sheets of other compositions, a fine tooth saw blade should be used. The best kind of saw is that used for fret work, and if the small wooden support employed in this class of work is put underneath the disc before commencing the cut, there will be little fear of a fracture occurring.

If a mean diameter of two inches is used in the winding the inductance for 50 turns will be 200 microhenries, other windings vary in value in proportion to the square of the number of turns. For example, a coil with 30 turns, which has 0.6 times the number of turns of the fifty coil, will have 0.36 times the inductance, or 72 microhenries.

A WAVE COIL ANTENNA.

An interesting form of research for experimenters is the investigation of the properties of wave coil antennae. This form of aerial was developed by the United States Signal Corps, and can be used for transmission over short distances, as well as for selective reception.

It is a well-known fact that the nearer an aerial is worked to its fundamental wave-length the greater will be its efficiency in throwing off or picking up electric waves. When excited by an outside source at a resonant frequency, there will be generated in the coil, standing waves and potential gradients similar to that in a regular open type aerial. In appearance the wave coil aerial is like a very large tuning coil. The greater the diameter the better the operation of the coil.

The best dimensions are eight inches in diameter, with a length suitable for the wire to be wound on. With a coil of the diameter mentioned, the number of turns will be found to be approximately equal to the wave-length desired to be received. For example, when receiving a 400 metre wave to the best advantage, it will be found that about 400 turns will be on the coil. The exact number of turns depends upon the insulation on the wire, which affects the distributed capacity of the winding. The voltage generated will be governed by the current oscillating in the circuit; therefore, to get these as high as possible a reasonably large gauge of wire should be used, such as No. 20 double cotton or bell wire. If a former of different size to that specified is used to wind the wire, the turns will have to be altered accordingly. With a four-inch tube the number will have to be approximately doubled.

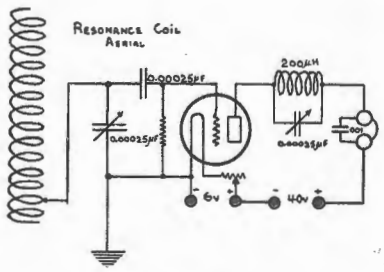


Fig. B.

Cardboard tubes of the large dimensions required will be very hard to purchase ready made, therefore it will be easier to build them up in the first place. With a fretsaw, or by means of a wood-turning lathe, prepare four discs of wood eight inches in diameter, and spacing them equi-distantly, screw on to them eight one-inch laths, with a length suitable for the finished coil. The corners on the laths should be smoothed off with a plane, and the whole should be given several coats of varnish before winding on the wire.

To determine the natural period of one of these aerials, stand it up or suspend it vertically, and connect the lower end of it to the grid term-

inal of a valve detector. The filament should be earthed, and a buzzer driven wavemeter set into operation near by. Adjust the latter until the maximum sound is heard in the telephones connected to the valve circuit.

The selectivity of this aerial is very marked, and it must be tuned exactly to the wave-length desired to be received, by adjusting the number of turns in conjunction with the wavemeter. Taps can be fitted to the coil, and a slight variation in the distributed capacity of the coil to earth secured by connecting it in series with a small variable condenser of about 0.00025 microfarads capacity, as shown in Figure B. Regeneration is best obtained by tuning the plate circuit by means of a variometer or an inductance shunted with a small capacity.

If transmission is attempted, a coupled circuit will have to be used, and in place of the series condenser used in the receiving connection, a coupling coil will have to be employed. If suspended horizontally, the coil is strongly directional, and receives best when the plane of the turns of wire are in the direction of the transmitting station.

AN INTERFERENCE-PREVENTING CIRCUIT.

When two or more spark or modulated wave transmitters are working on wave-lengths in close proximity, it will be found a difficult problem to tune out the unwanted station with any degree of satisfaction. In a recent issue of "Radio," a method was described of connecting trap circuits in the antenna, and thereby absorbing a fairly high proportion of the interfering signal before it reached the receiving apparatus. This method is very satisfactory when it is desired to exclude only one station, but if several unwanted stations happen to be in operation on different wave-lengths, it will need a separate trap circuit for each.

A very effective circuit is given in Figure C. The aerial circuit is the

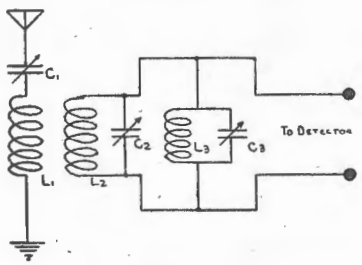


Fig. C.

same as in any standard receiver, in addition to the secondary circuit L2, C2. The special trap circuit is a parallel combination of inductance and capacity connected across the input terminals to the detector circuit. The operation of this circuit requires a fair amount of skill, for if the two circuits L2, C2 and L3, C3 are not exactly in tune with each other, even the loudest local signal will barely be audible. It will be noticed that there are two parallel tuned combinations in the secondary circuit. In one of these—L2, C2—the signal is induced by the primary winding, and any apparatus connected across its terminals will absorb energy in proportion to its impedance. The tuned circuit—L3, C3—when adjusted to resonance with the currents oscillating in the secondary winding, will offer a very high impedance to the passage of any current of that frequency. As a result it will absorb very little of the wanted energy, but if a second parasitic current of slightly different frequency is present, the special trap circuit will offer very little impedance to it, and act—as far as this particular signal is concerned—as a short circuit across the terminals of the detector.

In practice the signal is tuned in with the special circuit disconnected. When it is switched in, it will probably be off resonance, and the signal will disappear or be greatly reduced in strength. This circuit is now tuned gradually, and when it reaches resonance with the secondary the signal will re-appear with practically its original strength, but with a very marked discrimination against any other.

The lower the ohmic resistance of the inductance L3 to direct currents, the greater will be its impedance at resonance; therefore for best results this coil must be wound with a heavy gauge wire, or preferably stranded wire or "litzendraht," in the case of short wave work. Dielectric loss in the insulation between turns increases the effective resistance considerably, and for coils which have to carry very high frequency currents such as those employed in 200 metre work, spaced single layer windings only should be used. Experience has shown that the greatest discrimination is shown by circuits possessing low values of inductance and high capacity. The latter should be at least 0.002 microfarads, and instead of employing a large variable condenser of this value, several fixed mica condensers with a small variable as a vernier can be used. With this capacity an induct-

(*Continued on page* 287.)

The Radio Uncle

Fairy Tales For Children

Australian Kiddies In For a Good Time

"The little girl across the way
Turned up her nose at me to-day,
And all because her Daddy's got
A wireless set, and we have not;
And she can hear Dame Melba sing,
And concerts, and that sort of thing,
While, best of all (or so, she said),
She listens-in, when she's in bed,
To fairy tales by Radio—
A gentleman she does not know,
Who speaks a hundred miles away!

Science, the Fairy Godmother, has put a new toy into the hands of England's children. "Listening in" to bedtime stories is now an established rite in many thousands of homes. "Uncle C'actus," who does the story telling, gives a glimpse of the charming way in which "radio" children treat their uncle from without:—

"The advantages of being a radio-uncle are manifold. To start with, you have fixed hours. Being 'Uncle' is quite easy for a short time, but I have a sneaking suspicion that if I had to uncle it all the time I should be a ghastly failure.

"No. I couldn't be a real uncle to the whole ten thousand. After all, live and let live! A fair thing's a fair thing all the world over."

"There are other advantages in being a radio-uncle also. You can't be contradicted. You can't be asked 'Why?' You can't be commanded to 'Do it again.'

"I am told that wireless will some day enable us to speak to each other as we do on the telephone. Heaven forbid! On that day I shall reluctantly but firmly resign.

"At present it's a nice cushy job—as jobs in uncling go—and there's no cupboard love about it either. The proverbial avuncular tip cannot be sent via the microphone, or we should have all been broke long ago—even at a penny a time.

THE CHILDREN'S GIFTS.

If we are loved it is for our own sakes and nothing else. It is true I occasionally receive letters and postcards bearing childish scrawls, and containing strange requests—usually for a wireless set to be forwarded at once—but they are very rare.

Almost invariably the little ones are anxious to show their gratitude for the entertainment provided in every possible way.

"All these spring days we have had the country brought right into our offices by the great boxes of flowers the kiddies have sent us. Roses, bluebells, primroses, violets — till there have not been enough vases to hold them.

"Cigars, cigarettes, honey, chocolates, birthday cakes, and mascots of all shapes and sizes, these are some of our gifts; and the fact that they are sent so spontaneously leads us to believe that to some at any rate we have become real personalities. This is the ambition after which we are always striving.

AND THEIR LETTERS.

"Then the letters! I wonder if there is any one in the world who has such a jolly mailbag as a broadcasting uncle?

"A little while ago we were receiving 150 letters a day from our relations! And day by day in every way the mail got bigger and bigger. At last we had to stop it, because answering all these letters took up too much of the precious 45 minutes

devoted to stories. Now we only call birthdays, parties, or those who are sick, and even so the mail is over 50 a day.

"Letters so full of trust and confidence that it seems sometimes too great a responsibility to live up to. The trust of a child in an unknown wandering voice.

"And such care has been spent in writing these precious documents. The carefully ruled paper, the laborious detail of each letter, carrying a simple message such as this—

" 'Dear Uncle Cactus—I like your stories very much. Tell Uncle Jeff to be funny to-morrow. It is my birthday. I am seven. Your loving niece.' "

TREAT FOR AUSTRALIAN CHILDREN.

It is but a matter of months till the kiddies in thousands of Australian homes will have "radio uncles" like their little brothers and sisters overseas.

There are thousands of children—many of them well into their teens—scattered throughout the country districts of Australia who have never seen even a picture show, let alone enjoyed high-class concerts or other entertainments.

Radio broadcasting will shed a new light on the cheerless lives of these future men and women of Australia.

It is not only advisable, but absolutely necessary, that during their character - farming years children should drink deeply from the cup of high-class vocal and musical entertainment.

Therefore, there is good reason to welcome the advent of broadcasting in Australia. It will provide a treasury of innocent amusement for children, and a source of news and entertainment for those who up till now have been in the world, but out of it.

South Australia Hears New Zealand

Excellent results in the reception of radio telephony from New Zealand are recorded by Mr. F. G. Miller, Hon. Secretary of Murray Bridge Radio Society, South Australia, in a letter to Auckland Radio Service Ltd., N.Z.

In the course of his letter, Mr. Miller says:—

> I heard your announcer very plainly when closing down last night (8 p.m., Adelaide time), mention records and loan of Broadwood Piano, also song "An Old-Fashioned House" came in fairly clearly. I hope to be able to get all your concerts in future.
>
> I am using a regenerative receiver and one stage audio frequency amplification, on home-made apparatus. I think the distance covered, about 2,800 miles, is ample evidence of the efficiency of your transmitter. I may mention the modulation was excellent.
>
> In direct contravention of theory I am using an unbalanced "T" aerial, i.e., lead-in approximately one-fifth total length, 4 wire cage, mean height 40 feet, partly directional to east, 165 feet long. I regularly hear 2CM (700 miles) on one valve (Dutch) on music and speech. I have also heard on several occasions Mr. Bell, of Otago, N.Z., on CW.
>
> I would like to offer a suggestion that you transmit your call sign on CW, as there is a slight difficulty in recognising your call sign via speech, although I heard same clearly tonight after Jazz piece (7 p.m. Adelaide).

South Australian Notes

"What is going to happen to us?" is the general question asked by the S.A. amateurs, now that the Broadcasting regulations have been gazetted.

It is rumoured that the South Australian Motor Cycle Club intend giving a radio dance in Adelaide shortly.

Mr. C. E. Ames (5AV) has commenced working his 5-watt 'phone set.

Messrs. L. Jones, G. A. Miller-Randle, and H. A. Kauper comprise the directors of the newly-formed Adelaide Radio Company, Ltd. They are all well-known to Adelaide experimenters.

Patents Section

By GEORGE APPERLEY

The following are abridgements of complete specifications of Wireless Patents notified in the Official Journal of Patents as accepted at the Commonwealth Patents Office, Melbourne, during the month of June, 1923:—

No. 7255/22. Applicant Naamlooze Vennootschap Phillips' Gloeilampenfabrieken: The Netherlands, assignee of G. Holst, E. Oosterhuis, and J. Bruijnes, describes an invention relating to gasfilled electric discharge tubes. In order to overcome the difficulty of starting the discharge without resorting to auxiliary devices the tube is filled with a main volume of a rare gas to which is added a comparatively small quantity of another rare gas or vapour having an ionisation potential lower than the tension at which the first inelastic collision in the first mentioned gas occurs. The tube may be filled with neon, to which .5 to 5 % argon is added.

The invention is applicable to glow discharge lamps lamps, rectifiers, amplifiers, and the like.

No. 11312/23. Applicant: Metropolitan Vickers Electrical Company Limited, assignee of J. Slepian, United States of America. In order to cause the electrons emitted from an element in an electron tube to attain a velocity greater than that which is given by the influence of any electrostatic potentials applied to the cathode and another element they are subjected to the inductive effects of a varying magnetic field.

Fig. 1 shows one form of the invention as applied to an X-Ray tube 1, having parallel faces 2 and 3 with a centrally disposed electron emitting element 4, energised from a direct current source 5 and an anode 6, positioned between the disc-shaped pole pieces 9 and 11 of an electromagnet

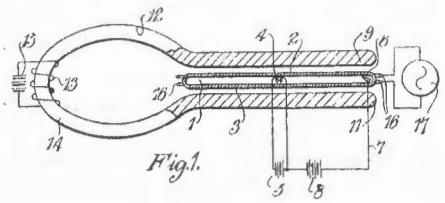


Fig.1.

12. The electromagnet 12 may be excited by means of the winding 13 and a source of direct current energy 15.

An exciting coil 16 is disposed in the plane of the tube 1 immediately adjacent the periphery thereof, and may be excited from a source 17 of alternating current or condenser discharge. According to the invention high velocity of the electrons is thereby obtainable with relatively low voltages in comparison with voltages heretofore considered necessary.

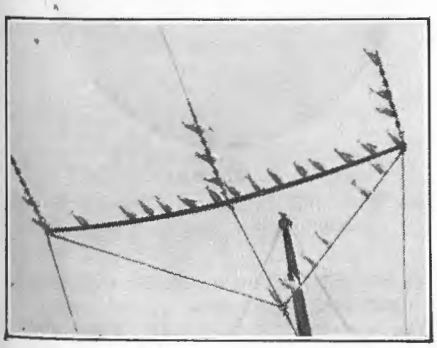
Humour on Shipboard

(By J. A. H.)

Occasionally passengers aboard ship fall victims to the "radio craze." When this happens, the "Dr." consulted is the wireless operator, whose remedy consists in answering endless questions or allowing an inspection of the wireless cabin.

Recently, on a well-known intercolonial steamer, crossing the Tasman, two very attractive damsels worried the operator for permission to "listen in" for wireless telephony. After fixing an appointment for the afternoon, the operator set about making arrangements. As it was an off day for wireless telephony, the officer on the bridge was requested to assist with the demonstration, to which he readily assented. At 3 p.m. the girls arrived at the wireless office, greatly excited. The operator handed over the telephone receivers to them, and stood by while they listened to the speech. "So clear and distinct," exclaimed one. Having satisfied their curiosity and expressed their wonderment, they gave warm thanks for the privilege and departed for the deck chairs with the good news of having heard a speech by wireless telephone.

Communication with the chart-house on the bridge is made by means of an ordinary telephone. At a prearranged signal the officer on watch was to discourse on "Bobbed Hair To Go." Little did the girls know that they were listening to one of the ship's officers talking to them over an ordinary telephone, not fifty yards away.



The above photograph, taken by Mr. H. Johnston, Wireless Officer of the well-known Interstate steamer, *Kanowna*, shows seagulls resting on one of the spreaders of the *Kanowna's* aerial while at sea off the Queensland coast.

Club Notes & News

BALMAIN RADIO CLUB.

A new experimental aerial of the cage type has recently been erected.

It measures 80 feet long, by 40 feet high, and consists of 6 wires (3/20 stranded copper) spaced evenly around 3 feet 6 inch rings.

A new series of lectures on the transmission and reception of damped and undamped systems of telegraphy, and the transmission and reception of telephony, will begin at an early date.

A practical demonstration of the latter will be carried out with the Society's C.W. ICW and telephony apparatus in the near future. This embodies new features, and the Society claims it is the first of its kind in amateur stations.

MR. J. R. ANDERSON,
President of the Trinity Grammar School Radio Club.

One aerial is used, and no change-over switches are necessary when changing from transmitting to receiving. Conversation can be carried on without relays, and in operation it is used as an ordinary land line 'phone.

A practical test of this apparatus was conducted by Mr. Stephens in conjunction with other well-known experimenters. Transmission was carried out without loss of strength or distortion to the messages being received.

MANLY RADIO CLUB.

Easily the most spirited and enthusiastic general meeting in its history was that held by the above Club on August 20.

The general business consisted of the election of a secretary to succeed Mr. B. Symes, who was obliged to relinquish the post through pressure of business.

Mr. W. J. S. Perdriau, one of the Club "live-wires," was elected to the vacancy, and was also appointed delegate to the Radio Association of N.S.W.

Mr. C. Wilcox was appointed assistant secretary, and Mr. Starkey was elected to a vacancy on the committee.

Mr. C. W. Mann, the well-known Sydney experimenter, delivered a highly interesting and informative lecture on "wave-meters."

Mr. Mann exhibited a heterodyne wavemeter in order to better emphasise the various points of his lecture.

On Tuesday evening, August 21, members of the Club paid a visit of inspection to the experimental station of Amalgamated Wireless (Aust.), Ltd., at Glebe.

A demonstration of wireless music will be given on Thursday, September 6, the transmission and reception arrangements for which are in the hands of Mr. Marks.

R. & T. RADIO ASSOCIATION.

The hon. secretary of the Railway and Tramway Radio Association (Mr. W. L. Carter) is determined that his Club shall prove a real benefit to its members. The membership is increasing steadily, but not until every experimenter in the railway and tramway service is enrolled will the executive feel satisfied.

Meetings are held in the telegraphy instruction room at the Sydney Railway Station, and a course of elementary lectures and buzzer practice is available to those who join up at once.

The Club certainly has an excellent and almost unlimited field to draw upon. Members of the R. & T. Service are noted throughout Australia for their inventive and constructional skill. Now that they have undertaken the study of radio, it will be strange indeed if some discovery or invention of outstanding value to the science is not credited to one or more of them in the near future.

TRINITY GRAMMAR SCHOOL CLUB.

The Club now boasts over 40 members, and its aim is to give them sound instruction in wireless generally. To that end apparatus of the most up-to-date and efficient type is now available for their use.

A course of lectures by duly qualified men has also been arranged, and from time to time visits will be made to various experimental transmitting stations.

Quite recently, through the courtesy of Amalgamated Wirelss (Aust.), Ltd., members visited Melbourne Radio (VIM) and enjoyed the experience.

MR. A. L. RICHARDSON,
Hon. Sec. and Treasurer, Trinity Grammar School Radio Club.

Concerts are heard clearly on the single valve receiving set installed in the school.

The younger members of the Club have buzzer practice on an average twice a week.

Many of the leading warehouses have granted Club members a reasonable discount on all purchases.

NEUTRAL BAY CLUB.

The second meeting of this newly-formed Club took place on Tuesday evening, August 21, and was largely attended.

The proceedings of the evening commenced by Mr. Gilmour conducting a buzzer practice class from 7.15 to 8 p.m.

After general business had been disposed of, the hon. secretary of the Club, Mr. E. J. T. Moore, delivered a most interesting lecture on the "Elementary Principles of Wireless." Following Mr. Moore's lecture, five other members spoke on various parts of a receiver, Mr. Donne dealing with "Aerials and Insulators," Mr. Gilmour "Condensers," Mr. Fleming "Inductances," Mr. Tatham "Detectors," and Mr. Trubshaw "Telephones."

A hearty vote of thanks was accorded to Mr. Moore and the other speakers for the simple and instructive way they dealt with each subject.

The following were elected to the committee:—Mr. H. Scougall, Mr. H. Wright, Mr. L. Petrie, Mr. M. D. Fleming, and Mr. F. R. McGrady.

A large number of applications for membership were received, and will be dealt with at next committee meeting.

The Club meets every second Tuesday at "Belle-Vue," 180 Kurraba Road, Neutral Bay, the next meeting dates being September 4 and 18.

All experimenters are cordially invited to attend, and communications should be addressed to the hon. secretary at above address.

KURIN-GAI DISTRICT RADIO SOCIETY.

At the August 21 meeting of the Society Mr. Hill delivered an interesting lecture on transmission. At a later stage he dealt with receiving circuits.

At the next meeting Mr. F. C. Swinburne, president of the Manly Radio Club, will lecture.

All enquiries should be addressed to Mr. R. R. Wilshire, hon. secretary, "Lauriston," Help Street, Chatswood.

WAVERLEY RADIO CLUB.

There was an excellent attendance at the last meeting of the above Club, presided over by Mr. M. Perry.

The date of the debate with the Metropolitan Radio Club was fixed as September 6. The Club rules, which have recently been revised by a special committee were considered, and a number of suggested alterations adopted.

The word "amateur" will in future be omitted from the name of the Club.

TO CLUB SECRETARIES.

Club secretaries all over Australia are invited to send regularly, bright, brief reports for publication in "Radio." A few lines every fortnight from each club is better than a whole page of matter from one.

Wireless Activities in New Zealand

(By our Special Correspondent.)

DURING the past month there has been considerable activity in wireless circles throughout the Dominion. The reason for this is due, in a great measure, to the marked improvements effected at Scots' Hall station, Auckland.

Although the question of wireless regulations has not so far come before Parliament during the present session, there is hope that it may yet do so. The matter has probably been deferred pending consideration of the report on the establishment of a radio station at the Three Kings instead of a lighthouse, as originally suggested.

In the annual report of the Department of Internal Affairs just published mention is made of the additional responsibility and work which has been thrown on the Government Astronomer and the observatory staff by the provision of a daily wireless time signal.

This new service was started on May 1, 1922, and has been regularly maintained since. The signals are sent every day, except on Sundays and Government holidays, at 11 p.m. Greenwich mean time (10.30 a.m. New Zealand time).

In addition to these signals, other wireless time signals are sent on Tuesday and Friday evenings at 9 a.m. Greenwich mean time (8.30 p.m. N.Z. time.

This broadcasting of time signals is much appreciated by ship's officers in the Pacific, and by the numerous radio amateurs all over New Zealand.

The longest distance reported to the Observatory is 4,320 miles for the wireless time signal received by the steamer *Tainui.*

The *Waimana* reported the reception of the time signals at a distance of 3,638 miles.

The observatory at Wellington has been equipped with a single valve wireless outfit, and time signals from Pearl Harbour, Hawaii, and even as far as Bordeaux, France, have been heard distinctly.

The Auckland Y.M.C.A. Wireless Club continues to hold successful fortnightly lectures which never fail to attract large numbers of enthusiasts. One evening recently Mr. W. Sinclair, a well-known Australasian experimenter, gave a lecture on "An Electrical Indicating Instrument."

Members of the Institution are keenly interested in wireless, and many of them have their own sets.

The problem of financing broadcasting is evidently exercising the minds of those responsible for the control of "IYA" station at Scots' Hall. The local clubs have been communicated with for the purpose of arranging a conference, at which it is hoped to induce those who benefit from broadcast programmes to bear part of the cost.

The Auckland Wireless School has passed a resolution to the effect that the cost of broadcasting be met by an increase in the Customs tariff on all imported apparatus, or by raising the license fee which the owner of a private set has to pay. The money thus obtained would be distributed by the Government amongst the various broadcasting stations in the Dominion.

Neither suggestion seems to meet the case.

The cost of wireless material is already fairly high and if the first suggestion were carried into effect those who manufacture their own would escape the impost.

In regard to increasing the license fee it is probable that not twenty per cent. of those who "listen in" to the concerts have paid one, nor has the District Radio Inspector, himself a busy Government operator, time or opportunity to look them up.

Some other means will have to be adopted in order to foot the bill.

At the present time it falls to the lot of two or three local firms to accept all responsibility in the matter. Of course they get it back in another way, otherwise it would be impossible to carry on.

The Auckland Wireless School contemplates experimenting with broadcasting at an early date. Negotiations for suitable apparatus are now going on and it is hoped that thousands of homes in and around Auckland will soon be "listening in" to their excellent radio programmes.

G. R. (Bombala): Possibly a short circuited winding or the diaphragm touching the magnet poles is the cause of your trouble. If the former, have it attended to by some reputable firm.

R. H. B. (Parramatta) asks: (1) Is it still necessary under the new regulations to pass a twelve words a minute test for an ordinary valve set? (2) Using a loose coupler crystal set, would it be advisable to use a valve as an amplifier or a detector for reception of amateur telephony? (3) If used as a detector would honeycomb coils be preferable to variocoupler? (4) Is aerial 120 feet long and about 35 feet high quite O.K.?

Answer: (1) Yes, when it is desired to employ regenerative valve circuits capable of energising the aerial. (2) Preferably as an audio-amplifier in conjunction with a crystal detector, or in the reflex circuit described in issue of "Radio," May 30. (3) Use only single layer windings for the reception of short wave signals. (4) Yes.

R. B. (Woodfort Leigh) asks: (1) What distance can a Ford car coil transmitting set be received on a crystal receiver? (Particulars of aerial submitted.) (2) What is the annual license fee for broadcasting receivers?

Answer: (1) A range of a few miles, if conditions are favourable. Remember that it is necessary to apply for a licence and in addition to employ properly tuned circuits. (2) The Government fee is 10/- per annum plus a royalty to the stations you wish to receive. The latter has not yet been fixed and may vary in individual cases.

Experimenter (Fitzroy) If the battery is charged at the rate specified by the makers no harm will be done. Take no notice of the personal prejudices of others, unless they can state definite and logical reasons why the charger should injure the battery.

H. S. G. (Moreland, Vic.) submits particulars of receiver and asks why he cannot receive signals below 600 metres.

Answer: A modern hard valve employed as a rectifier without reaction coupling is not as sensitive as a good crystal. As you will not be permitted to operate a valve receiver capable of energising the aerial, we suggest that you employ the single valve and crystal reflex connection described in issue "Radio." May 30. You should also build a special set of coils of the basket type in place of your present loose coupler. For the primary and secondary use 60 to 80 turns with a mean diameter of 2in. Particulars of suitable radio frequency transformers appeared in a recent issue.

If you use honeycomb coils you can expect a maximum range of 0.7 of that specified for a 0.001 m.f. condenser when employing a 0.0005 m.f. capacity.

R. C. (Wingham) asks: (1) In a two-wire aerial using twisted copper wire would a lead-in of No. 18 bare copper wire be suitable? (2) Need the two wires be connected opposite end of the lead-in? (3) Should the earth wire be insulated. (4) Could music be received from Sydney, distant 450 miles, on crystal set?

Answer: (1) The lead-in should be of the same capacity as the main wires. (2) Not essential. (3) No. (4) A multi-valve amplifier will be needed for this distance.

C. C. (Hunter's Hill) submits particulars and diagram of receiver, asks: (1) Wave length. (2) Address of G. & R. valve laboratories.

Answer: (1) Assuming you use honeycomb coils, the approximate range of the secondary will be 220 to 600 metres. It is possible that a larger size reaction coil will be needed for the longer waves. (2) We have no information regarding this Company.

The Experimenters' Corner

(*Continued from page* 279.)

ance consisting of twenty turns of wire on a three-inch tube will take care of all waves from about 300 to 600 metres, and if ten turns are used, the range will be from 150 to 300. A stranded cable with excellent high frequency characteristics can be made as follows:—

Take twenty-seven pieces of No. 36 double silk covered wire of the length required, and sort them out into groups of three conductors. Each of these groups are taken, and one end made fast to a nail, and the other fitted into the chuck of a small hand drill. The latter is revolved until the three strands are twisted up firmly. When all have been treated in this way there will be nine strands of 3/36 wire. Three of these 3/36 wires are now taken and twisted up into a 9/36, or, more correctly speaking, a 3/3/36 cable. The resultant three of these cables are now twisted in similar fashion into one of 27/36, or 3/3/3/36. This method of construction ensures that the wires are uniformly twisted, and none is forced permanently into the centre of the conductor, where very little current is flowing.

The inductance made with this special wire should be mounted along with the fixed and variable condensers in a box, and used wherever an extremely low loss resonant circuit is required.

Express Uses Wireless

Travellers on express trains between Paris and Bordeaux are now able to listen, through the medium of wireless, to concerts and to keep in touch with events of the day, and it is hoped that soon many trains on other sections of the Orleans Railway Company's system will be similarly equipped. At the present stage of the experiment the express leaving Bordeaux receives Eiffel Tower communications between Poitiers and Paris, and those of Radiola Company between Orleans and Paris. Four loud speakers have been fitted in a large smoking carriage—two at each end—and it is in this part of the train that passengers must station themselves to hear the music. Various technical difficulties, it need scarcely be said, have had to be conquered by the experts who undertook the task of providing railway passengers with this additional convenience and amenity. One problem was that of devising a receiving apparatus suitable for a train moving at so great a speed and passing through tunnels and under bridges, while another related to the preservation from breakage of many delicate portions of the mechanism. So far as reception is concerned, a system of wires running parallel along the whole length of the car has been adopted.

Movements of Wireless Officers

Messrs. A. J. Costa and R. C. V. Humphrey, 2nd and 3rd operators respectively, rejoined s.s. *Victoria* at Sydney on August 6.

Mr. A. S. Smith relieved Mr. G. I. Betteridge on s.s. *Wyandra* at Sydney on August 7.

Messrs. A. E. Sheppherd and E. C. Bouel, senior and 3rd operators respectively, signed on s.s. *Changsha* at Sydney on August 1.

Mr. R. T. Stephen was relieved by Mr. F. C. Smith on s.s. *Whangape* at Sydney on July 30, and proceeded on Home port leave.

Mr. A. L. Short signed off s.s. *Dilkera* at Sydney on August 9, and proceeded on Home Port leave.

Mr. K. J. Dines signed off s.s. *Cantara* at Sydney on August 7, and signed on s.s. *Waimarino* at Newcastle on August 14.

Mr. E. H. Pollard relieved Mr. J. H. Pullan on s.s. *Monaro* at Newcastle on August 13.

Messrs. P. B. C. Holdsworth and E. Meissner signed on s.s. *Hauraki* as 3rd operators at Sydney on August 13.

Mr. J. W. Fairley signed on s.s. *Koolonga* at Melbourne on August 8.

Mr. G. W. Rowland signed on s.s. *Ellaroo* at Melbourne on August 10.

Mr. N. W. G. Scott signed on s.s. *Barunga* at Sydney on August 14.

Mr. A. T. Parry was relieved by Mr. J. G. S. Flanagan on s.s. *Kaiapoi* at Melbourne on August 11, and signed on s.s. *Era* at Melbourne on the same date.

Mr. J. H. Pullen signed on s.s. *Booral* as senior operator at Sydney on August 16.

Mr. H. S. Chown signed off s.s. *Enoggera* at Sydney on August 13.

Mr. J. H. Carty signed off s.s. *Saros* at Sydney on August 16, and signed on s.s. *Merriwa* on the same date.

Messrs. J. H. Hawkins and G. Flynn signed on s.s. *Arafura* as senior and 3rd operator respectively at Sydney on August 17.