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Vol. 2.

June 22, 1923.

No. 25

BROADCASTING CONTROL.

INTERFERENCE CHECKS.

Consideration by the committee appointed by the wireless broadcasting conference, which was held in Melbourne recently, of the draft regulations for the control of broadcasting was continued last week at the Treasury Buildings in camera. For part of the session the committee resolved itself into sub-committees for the discussion of technical portions of the proposed regulations. It is understood that that the greater part of the five hours of the conference was devoted to the matter of wave lengths to be used for broadcasting purposes, and it was finally agreed to recommend that the available band of wave lengths be made far wider than purposed in the draft regulations. No fixed bands of wave length will be allotted to any class of station. The question of broad-

casters' fees was also keenly debated strong opposition being given to a suggestion in the proposed regulations that the fee to be charged to subscribers be specified in the broadcasting company's application for a license. The necessity for strictly supervising programmes to prevent the broadcasting of undesirable matter was realised by all, and this proposal was supported. Proposals for the supervision of receiving stations have also been supported.

The privileges to be granted to experimenters were the subject of some discussion, and it was decided to urge that when buying goods or apparatus, those holding experimental licenses be required to sign a declaration that they will not dispose of the apparatus to other private

individuals. It was also decided to urge that provision be made for those holding a broadcasting receiving license to use receivers of their own construction, provided that the receiver complies with requirements for the prevention of interference and "poaching" on the concerts of companies to which no fee has been paid. The proposals for the control of the broadcasting of news items were again brought forward, and though considerable exception was taken to a proposal in the draft regulations that the source from which news was obtained should be acknowledged by broadcasting stations, clauses for the protection of newspapers and news-collecting agencies were approved. After revision the draft regulations will be placed before the Cabinet for approval.

The Australian Broadcasting Conference.

VERBATIM REPORT CONTINUED.

SECOND DAY.

The Conference resumed at 2.30 p.m.

The Chairman: The committee which was appointed by the Conference yesterday to draft regulations for submission to the Government, sat until twenty past six last evening, and also from 9.30 o'clock this morning until after 1 p.m. The various points of importance were thoroughly discussed, and as a result the committee unanimously agreed upon certain suggested regulations which I will read to the Conference. The proposed regulations are:—

- (a) A number of wave-lengths to be allotted for broadcasting purposes, such wave-lengths to be selected in respect of their suitability for stations of various powers and their suitability for standardisation of receiving apparatus, and subject to their not being required for public wireless telegraph or wireless telephone services.
- (b) Licenses or concessions for broadcasting stations to be granted for all available wave-lengths within a given area.
- (c) Each broadcasting station to be licensed for transmission on one wave-length only, but transfers may be approved by Statutory authority.
- (d) Licenses to be issued under the Wireless Act to the public for receivers of design approved by Statutory authority and capable of receiving signals of one wave-length only, and incapable of variation without intentional tampering.
- (e) Licenses on nominal fee to sell or hire receiving apparatus to be issued to bona fide manufacturers and electrical or other traders.
- (f) All licenses to be renewed annually excepting in the case of broadcasting stations and

trading concerns, which are to be for five years.

- (g) Concessionaires and licensed dealers to be authorised to issue licenses to all their customers who have paid their subscription to the concessionaire.
- (h) Receiving licenses and renewals thereof to be withheld from all persons who do not pay the annual subscription to the broadcasting stations.
- (i) The Government to take of-



Mr. HURST, Managing Director British General Electric Co. Ltd., who represented Manufacturers of the Conference.

- fective measures to protect the industry.
- (j) Dealers and traders only to supply receiving equipment or parts thereof to holders of receiving licenses.
- (k) Dealers and traders must collect the first year's broadcasting subscription on all receivers sold.
- (l) Since there will be ample room for competitive broadcasting services, it is unnecessary to place any limitations on the nature of the service provided. Each concessionaire

may decide for himself the class of service that will bring him the greatest number of subscribers.

- (m) Retailers to keep a record of all equipment sold, together with the name, address and license number of purchaser, and to notify the concessionaire of any particular wave-length accordingly.
- (n) Any person, company or manufacturer dealing in or using wireless equipment without a license from the Government shall be subject to an adequate penalty.
- (o) The administration or regulations governing broadcasting to be in the hands of a Board, having thereon representatives of the Government, of broadcasting stations, and of manufacturers and traders.

The committee also drafted for submission to Conference three motions, the first of which provides:—

That this Conference affirms that principle of preference to Australian, British and foreign apparatus in that order, on such terms as will encourage the use of Australian and British manufactured apparatus, and that this be the recommendation from the Conference to the Minister.

The committee unanimously resolved that the motion should be submitted to the Conference. It was also unanimously resolved, on the motion of Mr. Fisk:—

That this committee realises the necessity for protecting the principle of property in news, and we forward herewith a memorandum drawn up and submitted to us by representatives of the press.

The third motion, moved by Mr. Court, and unanimously adopted, provides:—

That this committee recognises the right of fully qualified persons indulging in bona fide experimental work to be without

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hindrance, except as prescribed in Statutory declaration No. 169 of 1922, such right to be kept in mind in the allotment of wave-lengths, subject to the experimenter giving an undertaking that he will not poach on broadcasting services.

With regard to the second motions, as you are aware a representative of the press was appointed on the committee, and as a result a proposal is being submitted to the Conference by the press to which the committee does not desire to intend at the present time to say either "yea" or "nay." The committee, however, realises the necessity for protecting the interests of the press, and therefore the proposal is submitted, so that it can go to the Minister, without either the approval or disapproval of the Conference, to allow the Minister to take whatever action he may think advisable.

Mr. Collas: I suggest that the regulations be discussed *seriatim*, so that we can have full and free discussion.

The Chairman: That is the course we will adopt.

Mr. Wilson: Each regulation should be read out and members of the Conference invited to ask questions with regard to it. The most competent person to answer any such questions would be Mr. Fisk.

Mr. Collas: I support that suggestion.

The Chairman: The Conference being agreeable to that course, the regulations will be read and discussed in their proper order.

Regulations "a" and "b" agreed to without discussion.

The Chairman: Are there any suggestions with regard to regulation "c"?

Mr. Boyd: I would like to ask Mr. Fisk to give us a definition of what is meant by "transfers may be approved by Statutory authority." To what extent will a transfer be given?

Mr. Fisk: It is rather a difficult matter to define at the moment, but it will be easy of solution when we get a little more experience. I assume that a transfer from one wave-length to another will be tantamount to taking up a new or alternative concession; it will be practically the same as getting a concession for a different wave-length.

Regulation "e" agreed to without amendment.

Mr. Holloway: With regard to regulation "d," a person taking the highest wave-length, or a high wave-length, should be able also to take any lesser wave-length.

Mr. Mingay: No.
Mr. Holloway: Why not?



Mr. HOLTZ, Managing Director "The Argus" and "The Australasian," who represented The Press at the Conference.

Mr. Fisk: The whole scheme would break down if that were done, because irrespective of the length of the wave, we have to protect one service from another.

Mr. Holloway: I have another suggestion that may get over the difficulty. If you pay for a high wave-length, say, £5, and you want to receive signals of a lesser wave-length, say, £2/10, you should be able to pay £7/10, and receive signals of both wave-lengths. Of course, I am not pressing the suggestion, but I am only putting it forward for consideration.

The Chairman: Yes, we want criticism of that kind.

Mr. Fisk: I appreciate the point mentioned by Mr. Holloway, but it is a matter that requires very careful consideration. It is desired to safeguard the various services, and at the same time provide facilities for taking signals of more than one wave-length with the one tuner. It is rather difficult to see how it could be worked out, but we might ask the Government to consider the point in applying the regulation. It is a matter of providing means whereby a person can buy a sort of universal receiver for all the wave-lengths, subject to the adoption of the necessary safeguards.

The Chairman: Mr. Fisk really suggests that the Government be

asked to consider a regulation under which signals may be received on several wave-lengths.

Mr. Fisk: Yes. I suggest that a receiver may be used or licensed capable of receiving an two or more wave lengths from two or more broadcasting stations, subject to a subscription being paid for each wave-length.

The Chairman: You suggest that regulation "d" be amended in that way?

Mr. Fisk: Yes.

Mr. Holloway: That will do.

Mr. Brown: Does such an instrument exist, or would there by any mechanical difficulties involved in the production of such an instrument?

Mr. Holloway: There must be certain mechanical difficulties, but they can be got over.

Mr. Brown: Does such an instrument exist at the present time?

Mr. Fisk: Yes. If any difficulties are experienced in the matter, I would suggest that the person concerned write to my firm, or to some of the other people who have technical staffs, for assistance and advice. I am sure if that is done that every assistance will be given in regard to designing, and in any other way.

The Chairman: Regulation "d" will be amended as suggested by Mr. Fisk.

Regulation "d," as amended, and regulation "e" agreed to.

Mr. Holloway: Regulation "g" provides, "All licences to be renewed annually, excepting in the case of broadcasting stations and trading concerns, which are to be for five years." Does that refer to Government licenses, or licenses from Amalgamated Wireless, Ltd. and other companies?

The Chairman: There is no need to differentiate between companies.

Mr. Holloway: But we can differentiate between the Government and companies.

Mr. Salmon: The regulation refers to "trading concerns"; would they be broadcasting trading concerns?

Mr. Fisk: They may be firms engaged in the sale of receiving equipment.

Mr. Mingay: Broadcasting stations are trading concerns.

Mr. Salmon: Trading concerns are to be licensed for five years, and they need not necessarily be broadcasting stations.

Mr. Fisk: No, they may be selling apparatus.

Mr. Salmon: Where does the word "annually" come in? Does that apply only to receiving stations?

Mr. Fisk: To the general public. Regulation "f" agreed to.

Mr. Cameron: I suggest that regulation "g" be amended to provide that the licenses be issued by the Government and not by concessionaires and licensed dealers. Then the Government will handle the money paid for licenses and will pay the broadcasting companies.

Mr. Fisk: The suggestion may be a very good one, but it rather complicates the position. We are anxious to make the whole procedure as simple as possible, so that a person can go into a shop, buy his receiver, get his license, and pay his subscription, at one and the same time. We do not want to make it necessary for a person to have to buy his receiver at one place, pay his subscription at another, and receive his license at still another. The procedure laid down in the regulation will also simplify the keeping of records of the people who possess receiving apparatus. When a man takes out a license he must pay his subscription for the particular wave-length he is going to receive. Under the regulation as it now stands, the trader who sells him his apparatus will issue the license, and at the same time will collect the Government fee which, I presume, will be a nominal one. Then the Government will be notified that Mr. Smith, living at a certain address, has taken out a license for a given wave-length, and the broadcasting station will also be informed that Mr. Smith has become a subscriber to the service of that station. The regulation was framed with the object of avoiding several very considerable difficulties.

Mr. Cameron: I do not see how the public are going to be protected from the unscrupulous dealers.

Mr. Fisk: The public will be fully protected.

Mr. Cameron: I do not think they will as the regulation is worded at present. A dealer may sell a subscriber an old instrument quite unsuitable for broadcasting purposes, but if licenses are issued by the Government, then the instrument can be properly inspected, to see that they are suitable. If licenses are issued by the Government, the Government fee can be deducted

from the amount paid, and the balance handed over to the broadcasting company concerned. In that way the public will be fully protected, while the broadcasting companies will not be hampered in any way. As I read the regulation it is only aimed at protecting the dealers and the broadcasting companies.

Mr. Fisk: The dealers are not protected.

Mr. Cameron: The dealers and the broadcasting companies are protected as the regulation stands at present, but the public are not protected. I am out to see that the public get a fair deal. Yesterday the point was taken that the news-

regulations and motions were unanimously approved by the committee, they are open to amendment by Conference, but you must confine your remarks to the particular matter under discussion.

Mr. Cameron: Very well.

The Chairman: Do you desire to amend regulation "g"?

Mr. Cameron: Yes. I move—

That regulation "g" be amended to provide that all licenses be issued by the Government.

Mr. Brown: I second the motion.

Mr. Fisk: I do not think Mr. Cameron quite understands the position. The regulations provide that only apparatus approved by the Government may be issued, so that the issue of licenses will really be done by the Government, through the medium of the trading concerns which are distributing apparatus. Smoothly working machinery will thus be provided in that way, while the public will be protected from exploitation. Regulation "n" provides that any person, company or manufacturer dealing in or using wireless apparatus without a license from the Government shall be subject to an adequate penalty.

Mr. Wiles: And regulation "d" provides that receivers must be of a design approved by Statutory authority.

Mr. Fisk: Yes.

Mr. Wiles: In connection with the supply of electricity in Sydney, a contract with the Electric Supply Department of the City Council must be signed by the customer, and a deposit may then be required by the Council. In the interests of our business, my firm have found it advisable to carry out all the negotiations and details on behalf of clients desiring light or power, because we are anxious to retain and finish all the business that comes into the store. We do not want to send a customer to the Electric Supply Department to fill in the contract and pay the deposit, and take the risk of a clerk behind the counter say to him, "Have you bought your stuff, because if not, Mr. So-and-so around the corner is a very good man, and will allow you ten per cent. if you go to him."

Mr. Fisk: There is no doubt that the public will be fully protected.

Mr. Cameron: I have in mind the unscrupulous dealer selling inferior and unsuitable apparatus.

Mr. Slater: Will Mr. Fisk explain what is to happen to the amateur,



Mr. SWEENEY, Manager Radio Communication Co., who represented the Victorian Manufacturers.

papers had not been consulted so far as broadcasting was concerned, and immediately steps were taken to get the gentleman who raised that point on the committee. The name of a certain gentleman was put on the committee as the representative of the Wireless Institute, and immediately the accredited representative of the Wireless Institute protested against that action.

The Chairman: We are dealing with regulation "g," and you are not entitled to bring the Wireless Institute into the discussion.

Mr. Cameron: I understand that I was entitled to fully discuss the proposed regulations and motions.

The Chairman: Although the

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if accredited instruments only will be approved?

Mr. Fisk: You will find later that we have made provision for the experimenter. That was done in consultation with the representative of the Wireless Institute, and I think he is quite satisfied. The experimenter is not affected at all by this clause.

The Chairman: You will remember that I read a special regulation referring to the experimenter. That will come on for discussion at the proper time. With regard to regulation "g," an amendment has been moved that only the Government should issue licenses.

Mr. Salmon: Does this regulation mean that the seller of the set must fill in the license forms for both the Government and the broadcasting station. As I understand it, he would have to collect the Government fee, but not necessarily the broadcasting fee.

Mr. Fiske: We must get both. He must obtain the first year's subscription before the license is issued. The regulation says: "Issue licenses to all their customers who have paid their subscriptions to the concessionaire." If the customer prefers to go to the broadcasting company he can do the whole thing with them instead of doing it with the trader. He has that choice; he is not entitled to the license until he has paid the first subscription.

Mr. Slater: I take it that the trader's arrangement would be between himself and the broadcasting station?

Mr. Fisk: No. He really issues an official license to the man to use a receiver, but, before that is done, the man must produce a receipt either from the trader or from the broadcasting concessionaire.

Mr. Norris: How will this affect a man who wants to buy small parts? Assume that there is a small boy who spends a shilling sometimes, what will be his position?

Mr. Fisk: I do not think that this affects him at all. If people buy some parts from you, say, and some more from another person, and build receivers without a license, they are breaking the law. Then they are in the same position as anybody who breaks the law.

Mr. Norris: Could a provision be made to protect the buyer of small parts? There is at present no clause protecting him.

Mr. Fisk: What protection do you want?

Mr. Norris: As the regulation reads at present, the buyer of small parts must have a license.

Mr. Fisk: There is nothing in this regulation providing for him, but that matter will probably be dealt with later. Regulation "g" says that concessionaires and dealers shall be authorised to issue li-



Mr. J. H. J. of Edison Swan Electric Co., who represented the Victorian Wholesalers.

enses. That is the point with which we are dealing, but if anything crops up later dealing with your point, I shall be glad if you will mention it.

Mr. Brown: I think that this regulation relates to the question of the Government stamp. If a man buys spare parts and assembles them himself, he can then go to the Government and obtain a Government stamp.

Mr. Fisk: We shall come to that later.

Mr. Brown: I think that it is an argument in favour of Government control.

Mr. Fisk: I wish to clear up the point regarding Government control. There is plenty of control here. The receiver is controlled, the man holding the receiving set is controlled by license, and the manufacturer, the distributor, and the retailer are all under license, and consequently under control. Anyone who does the wrong thing to anyone else, or to the service generally, can be deprived of his

license. There is also a heavy penalty.

Mr. Norris: But what about people holding stocks to-day. Will they have to scrap them?

Mr. Fisk: We do not know what they are holding.

The Chairman: I think we are disagreeing. We had better come to some conclusion. The regulation is really intended to assist the public as much as possible. We must first deal with the amendment that only the Government should issue licenses.

Motion negatived, and regulation "g" adopted without amendment.

Mr. Brown: Does regulation "h" mean that unless a man subscribes to the broadcasting company he is not entitled to a license?

The Chairman: Absolutely.

Mr. Fisk: You have no use for a license if you do not subscribe to a service.

Mr. Brown: We understand that there are 1,500 to 2,000 holders of licenses to-day.

Mr. Fisk: These are experimental licenses. We are dealing with broadcasting now, which is different.

Regulation "h" agreed to.

Regulation "i" agreed to without discussion.

Mr. Fisk: In connection with regulation "j," I can answer the question as to the man who wishes to buy parts and build a set. First of all, remember that this is broadcasting. The man who wants to buy parts and amuse himself building a receiver in order to receive broadcasting, must naturally subscribe to the services from which he desires to receive. Therefore, he must buy licenses for those wavelengths. He may obtain his license and then buy the parts and make his receiver. In that case, he will have to submit his receiver to a proper authority so as to ensure that it is of the approved type the same as all other receivers.

Mr. Sweeney: If a man buys a receiver, it naturally becomes his own property. Then, supposing that he does not wish to continue receiving, and will not pay the license fees?

Mr. Fisk: He is in the position of a man who wires his house for electric light and then decides to use gas.

Mr. Norris: Is this penalising the small boy?

To be continued in further issues.

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THE NEUTRODYNE RECEIVER.

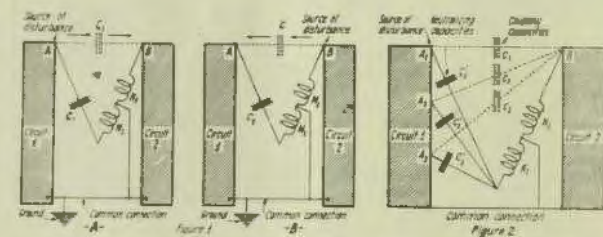
A NEW PRINCIPLE IN RADIO FREQUENCY RECEPTION FOR NEUTRALISING CAPACITY EFFECTS OF TUBES—TRUE RADIO FREQUENCY AMPLIFICATION APPARENTLY OBTAINED.

By ABRAHAM RINGEL
(Member, Institute Radio Engineers)

Experimenters and engineers have proposed various arrangements for getting rid of disadvantageous coupling effects in radio receiving circuits. Professor L. A. Hazeltine, of Stevens Institute of Technology, announced at a meeting of the Radio Club of America in Columbia University, the completion of his receiving set for this purpose. Professor Hazeltine traced the steps by which he claims to have finally eliminated the capacity coupling in the tube. He then demonstrated a number of receivers which embodied his scheme and called as witnesses a number of prominent amateurs who testified to the results obtained.

Professor Hazeltine named his amplifier the "Neutrodyne" because in it he attempts to neutralise the capacity couplings of the amplifier tubes. It consists essentially of a tuned amplifier, which is stable, neutralisation being effected by small capacities connected from grid to grid of successive radio frequency tubes. No potentiometer is necessary—and the tuning is said to be quite simple.

It is equally effective at short and long wave lengths. Some performances of a four-tube amplifier which is illustrated in figure 11 are as follows: (1) At broadcast wave lengths, as an instance, it regularly receives Fort Worth, Texas, which is at 417 metres and 2,000 miles away, while WEAF is working in New York City on 490 metres and only one mile away. (2) At amateur wave lengths: In one evening two prominent amateurs located in New York, both using similar sets, each received amateur stations in



all districts. No external oscillator was necessary, CW being received merely by making the detector tube oscillate.

Capacity Coupling and How to Neutralise It.

Before going on to the description of various practical neutrodyne hook-ups, the writer believes it best to explain the action of capacity coupling and the general method of neutralisation.

into circuit II, because of the capacity between I and II. This capacity is represented by C, and shown connected by dotted lines, which indicates that there is another electrical connection. Current will flow from A to B through C, in the direction of the arrows. To neutralise this action, the arrangement A-C2-N2-N1-B is introduced, with a lead taken from the junction of the coils to the ground. The

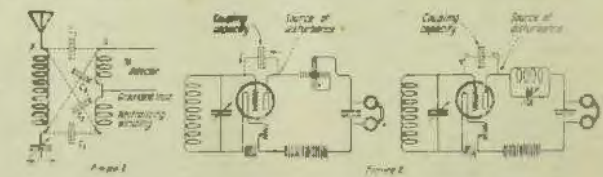
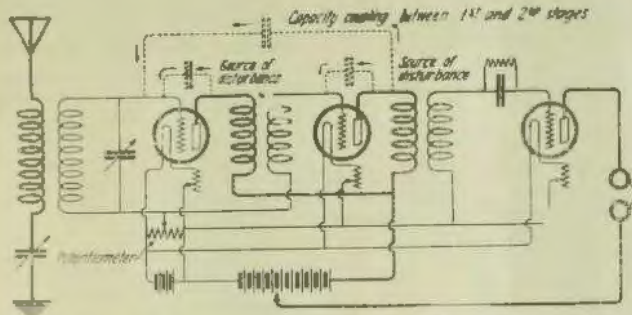


Figure 1 illustrates the general method of neutralising capacity coupling. There are two circuits, I and II, both connected to some common point, usually ground. If circuit I contains radio frequency energy, some of it is bound to get

into circuit II, because of the capacity between I and II. This capacity is represented by C, and shown connected by dotted lines, which indicates that there is another electrical connection. Current will flow from A to B through C, in the direction of the arrows. To neutralise this action, the arrangement A-C2-N2-N1-B is introduced, with a lead taken from the junction of the coils to the ground. The



der to obtain complete neutralisation, Professor Hazeltine has shown that the following relation must hold:

$$\frac{N_1}{N_2} = \frac{C_2}{C_1}$$

Where N1 and N2 represent the number of turns on the coils, this expression is also correct when circuit II is the source of the disturbance, as shown in figure 1B. The capacitance C1 and C2 may be made

primary and secondary windings of the receiver—because of the capacity. This was eliminated by making a secondary with two windings only one of which was useful in applying the received signal to the detector. The neutralising winding acts as one-half the inductance and provides neutralising capacity, through its capacity to primary.

Capacity Coupling in Vacuum Tubes and its Neutralisation.

Due to the internal capacity of the tube the amplified energy in the

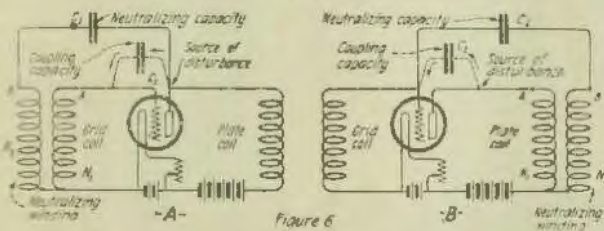


Figure 6

equal, in which case, N1 and N2 would both have the same number of turns. If N2 has four times as many turns as N1, C2 would be one-fourth as large as C1.

If there is coupling between a number of points of circuit I and point B of circuit II, as shown in figure 2, a similar method is used to neutralise these capacities. Here C1, C2 and C3 are the coupling capacities, and C11, C12 and C13 the neutralising capacities. Only a single coil need be used.

Figure 3 illustrates a previous practical application of this neutralisation in an old Navy type receiver. Trouble was experienced in getting zero coupling between

plate circuit may be fed back through this capacity to the grid and re-amplified, etc., until a state of oscillation is reached if the plate is almost in tune with the wave lengths of the grid circuit. The ordinary regenerative receiver which employs plate tuning (see figure 4), is a very common example of this. In radio frequency amplifiers we are likely to encounter in addition coupling capacities between various stages as shown in figure 5. Thus the radio frequency amplifier is not a true amplifier, since we reduce the actual amplification factor of the tube in order to stop oscillation, but depend on regeneration for proper functioning.



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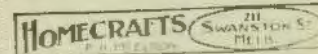
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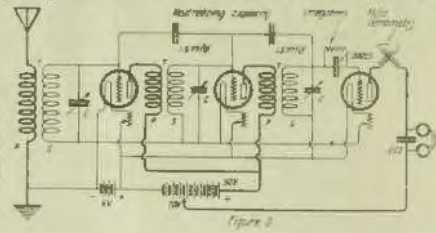
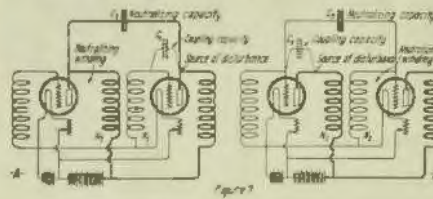
In applying the methods of figure 1 to neutralise the grid-plate capacity, we obtain circuits of figure 6A and 6B. The method of 6A corresponds to that of figure 1A and of 6B to figure 1B. In the former,

directly connected to the negative filament battery and in the other through the B batteries to the same point. Figures 7A and 7B show how this is actually accomplished in a radio frequency amplifier. In

1, the reader will convince himself of the essential similarity.

Practical Neurodyne Hook-Ups.

From the theoretical considerations just given, it is evident that



The neutralising winding is coupled to the grid coil and the neutralising capacity connected to the plate, which is the source of the disturbance. In the latter case, the neutralising winding is coupled to the existing plate coil and the neutralising condenser connected to the grid. The reader should trace these circuits himself and compare them with figures 1A and 1B in order to satisfy himself absolutely as to their identity. Of course the equation given above still applies. It is important to have the windings in the proper direction so that neutralisation of capacity coupling is obtained. This condition results when the points A and B are of opposite polarity.

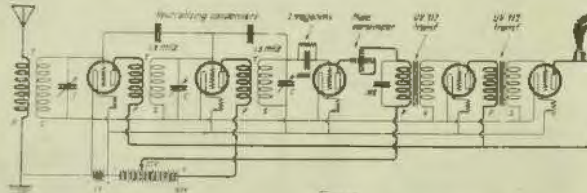
one case a neutralising capacity C_2 of the necessary value

$$(C_2 = \frac{N_1^2 C_1}{N_2^2})$$

is connected between successive plates. In this case, if N_1 and N_2 are of an equal number of turns, with proper polarity of windings, the neutralising capacity C_2 would be of the same value as C_1 . If the transformer is step-up, say N_1 has four times as many turns as N_2 , the neutralising capacity would be four times as large as C_1 —the grid to plate capacity. In the average amplifier tube the value of C_1 is about 6 micro-microfarads; so that C_2 would then be 24 micro-

in order to stabilise a radio frequency oscillator it is simply necessary to connect neutralising condensers between successive grids of the amplifier—or successive plates. The polarity of the windings should be properly made in order to produce neutralisation—and the capacities themselves adjusted to the correct value for neutralisation. Professor Hazeltine prefers to use condensers between grids rather than plates because he finds it easier to produce a condenser of 1.5 micro-microfarads than one of 24 micro-microfarads (since he uses a step-up ratio of 1 to 4 in his transformers). This method of stabilising may be used with ordinary radio frequency transformers, where the ratio of turns is about 1 to 1. The neutralising capacity connected either between grids or between plates is then 6 micro-microfarads.

There is no advantage, however, in using ordinary radio frequency transformers with their large effective resistance, since they will not function properly without regeneration. With a tuned radio frequency amplifier as here described, the adjustments are quite simple and the selectivity is greatly increased, because of the lower resistance of the coils. The wave length range with a transformer is limited, but with a tuned circuit, a very broad band may be covered, depending on the size of the coils and condensers. With the circuits and coils described here, the range is from about 180 to 500 metres, with practically equal amplification over the entire band. Professor Hazeltine estimates that he can obtain a voltage amplification of about 11 per stage, which is beginning to compare quite favour-



The circuits of figure 6A and 6B illustrate the essential methods used by Professor Hazeltine in his "Neurodyne" amplifier. But Professor Hazeltine was not satisfied to use additional coils and devised a method whereby no new windings would have to be employed. The transformer itself acts as the entire neutralising winding—both primary and secondary being employed; the junction of the coils, which is connected to ground being in one case

microfarads. In the case of figure 7B, C_2 is likewise determined by N_1 / C_1 . But here N_1 is the plate

N_2 coil and N_2 , the grid coil. Thus if we have a step-up ratio of 1 to 4, C_2 would be only one-fourth as great as C_1 , or in the case of the UV-201, about 1.5 micro-microfarads. C_2 is here connected between successive grids.

On comparing figure 7 with figure

ably with the audio frequency amplifier—where we can get about 20 times per stage.

Figure 8 illustrates a practical 3-tube neutrodyne receiver, which consists of two stages of tuned radio frequency amplification and a regenerative detector. The radio frequency coupling coils or trans-

plate variometer in the plate circuit of the detector tube does the trick very nicely. It is especially advantageous in receiving short wave C.W.—no external heterodyne being required. All the tubes may be hard, but a soft detector tube can be used to advantage.

The stabilising condensers, which

down so that it cannot be moved or disturbed.

Tuning.

In tuning, changing one adjustment does not materially affect the others; in other words, the adjustments are altogether independent of one another. Ordinary methods of tuning do not apply here. In an ordinary receiver, the antenna circuit has a rather broad tuning. But in the neutrodyne, the antenna, or rather the first tuned circuit is the most sharply tuned of all.

In order to bring in a station, all dials are set at approximately the same position (since the coils are alike). The last condenser is adjusted first, thus tuning the detector circuit. The second stage of amplification is then tuned, and finally the first. A little practice on the local transmitters will give the experimenter some idea as to the relative positions of the dials. If the positions for a 400-metre station are, let us say, 70 degrees on the last dial, 68 degrees on the second dial, and 72 degrees on the first, this relative position will be preserved to a fair degree. So that if a distant station at 380 metres is desired, the last dial will be reduced to approximately 65 degrees, the next to 63 degrees, and the first will be about 67 degrees. The adjustments are then slightly altered until the best results are obtained. Once these wave lengths are logged, it is merely necessary to set the condensers at the recorded values and the circuit will be in tune.

For C.W. reception, the plate variometer is tuned in the usual fashion until a beat note of the de-

formers are described in figure 13. It will be seen that the transformer T is composed of two coils very closely coupled. The primary consists of about 13 turns of No. 24 D.S.C. wire wound on a tube 2½ inches in diameter, which is inside the secondary coil. The latter consists of 55 turns of No. 24 D.S.C. wire wound on a 3-inch tube. The tuning condenser has a maximum capacity of about .0005 microfarads and is of standard 11-plate type. It will be noted that the antenna circuit is not tuned at all, but it is so closely coupled to the secondary that the aerial circuit is thus brought into resonance.

Regeneration may be employed with this hook-up. An ordinary

would have a capacity of only 1.5 micro-microfarads appears to present some difficulty. One ingenious method of obtaining such a small condenser is shown in figure 12. The wires connected to the grids are insulated and batted together, leaving a gap of about ¼ inch. A small metal tube is slipped over the wires, and the capacity is adjusted by sliding the tube until neutralisation is obtained. The last process is a matter for the individual experimenter and will require a little care to secure the correct capacity. But once done, it will be unnecessary to readjust unless an altogether different type of tube—with different grid to plate capacity—is used. The tube should then be tied

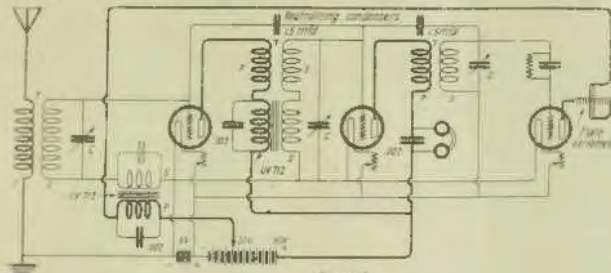


Figure 10

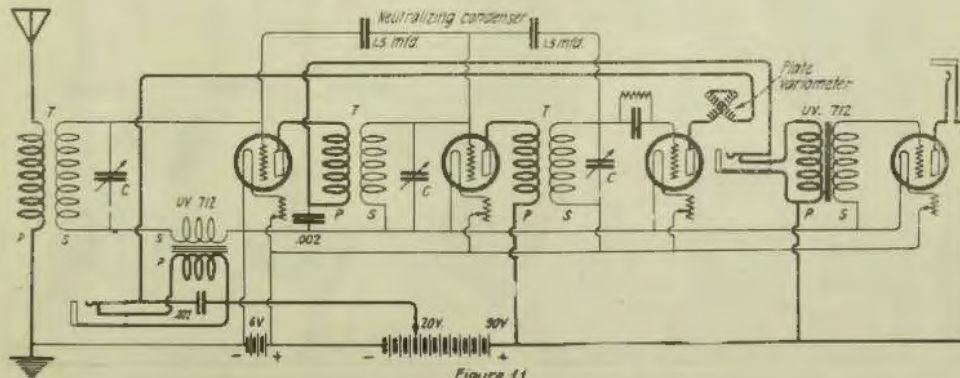
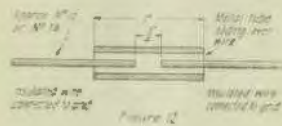


Figure 11

sized pitch is obtained. The beat note is altogether independent of the other adjustments, except the detector tuning which of course determines the frequency of oscillation together with the position of the plate variometer. The first two dials, which control the radio frequency tuning merely vary the intensity of the received signal. Only when all the circuits are absolutely in tune, is there a slight change in the beat note.



In the neutrodyne the amplifier will not oscillate, as the inventor claims. No adjustments, it is said, that can be made, except perhaps that of stabilising condensers, will produce this undesirable condition. A stabilising potentiometer is of no value—since there is no need for one. The tuning of the neutrodyne is not as sharp as a standard regenerative receiver—therefore no further adjustments are required. The panel, therefore, need not be shielded. All the circuits here given show only two stages of radio frequency amplification. It is inadvisable to add another stage because of the difficulty in preventing stray couplings between the last stage and the first two stages, unless the last stage is thoroughly shielded. It is also very hard to

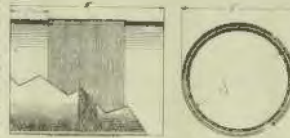


Fig. 13.

balance or rather neutralise the grid-plate coupling of the third stage, whereas a balance is very easily secured with two stages—adjustment of the stabilising condensers being fairly broad.

Another point that cannot be overlooked in the neutrodyne amplifier is the inductive coupling between the various stages, due to the magnetic field of the coils. This is settled by arranging the coils as shown in figure 14. The lines of force of the magnetic field of one coil will then be parallel to the windings of an adjacent coil—and thus no voltage will be induced in the latter. This is shown in the rear view photo of the receivers demonstrated by Professor Hazeltine before the Radio Club of America.

5-Tube Neutrodyne Amplifier.

The circuit of figure 9 is a 5-tube amplifier containing two stages of tuned radio frequency amplification, a regenerative detector and two stages of audio frequency amplification. The transformers T are those shown in figure 13, and the neutralising condensers (figure 12) are of the construction already des-

cribed—capacitive coupling being neutralised by connecting these condensers between grids as shown.

The tubes used were amplifier tubes, and exceptional results were obtained. On the detector alone, amateurs in all districts of the United States were logged in New York. Broadcast stations in Texas, Kansas City, Minneapolis, Dayton, were also heard. With a loud speaker and two stages of audio frequency amplification, Atlanta, Georgia, was quite loud with only a ground connection and no aerial at all.

3-Tube Reflex Neutrodyne.

Because it is unnecessary to apply a positive bias to the grids of the amplifiers in order to stabilise them, the neutrodyne lends itself admirably to reflexing. The main features of reflex circuits were described by the writer in an earlier issue of "The Wireless Age" (January, 1923) and there is therefore no need of going into more elaborate discussion.

Figure 10 illustrates essentially the circuit of figure 9 except that the first two tubes serve both as audio and radio frequency amplifiers. The incoming signal from the antenna is amplified at radio frequencies by the first and second tubes in the usual manner and then applied to the detector tube, which may or may not be regenerative. If standard regeneration is not desired, the plate variometer is either short circuited, set at minimum or removed altogether. The radio

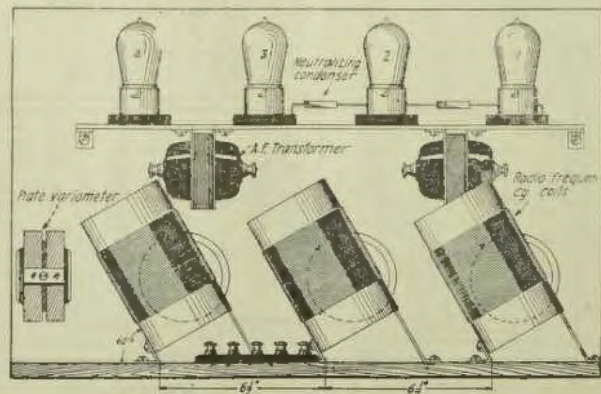
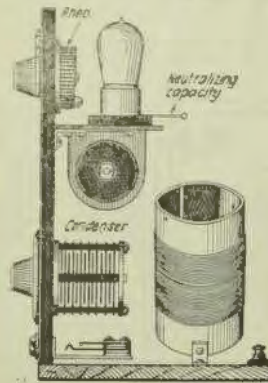


Figure 14.

frequency is rectified into audio frequency and applied to the grid of the first tube by means of a UV-712 amplifying transformer. The audio frequency is further amplified by the second tube, the phones or loud speaker being connected in the plate circuit. Audio and radio frequency windings are in series and it is necessary to have by-pass condensers of .002 microfarads capacity connected across the primaries of the audio frequency transformers and across the telephones, so that the radio frequency currents will not be obstructed. The secondary windings of the UV-712 transformers have sufficient distributed capacity for this purpose, and no additional condensers are necessary. The radio frequency windings offer practically no opposition to the passage of the audio frequency currents. Amplifier tubes are used throughout. The plate voltage is furnished by four B batteries having 90 volts.

A reflex amplifier in which both stages of audio frequency are reflex is rather difficult to handle, and generally quite noisy, so that the writer would not recommend it except to amateurs who are interested in tackling knotty circuits.

4-Tube Reflex Nentrodyne Amplifier.

The best combination of reflex and nentrodyne amplifier is shown in figure 11. The first two tubes amplify at radio frequency which is rectified into audio frequency in the detector. Neutralising condensers are connected between grids of tubes in order to stabilise the radio frequency amplifier. From the plate circuit of the third tube, which is the detector, audio frequency is applied to the grid of the first tube through a UV-712 transformer, is then amplified in the plate circuit, and applied to the grid of the fourth tube by means of a second audio frequency transformer.

Jacks are not connected in the circuit, so that the listener may plug in on the detector or either of the audio frequency stages. This circuit is probably the best reflex nentrodyne, since no large audio frequency voltages are impressed on the radio frequency tubes.

The layout of apparatus for such a set is indicated in figure 14. The four-tube sockets are mounted on a long horizontal panel, on the under side of which are suspended the audio frequency transformers and the blocking condensers. The tube panel is supported by the ver-

tical panel, which also contains the rheostats and tuning condensers, and also the variometer in the plate of the detector tube. The radio frequency coils, whose construction is shown in figure 13, are placed approximately six inches apart and inclined so as to make an angle of 60 degrees at the base. This is done in order to avoid inductive coupling between stages. All binding posts are in the rear.

The neutralising condensers are connected from grid to grid as shown in the diagram and their construction is illustrated in figure 12.

The operation of this set is the same as that described previously.

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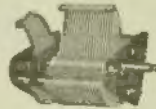
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CROYDON RADIO CLUB.

After the usual business, Mr. C. W. Slade gave a very interesting lecture on "Wireless Waves." After this the Club members were instructed in Morse code.

The membership has now increased to 30.

The Hon. Secretary, is G. Maxwell Cutts, "Carwell," Highbury Street, Croydon.

NORTH SYDNEY RADIO CLUB.

The regular weekly meeting of the above Club was held at its building, corner of Alfred and High Streets, North Sydney, last Tuesday evening, 12th inst., when its transmitting panel was practically completed.

Members are constructing the various apparatuses to be used in conjunction therewith, such as A.C. transformers, rectifiers, etc., and transmitting will commence at an early date.

Next Tuesday, Mr. Malcolm Perry will lecture at the Club on some important matters interesting to wireless amateurs.

WIRELESS INSTITUTE OF AUSTRALIA. (N.S.W. Division) GENERAL MEETING.

On Thursday, 14th inst., a general meeting was held in the Chamber of Commerce Building, George St., Sydney. Mr. H. A. Stowe was in the chair.

The business of the evening was a short address by E. T. Fisk, Esq., M.I.R.E., on the broadcasting situation and a lecture by Mr. H. R. Gregory entitled, "The Tasmanian Hydro Electric Scheme."

Before calling on the speakers the chairman welcomed Mr. Ralls, a visitor from Auckland, N.Z., who is a keen wireless experimenter, and takes a prominent part in the activities in the Dominion.

Mr. Ralls in responding gave some very interesting particulars of doings in N.Z., and several illustrative anecdotes of how the broad-

casting is conducted there. He extended a hearty invitation to any visitors to N.Z. to look him up at Radio, Ltd., Auckland.

The chairman then asked Mr. Fisk to address the meeting. In the course of his address Mr. Fisk drew attention to the necessity of making a start on some firm foundation, and indicated how the efforts of the Broadcasting Conference had done their utmost to achieve the most satisfactory basis for future working and at the same time provide for later amendments found necessary with as little dislocation as possible. Mr. Fisk reiterated his personal sympathy with all genuine experimenters, and stated he would always do his utmost to protect their interests. He specially drew attention to his own close association with the experimenter by his membership in the Wireless Institute and looked forward to great future developments being made by Australians in view of the success attained by the recent Trans-Pacific Tests. He concluded by asking all present to preserve a very wide perspective and regretted so little was known to the rest of the world of the Australian successes and stated that he hoped the next low power tests would be between England and Australia.

As the time was too limited on the conclusion of Mr. Fisk's address, Mr. Gregory's lecture was regretfully postponed till a future meeting.

LEICHHARDT AND DISTRICT RADIO SOCIETY.

Members of the Leichhardt and District Radio Society held their usual weekly meeting on Tuesday, June 12th, at the Club-room, 176 Johnston St., Annandale, when a very interesting and instructive lecture on "Vacuum Tubes" was delivered by Mr. A. C. Connolly. The lecture was supported by means of apparatus which Mr. Connolly had brought along with him for that purpose, and members spent a very pleasant evening. A feature of lecture was its clearness and its freedom from technicalities the result being that even the most raw beginner was able to understand clearly all that the lecturer had to say. At the conclusion of the lecture, and after Mr. Connolly had replied to a number of questions put to him, he was accorded a very hearty vote of thanks.

The next meeting will be held on Tuesday next, and all interested are invited to be present. All communications regarding the activities of the society should be addressed to the Hon. Secretary, Mr. W. J. Zerb, 145 Booth St., Annandale.

KURING-GAI DISTRICT RADIO SOCIETY.

Mr. Mingay, who was to have lectured at the last meeting of the Society on the 12th inst., was unavoidably absent, but the breach was ably filled by Mr. R. Hill, who came forward at the last moment and delivered a very instructive lecture to those present at the meeting.

Mr. Hill who had no subject prepared, supplied much needed information on various subjects, and judging by the profuse note taking by members his advice was much appreciated.

Prior to the meeting the usual buzzer practice was indulged in, but the response from members was very poor. Members who wish to avail themselves of the opportunity, are particularly requested to do so.

The next meeting is down for Tuesday, the 26th inst., at 8.15 p.m. Buzzer practice will be held from 7.30.

Continued on Page 18

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VICTORIAN ACTIVITIES

(By Our Special Correspondent.)

MELBOURNE NOTES.

Recent tests in low power valve transmission with New Zealand disclose the fact that communication can be easily maintained with that dominion with a power input of 10 watts. Several Melbourne experimenters have been heard well by a Mr. Bell, of Gisborne, New Zealand, and Mr. B. Hull (3JU) was successful in maintaining communication in both directions with Mr. Bell. Mr. Hull and Mr. Newman (3MC) were both heard distinctly by Mr. Bell, and a few nights later a test was arranged with one or two other transmitters which, however, was fruitless, as on the night in question Mr. Bell was unfortunately in hospital. A letter was received from a friend of Mr. Bell's, stating that in the course of listening he had heard 3DP very clearly. Mr. Bell has now recovered, and a series of tests will be carried out with New Zealand, commencing on the 12th instant, and results are eagerly awaited. The power input

is limited to 10 watts, and as the distance has already been covered by three stations, there seems no reason that all the transmitters in Victoria should not get across. Mr. Bell, the New Zealand amateur, has been clearly heard in Adelaide.

A meeting of the Broadest Conference Committee with the Postmaster-General to consider the proposed regulations, on the 14th May, has been convened, and the representative of the Wireless Institute of Australia has been invited to attend. It is proposed to alter certain of the experimental regulations, and a policy has been formulated by the Victorian Division in consultation with other divisions, to deal with the question. The kind way in which the Postmaster-General alluded to experimenters at the various conferences is reassuring, and experimenters feel content that their interests will be looked after at this meeting at which the Post

master-General will be present in person.

The Malvern Section of the Wireless Institute is rapidly being organised and rules and regulations have been framed for presentation to the section by an energetic committee. Mr. McMasters, the organiser, has had much experience in handling bodies of this nature, both in America and Australia, and it is felt that the Malvern Section including as it does some of Victoria's leading experimenters and the President of the Victorian Division—should become one of the foremost clubs in the State.

The Brighton Section, which is being organised by Mr. Whalley—a member of the Victorian Divisional Council—shows great promise, and when the amalgamation of all these clubs into a Victorian Division is complete, a really powerful and well organised body will be the result.

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LICENSES.

EXPERIMENTAL v. AMATEUR.

Mr. Phil. Renshaw, Hon. Sec., N.S.W. Division, W.I.A., gives his views:

The position now created by the inauguration of broadcasting is such as to give the man in the street much food for thought. The authorities have adopted the correct attitude in regard to the issue of experimental licenses, in that they are not issuing further licenses for this purpose until the broadcasting situation has been clearly defined.

It cannot be denied that the hundreds of applications now pouring into the office of the Controller of Wireless are endeavouring to get in before the broadcasting position has been settled, as it has been clearly indicated in the proposals submitted by the Conference to the P.M.G. that experimenters will be granted unlimited use of wave lengths for their experimental work. It is thus easily understood why the rush has set in.

To say that the authorities have acted wisely in deferring all such applications is not sufficient praise for their appreciation of a very delicate situation. It goes without saying that the experimenter has at last received definite recognition, and his status must be protected, which is a problem of no small moment. The definition of an experimenter must be clearly laid down, and to avoid injustice it is hardly fair that the full responsibility should rest with the Chief Manager of Telegraphs and Wireless. My suggestion is that a special board, consisting of two nominees of the P.M.G. (preferably service men) and three nominees of the Wireless Institute, with the State Radio Inspector as Chairman, should be constituted in each State of the Commonwealth, and meet regularly to investigate applications for experimental licenses and make recommendations to the Chief Manager of Telegraphs and Wireless, and thus facilitate the issue of such licenses and assure the general public that justice will be done.

I feel that no exception can be taken to such an arrangement as the public must surely realise that wireless has become of very potent commercial use, and it is essential to absolutely discriminate between those who want to receive the

broadcast on the cheap and those who genuinely intend to experiment in this enormous field of science.

To the Editor of "Wireless Weekly."

Dear Sir,—Your correspondent, "Q.R.N.," in reply to my comments in last week's "Wireless Weekly," has written a long epistle, most of which has no connection with the issue I raised. I did not, as alleged by "Q.R.N.," attempt to criticise the article written by "Amateur," but took objection to a couple of statements made therein which in my opinion are quite distinct from the rest of the article, and warranted the comments I made. Your correspondent makes the following remarks that "Mr. Crocker should have been fair, he should have read the article carefully before he criticised it." He also accuses me of dragging in Mr. Mac to "cloud the issue," and then asks me why I did not go further and quote Mr. Mac's views on the matter in "Amateur's" article. He further states that "I know Mr. Mac does not care a cuss whether he receives telephony or not." It is not my

province to accuse "Q.R.N." of not reading "Amateur's" article carefully, but Mr. Mac's views as coming from Mr. Mac are not in that article. He may hold some of the views in common with myself and others, but there is not a word in that article that would make them specially Mr. Mac's. Besides, I am not discussing Mr. Mac's views.

His statements, that I did not read "Amateur's" article carefully, and that I knew Mr. Mac's views on telephony reception, are assumptions, and are not true. I do not know whether Mr. Mac cares a cuss whether he receives telephony or not, but I will venture an opinion, and that is, if Madame Melba were to sing through the ether to-morrow night, Mr. Mac would care a "cuss," and hang on to his phones, but if I were to sing he would not care a "cuss." In regard to my statement that "Amateur's" article implies that a person concentrating his efforts on wireless telephony is not a genuine experimenter, and his statement that the genuine experimenter only takes a casual interest in telephony. It is obvious that this latter statement is a typical case, and represents the attitude of the rest of his genuine experimenters.

My contention is, that if the ex-

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perimeter in New Zealand who received music and speech transmitted from Sydney had only taken a casual or pastime interest in telephony reception, he would not have accomplished this feat, and this gentleman is as much entitled to be called a genuine experimenter as "Amateur's" experimenter, although he, from "Amateur's" point of view, is wasting his time on something of little practical value. "Amateur," to be consistent, must class this kind of experimenter as other than genuine. "Amateur's" statement that the Relay League had realised that telephony was only of casual interest, etc., is not correct. Mr. Charlesworth did make a statement similar to that referred to by "Q.R.N.," and there was considerable resentment at his remarks. Mr. Squires was a guest, and his crude remark about "monkeying" with telephony sets was also resented, but as a matter of courtesy it was not expressed. There were also "hear, hear," two of which I believe came from persons not holding transmitting licenses. Because a few said "hear, hear," to Mr. Squires, it does not warrant "Amateur's" stating that the Relay League accepted his views. I do not consider the remarks referred to, made by Mr. Squires or Mr. Charlesworth, were acceptable to the majority of transmitters present, no other speaker spoke in the same strain. These remarks caused many transmitters to think that their efforts were not appreciated, and "Amateur's" statement referring to the Relay League appeared to support this view. The tone adopted by your correspondent in reply to my letter is not just what one would expect from a wireless experimenter with whom one differs, and it is regrettable that he should think fit to state that I dragged in Mr. MacLurean to cloud the issue, which I did not. Yes, Mr. "Q.R.N.," atmospherics are very strong, but not sufficiently so to prevent a man from giving his call signal. I know sometimes it is necessary to write under a nom-de-plume, but when a statement is made which reflects upon one's character, he should, at least, have had the principle to put his name to it.

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- Douglas Slide Receiving Set, with Phone Condenser and Detector on Ebonite Panel, Nickel-plated, 30/.
- Valve Receiving Sets, Panel mounted, 2 variable Condensers, Vario Coupler tapped, Valve, Valve Rheostat fully engraved, Calibrated dials in polished Cabinet, nickel fittings, £11/10/.
- Detector Units, consisting of 6 x 6 Bakelite Panel, Valve Socket, Rheostat with graduated scale, in polished Cabinet, nickel fittings, £2/2/6.
- Filament Rheostats, nickel-plated, 5/6.
- Crystal Detectors, on Ebonite Base, with Terminal, N.P., 5/6.
- Vario Couplers, solid Ebonite, wound and tapped, 30/.
- Vario Meters, solid Ebonite, 25/.
- Grid Leaks, 2 meg., with attachment clips 3/9.
- Phone Condensers, Ebonite, Mica dielectric, 1/3.
- Grid Condensers, Ebonite, Mica dielectric, 1/3.
- Switch Contact Studs with Nut, 1/6 dozen.
- Terminals, 5d., 6d. and 8d. each.
- Radial Switches, N.P., 1in., 1/9; 1 1/2in., 2/3.
- Dials and Knobs, Bakelite Calibrated, 5/6.

WE MANUFACTURE EVERYTHING FOR RADIO.
SEND FOR CATALOGUE

Ramsay Sharp & Company Limited
RADIO ENGINEERS - - 217 GEORGE STREET, SYDNEY
OPEN FRIDAY NIGHT

Radio Notes

RADIO CAN DO IT.

Train control by wireless has been tried with varying success in a few European countries, but a new invention now being tested in America seems the very last word in perfection. Applying to either electric or steam railways, the invention provides for every possible contingency. Should the driver be overcome by dizziness, or become otherwise helpless, the train is automatically stopped by means of ether waves. The apparatus is meant to be placed in the cab of the engine and connected up to the usual air-brake mechanism. Nothing else is required, no laying down of wires or cables along the tracks.

NO MAN REQUIRED.

The present system is that of block signal control, but this needs human co-operation. The new device, which is the patent of a German engineer, is entirely automatic, and, if anything, still more efficient. If it is installed it will become all but impossible for more than one engine to enter any one block. Directly the engineer loses control, wireless steps in, and if, on approaching a signal, a loud-speaker warning "Look out!" should remain disregarded, the train will gradually slow down until it is brought to a dead stop. All this has to be done by human hands is to set an indicator. Radio does the rest. This system also claims immunity from static.

GOOD FOR THE POST OFFICE.

A marked increase in Government postal receipts has been noticed since radio came to stay. As each new station has been opened and operated, countless letters of inquiry, all of which have needed replies, have been sent daily. Catalogues of radio materials, outfits, etc., have been set by post. In many cases interested parties have ordered up their sets and parts from those, and had the packages mailed to them. Without noticing increasing fees, the G.P.O. finds radio very good for its exchequer.

Amateur Calls.

New South Wales

- 2 U J Shanahan, R. D. Knox St., Randwick. R.
- 2 U K Sheidow, R. L. 13 Pacific St., Manly. E.
- 2 U L Nowell, H. D. MacKenzie St., Lindfield. R.
- 2 U M Hale, N. D. Waminoe St., St. Ives. R.
- 2 U N Donnelly, N. F. 156 Livingstone Rd., Marrickville. R.
- 2 U O Coen, J. A. 30 Botany St., Randwick. R.
- 2 U P Cunningham, J. Seventh Avenue, Campsie. R.
- 2 U Q Hort, H. Forest Road, Arncliffe. R.
- 2 U S Lloyd, M. R. W. Springdale Rd., Killara. R.
- 2 U T Maher, W. J. 99 Lawson St., Paddington. R.
- 2 U V Keynes, D. Gunning Rd., Crookwell. R.
- 2 U X Sherwin, F. G. Penkivil St., Bondi. R.
- 2 U Y Parker, H. R. 62 West St., North Sydney. R.
- 2 U Z Goldstein, M. 22 Bourke St., Redfern. R.
- 2 V A Gazeley, Geo. Robert St., Rose Bay. R.
- 2 V B Palmer, E. J. Saywell St., Chatswood. R.
- 2 V C Favell, F. E. Silver St., St. Peters. R.
- 2 V D Pulford, G. S. Chapman St., Strathfield. R.
- 2 V E Pacey, W. H. 15 Hampden Avenue, Adamstown. R.
- 2 V F Lanser, E. H. L. 6 Birchgrove Av., Balmain. R.
- 2 V G King, A. C. 9 Alma St., Ashfield. R.
- 2 V H Kemp, J. S. 31 Ruthven St., Waverley. R.
- 2 V I Jung, J. E. George St., Gladesville. R.
- 2 V J Johnston, W. L. Wharf Rd., Longueville. R.
- 2 V K Graham, G. W. J. Cheltenham Av., Cheltenham. R.
- 2 V L Gibson, A. H. Speed St., Liverpool. R.
- 2 V M Daly, H. C. N. Agnes St., Strathfield. R.
- 2 V N Brown, N. H. 91 High St., Carlton. R.
- 2 V O Bassett, J. Stroud. R.
- 2 V P Young, J. C. A. Glencoe St., Sutherland. R.
- 2 V Q Drummond, G. P. 340 Stanmore Road, Petersham. R.
- 2 V R Mann, C. Canterbury High School Radio Club, Canterbury. R.

GERMANS IN SYDNEY

A FEW VISITORS have recently arrived from the Fatherland. Amongst them are some of Famous

BYNG BROTHERS

MECHANICAL STEAM
:: ELECTRICAL TOYS ::

THE VERY BEST MADE

See them at

O'Sullivan's Electric Shop

296 PITT STREET, SYDNEY

(Continued from Page 15)

AUSTRALASIAN RADIO RELAY LEAGUE.

A full committee meeting of the above League will be held on Friday, 22nd, at 8 p.m. in the Royal Society's Rooms, Elizabeth St. A full attendance of committee-men is requested.

GENERAL MEETING.

The general meeting of the Australasian Radio Relay League will be held on Thursday, 28th inst., at the Royal Society's Rooms, Elizabeth St., commencing at 8 p.m. All members and intending members are requested to attend.

SUCCESSFUL TEST.

A very successful test was carried out by Messrs. J. Davis, 2DS; R. C. Marsden, 2JM; MacIntyre, 2VX, and Mr. Ortell, of Christchurch, N. Zealand.

On Sunday morning both Mr. Davis and Mr. Marsden transmitted on C.W. which was heard strongly in Christchurch by Mr. Ortell.

Mr. Ortell replied and was read faintly by 2DS. Neither 2JM or 2VX were able to tune low enough to get Mr. Ortell's transmission.

EXPERIMENTAL TRANSMISSIONS.

For week ending, 24/6/23.

Monday: 7.30 to 8, 2GR; 8 to 8.30, 2UW.

Tuesday: 7.30 to 8, 2MB; 8 to 8.30, 2MB; 9 to 9.30, 2GR.

Wednesday: 8 to 8.30, 2GR.

Thursday: 7.30 to 8; 2GR; 8 to 8.30, 2UW.

Friday: 7.30 to 8, 2KC; 8 to 8.30, 2DF; 8.30 to 9, 2UW.

Saturday: 7.30 to 8, 2UW; 8 to 8.30, 2GR.

Sunday: 7.30 to 8, 2CM; 8 to 8.30, 2CM; 8.30 to 9, 2CM; 9 to 9.30, 2KC.

Vacant times may be booked by transmitters on application to Mr. R. C. Marsden, 2JM.

THE NAREMBURN SCHOOL RADIO CLUB.

The Naremburn School Radio Club held its weekly meeting at the school on Wednesday night.

There was a good attendance, and the members displayed the keenest interest in the proceedings.

A lecture was given by Mr. J. Barret, and buzzer practices by Mr. N. Teyer.

The club holds its meetings every Wednesday evening. All communications must be addressed to the Secretary, Naremburn School Radio Club.

MODELS.

Vertical Multi-tubular Boiler, 9in. x 4in., 80lbs. w.p. 14. jin. tubes. Feed pump, check and safety valves, water gauge, steam supply, valve and blow-down cock, 55/5/-. Illustrated Lists, 1/-

O. BURNABY BOLTON
DAILY TELEGRAPH BUILDING,
SYDNEY.

Radio Company Limited

MOVING to Larger and more Up-to-date Premises at . . .

**Goldsborough House
15 Loftus Street**

NEAR QUAY

Let us explain the New Broadcasting Regulations

Consult us before buying your Wireless Sets

Prices Moderate
Service Excellent

Demonstrations
Arranged Gratis



**"SATISFIED
JUST to KEEP the WOLF from the DOOR."**

THIS is the story of a man into whose satisfied soul the Alexander Hamilton Institute brought divine discontent.

May it be read by every man in Australia whose position and income are no better to-day than they were last year.

"A few years ago I occupied a position as manager of a branch of a large company in a city of some 20,000 inhabitants," the man writes. "This job I had held for five years, during which there had been no advancement for me in the way of remuneration or otherwise."

(One single year without advancement ought to be a danger-signal to any ambitious man.)

"My duties, however, were not arduous, and as I was paid a salary that kept the wolf from the door I was fairly well satisfied with my lot. Through the efforts of one of your representatives, the Modern Business Course and Service was placed before me; I took up the study of it and, after continuing for three months,

"I began to wake up.

"The fact was dawning upon me that I had been and was in a rut. After consulting with a member of the Alexander Hamilton Institute staff who favoured the change, I started at the very bottom with the concern on whose stationery this letter is written. My advancement has been gradual, until I am secretary of the company, a mem-

ber of the Board of Directors, and have charge of the advertising and selling activities. . . ."

The concern is the largest manufacturer of shoes in its territory.

The letter is too long to quote in full; but you will note that the Institute representative who accepted this man's enrolment was not satisfied to let the matter rest there. He counselled with him about finding a different job; he advised him step by step just how to make his training count. This is what Alexander Hamilton Institute service means; it is one of the reasons why thousands of successful executives are so enthusiastic in their praise of the Institute's value in their careers.

You are paying for this training whether you receive it or not.

All through these years when he was "keeping the wolf from the door," and was "fairly well satisfied with his lot," the writer of this letter was paying a terrific price for what the Alexander Hamilton later brought to him; paying in opportunities that passed him by because he had not the knowledge and self-confidence to make them his own; paying in years of no salary increase, when the increase might have been swift and sure.

And you, too, are paying. You know in your own heart how big a man you are. You have set a figure which you believe will some day represent your value in the business world.

If you are a £1,000 man in your own estimation and working for £500, then you are paying £500 a year for what the Alexander Hamilton Institute

has to give. If your mark is £2,000 and your salary is only £700, then you are paying £1,300.

Isn't it too much to pay for the failure to investigate? Is it fair to your wife and children to put off year after year the realisation of the hopes that might be fulfilled now?

Send for this book of success.

All the facts about the Modern Business Course and Service and the answers to every question you are likely to ask are contained in a 120-page book, "Forging Ahead in Business." It is a valuable addition to any business library, yet you can read it in a single evening. A copy will reach you entirely without obligation on receipt of your name and address; merely fill in the coupon and mail.

**Alexander Hamilton Institute
42 Hunter Street, Sydney**

Send me "Forging Ahead in Business," which I may keep without obligation.

Name
(Print here)

Business Address

Business Position

New Zealand Address: W.I.
BOX 427, G.P.O., AUCKLAND.

Questions and Answers.

T.G., Rose Bay, asks:—

Q. (1): What does oscillating mean?

Q. (2): What does oscillations in coils with a view to thus determining their self capacity?

A. (1): A current is oscillating when it is changing its direction of flow in a conductor alternately at a rate of over 20,000 times per second. When the frequency of an alternating current exceeds 10,000 cycles per second, it is said to be oscillating. The discharge of a condenser in a low resistance is an example of an oscillating current.

A. (2): The question of self capacity of coils and how to measure same is a very difficult one, and as yet has never been satisfactorily answered. To attempt to thus answer this question would mean writing a text book.

E.J.P., East Minto, asks:—

Q. (1): Would it be possible to pick up music and telephony with a crystal set (published in "Wireless Weekly," May 4th), 25 miles from Sydney, with a two wire inverted L aerial, 50 feet high and 100 feet long?

A. (1): Yes

P.B., Sydney, asks:—

Q. (1): What extra apparatus do I require (to receive music) than the following: Single slide tuner, 6½ x 4, wound 28 gauge enamel wire, double crystal detector, zincite and borate, potentiometer 6½ by 3½, 4 volt accumulator, phone condenser, aerial two 20 36 feet long and 20 feet high, T type, one pair Murdock's phones 3000 ohms?

Q. (2): What apparatus would I require to make a single valve set?

A. (1): You have sufficient gear to construct a crystal set as shown in "Wireless Weekly," May 4th.

A. (2): Any wireless advertising dealer in "Wireless Weekly" will give you a complete list of parts required, with prices on application.

Radio Bug, Petersham, asks:—

Q. (1): What gauge of wire do I require to construct a loose-coupler inductance coil?

A. (1): See wire tables. "Wireless Weekly," Vol. 2, No. 21.

G.N., Pyrmont, asks:—

Q. (1) The name of the manager, and address of a city wireless club, also cost and yearly subscription?

A. (1): Call and see Mr. P. Renshaw, Secretary of the Wireless Institute, State Munier Pipe Works, Bond Street, City. He will be pleased to give you all particulars.

N.C.H., Auburn, asks:—

Q. (1): Where can I get names and call signs of Australian experimenters?

Q. (2): What time does Pennant Hills start to transmit at night?

A. (1): Back numbers of "Wireless Weekly" contain all these calls, which may be obtained on application.

A. (2): VIS (Pennant Hills) transmits at all times according to the amount of traffic. He sends weather at 8 p.m., on 400 metres.

J.P., Fycombe, asks:—

Q. (1): In reference to electrolytic rectifier described in your last issue, are same suitable for use on 240 volt mains direct? I understand such cells have a critical voltage?

A. (1): 50 volts per cell.

T.J.H., Bankstown, asks:—

Q. (1): Will you let me know the nearest radio club to Bankstown?

A. (1): Blawarra Radio Club. Write to the Secretary, Mr. W. D. Graham, 44 Cameron Street, Rockdale.

E.H., North Ryde, asks:—

Q. (1): Is it right that every holder of a license is allotted a call sign. I have a crystal license, but no call sign came with it?

Q. (2): Where do we have to pass the test to get a valve license?

A. (1): So long as you have a license you need not worry about a call sign. In future receiving licenses will not be allotted a call sign.

A. (2): No further licenses will be granted until after the broadcasting regulations are gazetted. See Mr. Crawford, Radio Inspector.

McDonnell House, Pitt Street, City, in reference to passing 12 word a minute test.

X.C.L., Sydney, asks:—

Q. (1): I have an extension from my phone terminal on a loose-coupler set running a distance of 30 feet into another room. The signals appear to be louder through this additional wire than from the set direct. If long phone leads have this effect would it not be possible to amplify signals by making them pass through a coil of wire between detector and the phones?

Q. (2): Does VIS work with any other stations at any set time, or send any other regular signals besides the weather report at 8 p.m.?

Q. (3): I have often noticed in magazines to join the leads from each wire of the aerial just before they enter the building. I haven't noticed any aeriels constructed this way, and would like to know the advantages of the scheme?

Q. (4): Would a twin wire inverted L aerial, 75 feet long, 50 feet high, at free end, and 44 feet high at the other end, be classified as fair, good, very good, or excellent?

Q. (5): What is the advantage of a twin wire aerial?

A. (1): No. The fact is accountable because the long phone cords act as a condenser shunting the phones, so by passing the radio frequency component. Try bridging your phones with a .001 condenser.

A. (2): Not to our knowledge.

A. (3): Theoretically the resistance of the aerial should be as low as possible. Consequently the feeders should be brought right to the entry.

A. (4): If a short wave length reception, "very good"; if for long wave lengths, "good."

A. (5): The advantage is an increase in capacity and a lowering of resistance. If the length is restricted capacity is an advantage.

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

June 22, 1923.

WIRELESS WEEKLY

Wireless Experimenters' Requirements

Apparatus and Parts with a Guarantee of 100% Efficiency

DOUBLE SLIDE TUNERS, £2; complete with phone condenser detector panel.
LOOSE COUPLERS, £2; with detector panel, £3/15/-.
LOOSE COUPLER PARTS: Baseboard, 1/6; complete set of ends, 2/3; tubes, 6d. each; slider, 3/6; secondary sliding rods, 2/8 pair; primary wire, 2/-; secondary wire, 1/6; 8 studs and stops, 2/-; secondary switch, 2/9; Crystal detector, 4/6; all loose coupler parts nickel plated.
VALVE RECEIVING SETS, equal to any on the world's market, from £16; complete with high and low tension Bat aerial wire, insulators, Phones, etc., with Vernier adjustments for Telephony, £1 extra.
SWITCHES: 2/9, 3/4, and 4/- each.
CRYSTAL PANEL MOUNTED SETS, £7, complete with phones, aerial wire, etc.
VALVES: Expense "B," 35/-; Radiotrons, 200, 37/6; 201, £2; 202, £2/10/-; Myers' Detectors and Amplifiers, 35/-; Mareoni "R," 25/-; V-24, 37/6; Mullard Ora, 27/6; D.E.R., 50/-.
PHONES: Brown's single, 25/-; Murdock's, 30/-; Bestone, 32/6; Trim's, 39/6; Western Electric, 4000, 42/-, 8000, 45/-; Baldwin's, £4/18/6; Brandes' Superior, £3; Stromberg Carlson, 45/-; Amplihorns, 12/6 each; Magnavox, £14/10/-.
CRYSTALS: Galena tested and guaranteed, 2/-; magnetite iron pyrites selicon, 1/6 each.
"COL-MO" CONDENSER: Ready to assemble, .0001, 7/6; .0002, 8/3; .0003, 10/-; .0006, 12/3; .0008 15/6; .001, 18/6; assembled and adjusted, .0001, 10/- to .001, 25/-; with Vernier control, 10/- extra on assembled price. **TERMINALS**: From 5d. each; studs, 2/- and 2/3 per dozen.
EBONITE TUBE: 3 in., 3 1/2 in., and 4 in., diam., 12/- per ft.; Rotors, 5/6 each.
TRIPLE HONEYCOMB COIL: Mountings, 18/6; Remler, £1/-; Plugs, 4/6.
REMLER APPARATUS: Potentiometers, 8/6; Rheostats, 8/6; Dial Rheostats, 12/6; Knob and Dial, 6/6; Rotary Switches, 3/6 and 4/6; Q.S.A. Tapped H/C Coils, 850 turns, £2/5/-.
VERNIER RHEOSTATS: "Fada" Type, 10/6 each.

The Colville-Moore Wireless Supplies

10 ROWE STREET, SYDNEY
 WE SEND GOODS (PER VALUE PAYABLE POST).

Graham Patent Variable Condenser



Measures
5 1/2 x 2 1/2 x 1 1/2

Costs only
25/-

Occupies only a quarter of the space of an ordinary condenser. Now being used in wave-metre construction. Ideal for concert tuning, and easily holds the variable wave.

Will fulfill every requirement of any condenser for any part of any wireless circuit. No Rotary Plates washers to get out of order. Absolutely no capacity effects.

Solid aluminium case 3in. 360 degree dial. Other metal parts Nickel plated. 1 5/8in. polished milled edge, ebonite knob. Use it as an aerial tuning secondary tuning or Variable Grid Condenser.

Now Available at all Radio Dealers, or from the Manufacturers' Stock.

Ask your Radio Dealer to show you the Graham Products. If your Dealer cannot supply you, write direct to us, or, better still, make a call.

Continental Radio & Electric Co.
 165 KENT STREET, SYDNEY
 (Near Grosvenor Hotel)

QUALITY RADIO

Winter Seasons are the best for Radio Reception. Secure your Set before the season arrives.

WE STOCK COMPLETE SETS OR PARTS TO BUILD YOUR OWN.

B.T.H. English Detecting, 35/-; Amplifying, 35/-; and Transmitting Valves, 40/-; Head Sets 2000 to 8000 ohms.; Crystal Sets complete with 4000 ohms.; Head Set, £5.

SEND FOR PRICE LIST TO

W. HARRY WILES,

Radio Department,

60-62 GOULBURN STREET,

One door from Pitt Street

SYDNEY.

WIRELESS WEEKLY

June 29, 1923

MARCONI VALVES

MADE AT THE OSRAM LAMP WORKS

(COVERED BY VARIOUS PATENTS)

Marconi:Osram

—two names to conjure with in the
WIRELESS VALVE world.

Just as the name MARCONI is associated with the development of Wireless, so is the name OSRAM with the development of Electric Lamps.

The joint research and technical skill of these two great enterprises resulted in the production of



Undeniably the Best for Broadcasting

CALL OR WRITE FOR PARTICULARS

British General Electric Co. Ltd.

"Magnet House," 154-6 Clarence St., Sydney

Ct. Scott and Bolton Sts., Newcastle
Magnet House, 590 Bourke Street
Melbourne
And at Wellington, Dunedin and
Auckland, N.Z.

Sole Agents: Norman Bell & Co.,
Brisbane
Morris, Hedstrom Ltd., Suva
and Levuka, Fiji.
Magnet House, 203-7 Murray St.,
Perth