Chas. E. Biele U-2AOS
S.S. TREDINNICK AUCKLAND, NEW ZEALAND
RADIO GDWQ
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THE NEW ZEALAND

WIRELESS AND BROADCASTING NEWS

VOL. II. No. 5. JUNE 20, 1924. PRICE 1/-

See page 26 – W7OE ???

SPECIAL FEATURES:

THE BROADCASTING SCHEME

Radio Science

ANALYSIS OF TRANSMITTING CIRCUITS

Sidelines in Wireless

LOW FREQUENCY AMPLIFICATION

The Care of Telephones

THE SCHOOL RADIO CLUB

NEW ZEALAND WIRELESS AND BROADCASTING NEWS

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THE NEW ZEALAND
WIRELESS
AND BROADCASTING NEWS

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Reports and Contributions are solicited from Radio Clubs and Subscribers.

Short personal items, written in a friendly spirit, respecting well-known radio men, are welcomed. Send marriage, birthday greeting, holiday, promotion, illness, accident, etc., information.

The Editor will be pleased to receive for review, books, pamphlets, trade catalogues, and other literature.

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THE BROADCASTING SCHEME.

Thanks to a friendly administration, New Zealand will probably within a few months embark upon a radio broadcasting scheme which, if the main proposals are carried out, will be the most satisfactory yet adopted in any part of the world. The Dominion is in a position to profit by the experiences of other countries where broadcasting has been in vogue for some time. In the United States a condition of affairs exists which has brought about an utter chaos. "The Land of the Free" is beginning to realise that the spirit of freedom can be carried too far, and that under our social system the individual is under certain obligations to the rest of the community. The man with a radio set in the United States is not required to take out any license, nor has he to pay any broadcast fees, while he is permitted to operate any kind of circuit whether it interferes with his neighbour or not. The teeming millions in the United States, with their tremendous purchasing power, enable the radio manufacturers to spend large sums annually in maintaining up-to-date broadcasting stations without any direct revenue to pay for the upkeep of same. These companies, by providing radio concerts, are stimulating the demand for their goods, and are able to recoup themselves out of their trade profits.

About eighteen months ago a solution of the broadcasting problem in Great Britain was found in the inauguration of the British Broadcasting Company, which owns and operates a number of broadcast stations at Home. This company was formed under the authority of the Postmaster-General, by whom its operations are licensed and controlled. It consists of a Limited Liability Company, whose members are drawn from the various wireless manufacturers who, for the purpose of broadcasting have come together under this title. The Broadcasting Company has for its revenue a proportion of the Post Office license-fees and certain royalties on all apparatus sold, every article of which, according to the Act, must have one of the company's stamps on it. The license-fees in Great Britain range from ten shillings to a pound, and come under three categories—the experimental license, the broadcast-listener's license, and the transmitting license. The British broadcasting stations are permitted to radiate about 1,500 watts, but recently this has been reported to have been increased very considerably. There are, however, unreasonable restrictions in Great Britain against the use of regenerative circuits, owing, it is claimed, to the fact that the regenerative circuits re-radiate and cause interference with owners of other sets. This is an unwarranted restriction, as it is established that a regenerative three-coil circuit will only re-radiate when unskilfully operated. The prohibition against the regenerative circuit has robbed listeners-in of one of the most efficient yet devised.

In Australia, owing to the thoughtless acquiescence of interested parties to a scheme that was as obnoxious to the average listener-in as it has been found inefficient, radio has experienced delay from gaining popularity. One of the outstanding faults in the scheme was the "sealed set." Radio sets were sold that were so contrived that they could tune-in on only one wave-length—the one for which they paid a license-fee to listen-in to a certain broadcast station. Anyone associated with radio knows that much of the fascination of the ownership of a receiving set is the power to change reception from one station to another when the fancy dictates. Another disability of the scheme was the veto against regenerative receivers. However, a big conference of representatives of the trade and radions was held in Sydney a few weeks ago, which promises to result in the introduction of an entirely new scheme which should place radio broadcasting on a completely satisfactory footing.

The proposed New Zealand broadcasting scheme will involve the erection and operation of four up-to-date broadcasting stations, one in each of the principal cities. These stations are to have a power output of 500 watts, which, with first-class modulation, provides ample strength for a country of the area of New Zealand. It has been suggested that it would be more economical to have only one station with 2500 watts output located at Wellington, the geographical centre of New Zealand. The authorities, however, recognise the risk of interference with ship and shore commercial stations, and have decided that an output of 500 watts is quite enough power to be within the safety limit. Further, those listeners-in residing nearest Wellington would be far better served than those residing in more distant areas who would suffer in reception by their remoteness. The owners of crystal sets, in particular, would thus be placed at a disadvantage. A highly-commendable spirit of equity is a dominant feature of the projected scheme. Regenerative three-coil sets are to be permitted, as hitherto. The wave-lengths of the four stations are to be widely separated, so that listeners-in will be able to tune-in any of the four stations without jamming one upon the other. The stations are to be owned and operated by a national broadcasting company, which will derive its income from a proportion of the license-fees collected by the Government from listeners-in, and from license-fees issued to all dealers in radio goods. On the whole, the prospects are favourable to the development of a remarkable boom in radio broadcasting, which will owe its popularity to the friendly endeavours of a far-seeing and well-informed administration.

RADIO DIRECTION-FINDING.

Navigation in Fog.

In ideal weather for the particular work in hand, the New Zealand Government steamer Tutanekai left Auckland on May 28 for a demonstration with her radio direction-finding apparatus. From every point of view the demonstration was an unqualified success, the ship being navigated to Tiri through dense fog, and, thanks to her apparatus, making a perfect land-fall.

This vessel, which is under the command of Captain J. Bollons, an enthusiast where radio direction-finding is concerned, left Prince's Wharf at 9 a.m., having on board representatives of the Chamber of Commerce, the Harbour Board, and the Merchant Service Guild. The nautical adviser to the Marine Department, Captain G. Hooper, was on board, with his assistant, Captain W. Whiteford, and during the eight hours that the ship was away they had abundant opportunity of demonstrating the operations of the ship's receiving set, and of explaining its very simple mechanism. Admittedly a fair proportion of those making the trip came on board as critics, but they left the ship fully persuaded that their previous doubts had gone by the board, and they were candid enough to make frank admission of their new and enlightened attitude.

Feeling her way cautiously in the murk, the Tutanekai went down the harbour. When between North Head and Bean Rock, she dropped anchor, and at once got into communication with the temporary radio station on Tiri.

In the Tutanekai's wheelhouse, where is placed her receiving apparatus, Captain Hooper gave what in effect was a clearly-phrased lecture on radio direction-finding. He wore one set of receivers over his ears, and in turn all of those present listened in.

The apparatus was subject to quadrantal error, said Captain Hooper, but that error was constant. There could be no error when taking a direction directly ahead, astern or abeam.

Asked about the use of the apparatus at long range, Captain Hooper said they had operated with it when 57 miles off the Three Kings, in a dense fog, and had come safely in and anchored. That, he said, was a telling indication of their faith in it.

There were, said Captain Hooper, 88 ships running between Great Britain and the United States fitted with the apparatus, and as it was utilised between ship and ship, it had proved most valuable in preventing collision.

A shipmaster remarked that if it were so perfect it was the duty of the Government to have, say, six such direction-giving stations along the New Zealand coast. To that Captain Hooper replied that anything that assisted navigation they always helped along.

The tests at anchor completed, the Tutanekai got under weigh and headed towards Tiri. After clearing Rangitoto Beacon the fog was so dense that the ship had to go at a very slow speed, making about two or three knots, and at times stopping and taking a cast of the lead. The direction of Tiri was obtained immediately by the apparatus, and the vessel kept her course solely by the aid of the apparatus. The tidal streams deflected the ship somewhat from her course, but this deflection was remedied from time to time by means of the direction-finder. The fog hung heavily over the water till the ship was within less than a mile of Tiri. As she steamed into clear weather it was seen that her bow was pointing directly for the mast of the radio station on the island.

The chairman of the Auckland Harbour Board, Mr. H. R. Mackenzie, speaking after tea had been served, said he was satisfied the Government was doing the right thing in its tests, and especially so if it erected a station at Cape Maria Van Diemen. To Captain Hooper he said: "Your word has been your bond, and you have proved your case."

Analysis of Transmitting Circuits

Finding Out What Circuit You Are Using

Amateur transmitting circuits go by such a variety of names that many amateurs are themselves confused as to what circuit they are using. We are indebted to Mr. A. W. Parkes for an article which appeared in the April, 1924, issue of "QST," which article appeals for the adoption of a standard system of classifying such circuits. We agree with Mr. Parkes when he states that it would simplify the reading and the writing of radio articles dealing with transmitting circuits if amateurs adopted the system of a descriptive name based on the fundamental circuits "Meissner," "Hartley," and "Colpitts."

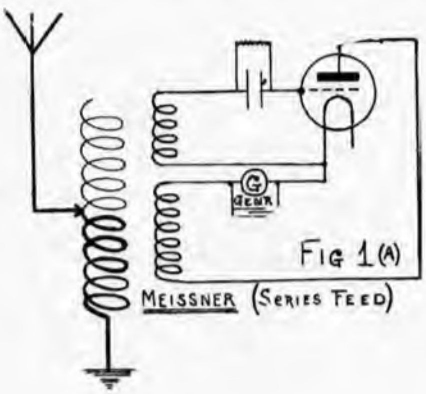
In the article above-mentioned, the writer states that descriptions of circuits in use were obtained from amateurs all over the United States, and it was found on analysis that of 155 transmitting circuits there were 71 Hartley, 70 Hartley-with-tuned-grid, 11 Colpitts, and 3 odd circuits. But a great many of the 155 circuits were given under names which meant nothing: "Sure-fire," "reversed feed-back," etc. "Why," says Mr. Parkes, "speak of reversed feed-back, when the feed-back is always from the plate to the grid? If we term it a 'Hartley with tuned grid,' we will be more correct, and we will be more readily understood."

The greater portion of Mr. Parkes' article is reproduced below.

In all the diagrams here shown, the metres, switches, and most of the filament circuits have been left out because they are unimportant as far as an analysis of the oscillating system employed is concerned. One connection is made to the filament, and in practice this connection would go to the centre tap of a filament transformer when alternating current is used for filament lighting. A condenser would be joined across each half of the transformer winding. Readers will understand that the two arrow-headed wires shown on the right-hand side in figures 2, 3, 4 and 5 go to the plate power source.

A System.

Since all oscillating circuits must contain a combination of Inductance and Capacity tuned to the desired frequency, we can boil



our entire analysis down to two factors—

1. Method of grid excitation: inductive or capacitive.
2. Method of Power Feed: series or parallel.

Note that we have **not** included the method of coupling to the antenna as a factor, because any of these circuits **may be coupled inductively or conductively without changing their nature**.

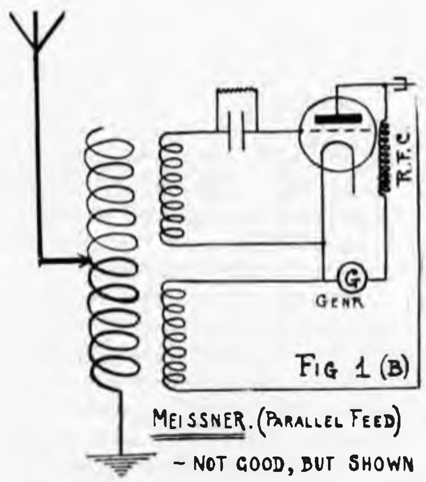
The Meissner Circuit.

In the Meissner circuit of Fig. 1, note that the grid excitation is obtained by induction from the oscillatory current in the antenna circuit. This grid feed may be varied at will by changing the value of the coupling between the grid and antenna coils. This circuit is not at all popular with amateurs because it is very easy to set up "spurious" or "parasitic" oscillations when working at low wave-lengths, due to the combined effect of inductive and capacitive coupling, which cause out-of-phase effects. However, the circuit is extremely flexible because it requires very little change of coupling over a wide range of wave-lengths, hence it is popular in the laboratory as a source of high-frequency current. It is convenient as an external heterodyne, for hunting down harmonics, or as a source of power when measuring antenna resistance, using the method described by Mr Albert F. Murray in the May, 1923, issue of "QST," which can be obtained from the Circulation Department of that magazine.

The Hartley Circuit.

In the Hartley circuit of Fig. 2 we couple the plate to the grid by means of the voltage drop across the reactance of the helix turns.

The Hartley circuit may generate short-wave "parasitics," but they are easily stopped by placing a very small choke coil in the grid circuit right at the grid



binding post. At Mr. Parkes station this happened, and the parasitic was found clear at the lower end of the wave-metre scale,

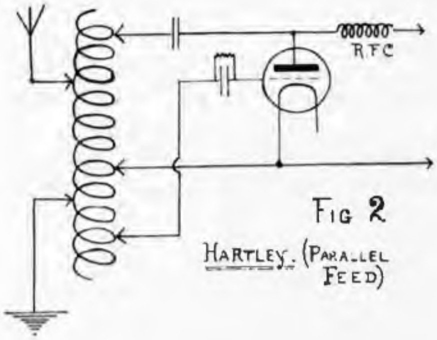


FIG 2
HARTLEY. (PARALLEL FEED)

where it was located on 50 metres! As soon as the choke coil was inserted the wave-length returned to normal, and no further difficulty was experienced. The grid choke was made by winding 20 turns of ordinary bell wire on a pencil.

Morecroft (Principles of Radio Communication, p. 502) explains that this also occurs when the natural frequency of the grid circuit is near that of the main oscillatory circuit. The valve may then oscillate at the frequency of the grid circuit instead of at the proper frequency (and it may at times jump from one to the other, remarks the Technical Editor of "QST").

The Colpitts Circuit.

In the Colpitts circuit of Fig. 4 the voltage drop across the condenser C is used for the grid excitation. For this reason we call this a "capacity-coupled" grid circuit. The Technical Editor of "QST" has pointed out that, as we tune the antenna with the condenser "C," we also change the value of the grid coupling, since the voltage across the condenser changes with its setting. This disadvantage can be readily appreciated. Another great disadvantage of the circuit is that (especially with large valves) it is difficult to obtain a variable condenser that will stand the plate voltage and at the same time have low losses. Of course it is possible to leave the condenser alone and change the wave-length by varying the antenna clip on the helix, but this, too, changes the grid excitation because the voltage across the condenser changes not only with the antenna current, but also with the frequency (wave-length).

Methods of Feeding: The Plate Power Series Feed.

In the Meissner circuit of Fig. 1a, we have an example of series power feed. This means that the D.C. and the radio-frequency A.C. components of the plate current **flow through the same paths in the plate circuit** (first going through the plate coil together, and then going to the source of plate power, where the A.C. may be passed around the generator or transformer by a condenser, and

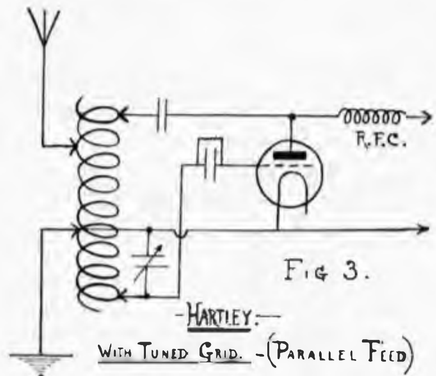


FIG 3.
-HARTLEY.-
WITH TUNED GRID. -(PARALLEL FEED)
(SEPARATE GRID COIL OFTEN USED)

finally back to the filament together). In consulting Prof. J. H. Morecroft on this subject, he says: "I can say that practically all of the ordinary circuits are capable of being adjusted to give equally efficient operation of a valve, but those in which alternating or pulsating currents flow in the fewest circuits are best."

Parallel Feed or Shunt Feed.

In Figures 1 (b), 2, 3, 4 and 5 parallel feed may be observed. Note that always with parallel feed there must always be a radio-frequency choke coil (R.F.C. in the figures) to keep the radio-frequency currents away from the plate power supply, and a blocking or stopping condenser to keep the plate power out of the plate coil.

Differentiating Between "Shunt" and "Series" Feed.

The use of parallel (shunt) power feed, as compared with series feed may always be determined in any circuit by observing whether the power lead to the plate also carries the oscillating current. If it does we say that we have series feed; if it carries the plate power only, and the oscillatory current is led off another way, we say that we have parallel (shunt) feed.

A by-pass condenser around the source of plate power **is always** needed for series feed, otherwise the oscillatory current will not go through, or else would damage the power source. With parallel feed it sometimes happens that some of the radio-frequency current gets by the choke. In this case also the power source (generator or transformer) must be protected by a by-pass condenser.

"Un-scrambling" Amateur Circuits.

In comparing the Hartley circuit of Fig. 2 and the so-called "Sure-fire" circuit of Fig. 3, we find that the only difference between them is that the "sure-fire" has a tuned grid circuit—in other words, it is a "Hartley-with-tuned-grid."

When working with a high-resistance antenna, the transmitter often refuses to oscillate until the grid circuit is tuned. However, this same thing can be accomplished by using the proper values of plate stopping condenser and radio-frequency choke, as shown by Mr. Prince of the General Electric Company in the

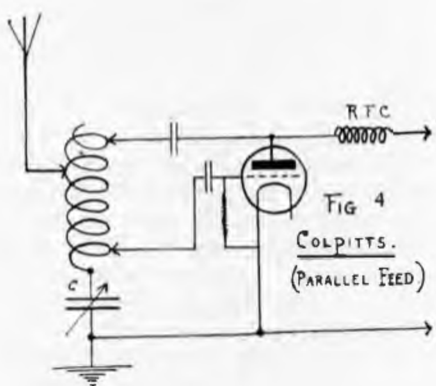


FIG 4
COLPITTS.
(PARALLEL FEED)

ley-with-tuned-grid," and the Reinartz are one and the same, used for different purposes. It is very interesting to draw circuits side by side in this fashion with the parts in the same relative position. The likenesses of circuits may then be easily observed. Many "new" wonders will disappear if you analyse them in this way.

In this discussion the term "reversed feed-back" has been used as by the amateur, not as by Ballantine, who applies it to an arrangement in which there is no inductive coupling between the helix and the grid coil.

With reference to Fig. 4, Colpitts parallel feed circuit, the condenser shown between the aerial inductance and the plate may be omitted in low-power sets.

(From "QST," April, 1924, pp. 26-28.)

PHONES WRONGLY CONNECTED.

One of the easiest ways to ruin a pair of phones is to leave them connected in the wrong direction on a one or two stage audio amplifier. There is a right and a wrong way to connect phones, and if they are connected incorrectly they become demagnetized and lose their sensitivity.

The best way to tell which is the correct connection is to plug the phones in the second stage of amplification and tune in a loud signal. The phone caps should then be removed and one edge of the diaphragm should be lifted up about an eighth of an inch with the finger. When the phones are connected in one direction a very much greater pull will be noticed than when connected in the other direction. After this has been determined some kind of a mark may be placed on the phone terminal that was connected to the plate of the tube when the greater pull was placed upon the diaphragm, and the phones should always be connected with the marked terminal to the plate.

SEEING ROUND THE WORLD.

In Ten Years.

"I am certain that television will be accomplished in 1924, otherwise seeing by wireless, and I will stake my scientific reputation on it," Professor Fournier d'Albe, of London University, is reported to have said in a recent special cablegram to the Sydney "Sun."

Professor d'Albe invented the Optophone, an instrument to enable totally blind persons to read ordinary print, the needle periscope for trench warfare, and the tonoscope, an instrument for making speech audible to totally deaf persons.

"I think television, though somewhat crude at first, will be among the wonders of the Wembley Exhibition," said the Professor, who has been working on the problem and has reached the point where success is assured. Other scientists are studying the problem, and there is the keenest competition to be the first to construct a satisfactory apparatus. Professor d'Albe's most recent achievement is to perfect an apparatus by which photographs taken from an aeroplane may be transmitted by wireless to a land base.

"It is highly probable," said the Professor, "that within five or ten years an audience will be able to sit in a big hall and watch the Derby, a naval review, boxing matches in America, and even a big battle, by means of moving pictures projected on a screen at the moments the events happen. Explorers will carry television cameras in climbing Mount Everest, in penetrating to the North Pole, or examining the ocean bed in submarines; and we, sitting in ordinary picture theatres, hundreds or thousands of miles away, will accompany them step by step.

"As far as vision is concerned," the Professor concluded, "as wireless waves can be relayed almost indefinitely, I see no reason why we, a decade hence, should not be able to watch what is happening on the other side of the world."

SOLDERING HINTS FOR THE EXPERIMENTER.

If you are going to experiment with your wireless set, and add to it, and realise the joy of making your own instruments, you will need a working knowledge of the art of soldering.

Again, if your aerial wire snaps in the night, it is a bad policy to make a rough join. The two strands should be soldered together. Bad "joins" are fatal to good results on your receiver.

The most important thing in soldering is to have the ends you wish to connect clean.

The presence of dirt will retard the fusion of the two metals, and so, before heating either of them, ascertain that they are both scrupulously clean.

You will require the following articles for your soldering outfit.

A soldering iron, tin of Fluxite, a file, a stick of solder, some sandpaper, a pair of small, clean pliers.

With these materials in hand you are ready to start. First, heat the iron. This can be done in a plumber's blow-lamp, or on a gas-ring.

There is a certain temperature to which to heat the iron, and it is most important that this exact temperature is reached.

This is the most difficult thing the beginner will be called upon to judge. Experts can tell by the amount of green flame round the hot iron; others withdraw the iron and judge by the "feel" of it when the palm of the hand is placed a few inches away.

Probably the most reliable method is the following:

Withdraw the iron from the flame and dip it for a second in the Fluxite. Note whether the paste burns off at once or merely melts and runs about the surface of the hot iron. If the iron is ready for use, the paste will begin to fizzle at once, and the iron should not then be made any hotter.

The next thing is to "tin" the iron. Take a file and file up one of the faces of the iron from the point for about half an inch until it is clean and bright.

Do this as quickly as possible, so that the hot surface does not have time to be affected by the air. Next dip the prepared part in the Fluxite and rub it with a stick of solder which has also been dipped in the Fluxite. You may find that a piece of sal ammoniac to rub your iron on will help the "tinning" to take better.

You will then have a coating of bright, melted solder, into which you can melt more and apply it to the work in hand as required.

Replace the iron in the flame.

Now take the two wires to be joined and smear with Fluxite; then remove the iron from the flame and make sure that the tinning is still clean and bright.

Prepare enough solder to enable you to dip in it both pieces of the wire. Twist them about until they are well tinned. Dip the tinned ends in Fluxite, and with the clean pliers screw them tightly together. Finally, dip them in the melted solder again for a few minutes and the job is done.

Don't buy too small an iron, as one with a copper "bit" three inches long by one inch square will retain the heat longer and enable you to do practical work, whereas a tiny bit will go cold very rapidly and you will wonder why you cannot solder properly.

Radio Science

By "B.C.L."

New Zealand has already become famous throughout the scientific world through the attainments or achievements of such men as Professor Rutherford, the discoverer of the electron; Professor Bickerton, propounder of the "partial-impact" theory, and many others whose names will go down to posterity. Therefore, welcome the Wellington Radio Science League, which has been inaugurated with the avowed object of "concentrating its attention on experimental work of a somewhat advanced character, and to place its work on record in papers which will be made available for those who desire to consult them." Such worthy intentions merit the utmost encouragement, for there are many things in radio science which have for years been baffling the intellectual giants of the world. The Wellington Radio Science League has adopted the plan of forming the members into groups of seven in order to conveniently concentrate and co-ordinate the results of individual research. This "we-are-seven" principle has found expression, already, in one group of scientific investigators, and an eager, expectant radio community is awaiting the compilation of the first paper. To the writer it seemed a quite unbecoming modesty that prompted the announcement that the existing group was restricted to seven members. I number many scientific experimenters and inventors among my acquaintances, but confess that the only one calculated to qualify for radio "experimental work of a somewhat advanced character" is too busily engaged upon devising a contrivance upon which to strike matches on a radio set, without scratching the varnish of the cabinet, for the purpose of examining dull-emitter valves, to ascertain whether the filaments are all right. As the intricacies and obstacles to be overcome are so manifold, this experimenter does not expect to be free till the autumn of 1928 for other experimental work of a somewhat advanced character. I could lay my hand on another man—but I forgot: he is not a radio investigator. He is merely perfecting a perpetual motion contrivance, and I don't know when he will be free. No; I am convinced the "we are seven" policy is quite superfluous. Indeed, I must congratulate the founders of the League on having unearthed as many as seven qualified experimenters in such a relatively small community. Of course in Wellington radio circles there are many who know a little about wireless and talk a lot about it, and vice versa. But, to rope in seven individuals who are really qualified to carry on "experimental work of a somewhat advanced character" is indeed quite a fortunate circumstance. It would be a pity if the newly-formed Wellington Radio Society permitted the papers of the Radio Science League to be bidden away in some dusty archives. It may be possible that an occasional paper would not be of a too advanced character to render it unintelligible to the few select intellectuals of the Society. The fields of radio research are illimitable, and, after all, the feeble, immature efforts of Marconi, De Forest, Armstrong, Fleming, Flewelling, Scott Taggart, Reinartz, Frank D. Bell, Professor Hazeltine, Albert Edward Huia Simpson, Cockaday, and the rest of the bunch, have really reached a dead-end. One still has to twist knobs, turn dials, and curse static till the perspiration oozes, merely to pick up some ridiculously adjacent broadcast station just across the other side of the Pacific.

Take the common or garden radio valve. I say take it; but take it **carefully**, or else anything up to £2, or even more, goes west. What the Wellington Radio Science League wants to do is to invent a valve with which you could play ping-pong with impunity. Then there's static. What a field for experiment! What is there to prevent us from tapping this unbounded source of energy? There is a breed of static around Wellington that comes in strong enough to knock your hat off. Could not this power be harnessed so as to do some of the labour of this overworked human race? Then there's harmonics. Ask Mr. F. J. O'Neill, of 4YA, Dunedin, the discoverer of New Zealand harmonics. Why, any night in the week, it is scarcely safe to venture on the air with your head 'phones on. The ether fairly bristles with harmonics, like a porcupine's back. Night after night one can struggle through this jungle of harmonics until all faith in mankind is abandoned. Here is a chance for the resourcefulness of the Wellington Radio Science League. Could not these experimenters devise some method of tuning-in a harmonic so that by pressing a button one could give the proprietor of the harmonic sufficient high voltage to scorch the Chinese laundry mark off his collar? These are the things that really matter in radio. If the bunch of radio luminaries I have already mentioned have reached a dead-end, there is no reason why the Wellington Radio Science League should not progress further. If one desires to plumb the very depths of human degradation, let him endeavour to tune-in a popular DX station when the pack are on the job. Howls? Dante's Inferno, Tophet, and a score of fire-engine syrens in one grand concerto are a mere berceuse or lullaby compared with the pandemonium which surrounds a DX broadcast carrier wave. Talk about traffic regulations! If the average motor road hog caused half the trouble on a highway as these miscreants do in the ether, prosecutions would keep the magistrates working overtime. Can't the Radio Science League clean up this gang of valve-howlers? What about a "death-ray" for sweeping these abandoned characters off the ether? Yet these howling individuals are gentlemen in comparison with the creature who inserts a buzzer in the earth circuit of his receiving set. Why could not the Radio Service League produce a contrivance for electrocuting the buzzer fiend the instant he presses his key?

Oh, those microphones!—broadcast and amateur. They are all about the same. A microphone that will transform Charlie Forrest's cultured Wellington college accent into that of a Yankee hobo should be relegated to the chamber of horrors among the things that used to be. Then there is friend Jaques, possessed of the purest Dublin accent, who announces from 2YK, the Dominion Radio Company. But what do we hear? Instead of Jaques's dulcet voice we get an emery-paper counterfeit. What are the members of the Radio Science League going to do about it? While De Forest is fiddling around with a new idea in the form of a flame microphone, our own League can go ahead and show these professional inventors the way. I am told there are something like 1,100 wireless "experimenters," including members of clubs, in Australia. They are "experimenting" year in and year out, but I cannot ascertain the extent of their achievements in the progress of the science of radio by this galaxy of talent. It may be, however, that they have not concentrated their attention on experimental work of a somewhat advanced character. At all events, let us again welcome the Wellington Radio Science League. It heralds a new era in scientific endeavour. May success attend its labours.

TO PREVENT INTERFERENCE

One of the leading authorities in America has laid it down that 40 per cent. of the efficiency of a receiving set is due to its operation. Therefore one should learn to operate a set properly, and without causing interference. Much of the present interference can be eliminated if we show the owner how to operate his set (writes C. D. Tusha in the New York "Herald Tribune"). In general, all present-day receivers (regenerative, radio frequency, and most of the "dynes") have at least two control knobs. One of these knobs generally covers wave-lengths, while the other, no matter what it is labelled, covers regeneration. Regeneration is the building-up, reinforcing, or amplifying of received signals within the vacuum tubes. Regeneration carried too far causes the vacuum tube to sustain these amplified or reinforced signals and results in the generation of radio frequency currents. This is called oscillation. Regeneration up to the point of oscillation will never cause any interference. What happens is that the regeneration is carried a few steps too far and the receiving tube starts to radiate waves corresponding to the length at which the tuning controls are set. The receiving set becomes a transmitting outfit.

We can easily avoid this by setting the wave-length dial at any wave-length we desire to receive and bringing regeneration only up to the point of maximum signals, avoiding oscillation.

How to make a novice distinguish between regeneration and oscillation is not an obvious affair. I would recommend that those of you who have receiving sets and do not know, take this suggestion and try it out on your own set.

When a Set Oscillates.

Set the wave-length dial and bring the regeneration up from the zero to the maximum position. As the regeneration is increased, using the right hand to turn the control, tap the wire leading to the grid of the detector, or first tube, with the left hand. When the tube is exceeding the regenerative point and has broken into oscillation you will hear a click or two clicks as you tap the grid connection. Sometimes you can get the same effect by tapping the aerial binding post, but the grid is the only reliable contact.

Supposing the left hand dial is wave-length. Turn this knob with your left hand. Turn a degree or two and then use the other dial (regeneration) with your right hand, and carefully bring the dial up to a critical point of "maximum" regeneration. This point may easily be distinguished after a little experience by the nature of the sounds in your loud speaker or phones. If you have gone too far in regeneration the received signals will sound mushy. Back down the regeneration dial. Then leave it alone. You will (if you are human) try to improve things, but once the set is tuned you can't improve things. Don't tune with the rheostats. Try this new method to-night.

Sidelines in Wireless

By Lt.-Col. Chetwode Crawley, R.M.A., M.I.E.E., in "Modern Wireless"

Until quite recently the transference of energy by wireless waves could only be considered, from the commercial point of view, as a new means of telegraphic signalling, applicable to the mobile communications of ships and aircraft, as well as to the point-to-point communications, already catered for, to a great extent, by cables and land lines. This telegraphic application of wireless waves is still a child, and a very robust child, but it may be of interest to glance at other applications which as yet are only infants, some thriving, some weakly, but all of promise.

Broadcasting.

First and foremost among the infants is the application of broadcasting words and music for entertainment and instruction. There is no need to expatiate here on the rapid growth of broadcasting in this country, as it is common knowledge that what was a year ago theoretical possibility is now looked upon as a popular and almost commonplace form of entertainment. Not that we can yet grasp the potentialities of broadcasting. We are indeed only groping on the fringe of the most far-reaching discovery of our time, possibly of any time, and it would be as easy as it would be futile to let our imagination run riot on a world knitted together, through broadcasting, by a bond of universal intercourse and understanding. The most terrible war in history has given us, after all, only a League of Nations, such a league as may well sink into nothingness compared with a League to be born of wireless broadcasting. Just think of the great area and population of the United States of America, and realise that even now, after only a couple of years' experience of broadcasting, every man, woman, and child in that vast country could listen with simple inexpensive apparatus to the words spoken by a single individual in Washington. What is to be the outcome of this? Are there not indeed good grounds for saying that broadcasting is the most far-reaching discovery of our time in more senses than one?

But we must leave broadcasting visions for a brief consideration of other sidelines branching off from the mainline of telegraphic communication.

Position Finding.

The sideline which is most developed at the moment is that of determining the positions of ships and aircraft by wireless waves, and the great potential advantages of such an arrangement for navigational purposes are obvious. The position is determined by the operator in the ship or aircraft taking bearings, by means of special wireless receiving apparatus, on two or more fixed stations which are transmitting wireless waves, the point of intersection of the lines of the bearings, plotted on a chart, giving the position of the craft. Many ships and aeroplanes are now being fitted with this apparatus, and as experience is gained so are results attaining to greater reliability.

Positions can also be found by any ship or aeroplane fitted with an ordinary wireless installation. In these cases, however, the bearings can only be obtained from such fixed wireless stations as are fitted with directional receiving apparatus. All aerodromes have a station so fitted, but in this country there are at present only three stations, viz.: Berwick, Flamborough and Lizard, available for giving bearings to ships For ship work, bearings sufficiently accurate for navigational purposes can usually be obtained, in the present state of development, up to distances of about 100 miles by day and 50 miles by night. The results obtained by the apparatus when it is fitted in a ship or aircraft are less reliable than when fitted in a fixed station, but, as already mentioned, experience in the use of the system in ships is rapidly producing greater accuracy, and demonstrating to ship owners the great value of this new aid to navigation.

Wireless Beams.

There is another form of directional apparatus of which only one example is yet in use, and that experimentally, viz, at Inchkeith in the Firth of Forth, though another is being installed on the South Foreland lightship. From this station a rotating beam of wireless waves can be radiated, specific letters being signalled to signify the various directions of the beam. By this means a ship fitted with special wireless receiving apparatus coming within range of the beam, at present about 10 miles, can determine accurately its bearing from the station, and, roughly, its distance, the station acting, in fact, like a wireless lighthouse.

Experiments for sending beams of wireless waves over long distances are now in progress, and are producing very promising results. The advantages of such an arrangement would be, first, that as the radiated energy is concentrated in one direction, instead of being emitted in all directions, less power, and therefore less money, would be required to signal from one place to another, and secondly, that communication would be more secret, as the messages could only be intercepted by stations situated in the line of the beam, instead of, as at present, by any station within range, irrespective of its position.

Wired Wireless.

A sideline of wireless telegraphy and telephony which has considerable possibilities is "Wired Wireless," an anomalous but expressive title, so anomalous indeed that many prefer to use some other title such as "Carrier Current" telegraphy or telephony. This system of communication was first achieved in 1911 by Major-General Squier, in the United States of America, and it is there and in Germany that it has been chiefly developed, though much has been accomplished with it in this country during the last few years. In fact it is really only during the last few years, i.e., since the development of the thermionic valve, that the arrangement has become of commercial value. "Wired Wireless" consists, broadly speaking, of transmitting energy along a wire in the form of high-frequency currents similar to those used in wireless signalling. For instance, a line already in use for ordinary telephony may have a high-frequency current generated and modulated in it by a wireless telephone transmitter, the speech being received at the other end of the line, by a wireless telephone receiver, and a number of transmitters and receivers can be used simultaneously on the same line by employing different frequencies for each communication. This system is being found of great value for providing additional communications along ordinary telephone lines loaded to their maximum capacity so far as ordinary telephonic working is concerned, and it is also coming into use for communication along lines which are being used for the transmission of electrical power. In fact, so far its chief practical application has been for communication along lines already in use, either for other forms of communication or for some other purpose.

Wireless Pictures.

"Wireless Pictures" is a heading which has often appeared in the Press of late, and a very interesting sideline it is, though it cannot yet be considered as a commercial proposition. One of the most promising systems of this transmission of pictures or writing by wireless signals is that of the French scientist M. Belin, who succeeded, two years ago, in sending a telephotographic message across the Atlantic. The transmission by M. Belin's method occupies some minutes in building up the picture or message, so that it cannot rightly be called "television," which is the term used to signify the practically instantaneous transmission of a picture, etc., as a whole, a problem which is still unsolved, though unlikely to remain so for long. M. Belin uses at the transmitting station a cylinder on which the picture is engraved in relief. The cylinder is rotated and a needle pressing on it rides up and down the little hills and valleys, like a gramophone needle, the alteration in pressure at the other end of the needle being arranged so as to alter correspondingly the strength of an electric current, which, in its turn, alters or modulates the continuous stream of wireless waves which are being radiated from the station. At the receiving station, these modulated waves are made to influence a beam of light which is directed on to a rotating cylinder, covered with photographically sensitised paper, so as to produce light or dark shades corresponding to the little hills and valleys of the picture on the transmitting cylinder. Both cylinders are made to rotate at the same rate, and to move at the same rate along their axes, so that at the transmitting station the needle traverses the area of the picture as does the beam of light in producing a replica of the picture on the receiving cylinder.

Wireless Control.

There are also many interesting sidelines which may be grouped together under the heading of "wireless control." First amongst these in popular interest, if one may judge by the frequency of reports in the Press, are methods of navigating ships and aircraft by wireless signals. Much has been written of the horrors of the next great war, when this country, it is said, will be invaded by hordes of aircraft navigated by wireless from the enemy country, these aircraft releasing in the same way bombs of hitherto unheard of destructive power whenever desired. At the same time, apparently, all our ships will be sunk by torpedoes similarly guided by the master brain of the enemy. But even if such arrangements were to become practical on a large scale for one side, it must not be forgotten that in war there is always "the other fellow" who can use his wireless too, and it would be just as easy, and unprofitable, to write at length of the facility with which the enemy's plans could be annihilated by wireless signals sent from our own stations. The following paragraph from a newspaper shows strikingly how wireless interference may prevent navigation by wireless.

"The seven destroyers which went ashore on Saturday night at Pedernales, California, with the loss of twenty-three sailors, were unable to find their bearings in a dense fog, because the air was filled with wireless messages about a freight steamer which had gone on the rocks at San Miguel Island, a few miles away.

"It is customary during a fog for warships to secure wireless bearings, but, lacking these, the destroyers continued in line-ahead formation at twenty knots by dead reckoning."

But the fact remains that more or less successful experiments HAVE been carried out with bombs loosed by wireless signals from aircraft navigated by wireless signals, and with torpedoes fired by wireless signals from ships navigated by wireless signals, and there can be no doubt that such things WILL be done in the next great war, if there is to be a next great war, but certainly not on the large scale so often predicted.

The Care of the Telephones

(This article contains some very useful hints which should enable users of telephone receivers to obtain longer life and better service from the headsets.)

In the average amateur receiving station the telephones appear to come in for a great deal of neglect. The owner is generally satisfied if signals and telephony are reasonably loud, but, as is often the case, additional amplification is employed unnecessarily. The telephones may be at the root of weak reception, although the blame usually attaches itself to some other portion of the apparatus.

When purchasing a pair of telephones great care should be exercised. It does not necessarily follow that the most expensive will be the best, or that the cheaper variety are not efficient. The safest rule to follow is that something with a "name" is generally to be relied upon. When the two ends of a really sensitive pair are rubbed together a scratching sound will be heard in the receivers.

To those new to wireless the difference between the two terms "high" and "low" resistance may not be understood. A high resistance pair, if not marked, can usually be distinguished by the earpieces being filled in with a hard, glue-like substance. The reason for this will be obvious later. For maximum efficiency the internal resistance of the phones (i.e., the resistance of the pole windings), must equal that of the detector with which they are used. Whether the latter be crystal or valve it will be of the order of several thousand ohms, and it therefore follows that the phones must possess very high resistance also. Since they depend for their action upon "ampere-turns" it is useless to use a few turns of high-resistance wire. In practice, many hundreds of turns of fine gauge wire are wound on the pole-pieces. It may be argued that many more turns could be put on before the required resistance would be reached, if thicker gauge wire were employed, but it must be remembered that the larger the wire the more bulky will be the receivers. This is, of course, an undesirable feature, as they must be essentially as small and light as possible to ensure comfort when worn for long periods.

In the case of high-resistance phones there is no disadvantage in connecting them directly in a crystal circuit, but it is a different matter when a valve is used as a detector. In this case a continuous current will be flowing through the windings and they may be subjected to potentials of between twenty and a hundred volts, or even more. The fine wire used has very thin insulation and is liable to break down, resulting in a continuous crackling noise being heard. In a very short while after this occurs the phones become utterly useless. The risk of shorts between adjacent turns and layers is to a certain extent minimised by pouring in some form of insulating substance such as shellac or paraffin wax and allowing it to cool. There is a possibility of burning them out through an accidental connection which subjects them to the full battery potential, and a certain risk of shocks to the wearer when certain parts of the apparatus be touched.

All these disadvantages can be overcome by using low-resistance phones and a telephone transformer. The transformer is merely an iron core over which is wound a primary and secondary. The high-resistance winding is connected in the place of high-resistance phones, to whose resistance that of the winding is equal. The low-resistance winding is joined in series with the low-resistance phones. Thus although the phones are of low resistance the rule of internal and external resistances being equal is still observed. The high-resistance winding can be of relatively thick, well insulated wire, since the size of the transformer is not such an important consideration. The windings of the phones themselves may also be more robust, the ampere-turns being made up by increased current strength. Not only will they be very much less liable to break down, but both phones and wearer will be entirely insulated from the rest of the apparatus. To a great extent the extremely irritating alteration of tuning which occurs when directly connected phones are used, and a movement is made by the operator, may be prevented.

When a transformer is used, instead of the received rectified impulses passing directly through the telephones they flow through the high-resistance winding, and as the current rises and falls so does a magnetic field which it creates. This field affects the low-resistance winding and induces a current in it, which rises and falls at the same rate as that in the detector circuit.

Telephones should never receive hard knocks, such as may be caused by dropping, etc., or their sensitivity will be greatly reduced. The pole-pieces are permanently magnetised to a certain extent and a shock will destroy this magnetism. Some types have the diaphragm supported by a reed, with an adjusting screw at the back. This should be interfered with as little as possible, for it is an easy matter to "over-adjust" and break the reed.

When using phones in a valve circuit there is a right and a wrong way to connect them. While current in one direction will assist the magnetism of the poles, a reverse current will in time totally demagnetise them. This applies, of course, to directly connected phones. The ends should be marked. (This is done by the makers in some cases, but the majority are not marked at all.)

If at any time there is reason to suspect the telephones, their magnetism can be tested and if considerably weakened, the diaphragms will not stick. In some makes there is a small gap designed to protect the windings from any sudden high voltage impulses such as may be occasioned by lightning, induction from nearby transmitters, and accidental connection across the high tension. The points should be set as close as possible without touching, and examined periodically to see that no dust or moisture has caused them to be shorted. It is a good plan to have two pairs in use, changing them directly moisture begins to accumulate through wearing, and a bent or dented diaphragm should be immediately replaced.

Always remember that a pair of telephones requires as much careful handling as a valve. They are almost as delicate, and certainly more expensive when a replacement is needed. Every hard knock means a few more miles off their range.

RADIO KNIFE IN BLOODLESS SURGERY NOW.

Radio moved its tubes and condensers, its variable couplers, and its crazy quilt vocabulary into a white tiled operating room at the Alexian Brothers' hospital recently claimed the knife from the rubber-gloved hand of Dr. Louis E. Schmidt, and demonstrated the newest in surgical technique—the bloodless operation.

Two major operations—and the only sharp instrument used was the needle for sewing up the wound. Radio high frequency waves like those that clog the ether every night, but this time caught and narrowed to a steel point a third as large as a pencil—radio was the answer. No stunt affair of jazz broadcast for jaded hospital nerves, but cases of life consequence to the patients.

May Kill Cancer.

In the opinion of surgeons, the "radio knife," which is not a knife but looks more like a knitting-needle, may cause a small revolution in the operative treatment of certain diseases. By its inventors it is claimed as one of the most successful means of excising cancerous growths. The child's toy, and grown man's hobby of to-day, they say, may hark back to the "S O S" that first flashed from a ship at sea, and become again a saviour of humanity.

In the simplest of language, as explained by W. H. Dodge, representative of the laboratory that perfected the new device, a low power radio transmitting set is used to generate the current. The "knife" forms one terminal. The other is applied to the patient. The human tissue offers resistance to the passage of the current when the knife is applied. The resistance causes heat. The knife burns itself through skin, fat, and muscle as quickly and without the necessity of pressure as though one were cutting soft butter.

Heat It Great.

More technically, the set is equipped with two 40-watt power tubes and condensers. The current oscillates at the rate of 40,000 cycles per second. The tension is 800 volts at 50 milli-amperes. The heat developed, though it has not yet been accurately measured, is great enough to fuse brass.

The new knife, as Dr. Schmidt and his assistant, Dr. A. J. Wochinski, used it yesterday, seared the tissue for only a depth of perhaps a thirty-second of an inch on either side of the wound. It is the searing which makes the operation practically bloodless. It is the searing which is sought in certain operations for cancer, in the hope that it will seal in cancer cells which otherwise might run through the blood and lymph streams.

Dr. Schmidt operated on two men with cancer of the bladder recently, but the blood might have been caught in a few tablespoons.

Beside the operating table stood a cabinet, closely resembling the receiving set of the ordinary radio. In his hand the surgeon held the "knife," set in a rubber handle, a cord leading from it to the cabinet. Another cord is attached to a sheet of tinfoil on which the patient lies.

Delicate Work Possible.

"Very delicate operations are possible with this new instrument," declared Dr. Schmidt after the second patient had been wheeled away. "It will by no means replace the surgeon's knife, and it is too early to make any predictions for its ultimate success, but from present evidence it will be an extremely valuable addition to the list of surgical instruments."

And here is another notable thing: Radio fans within a score, perhaps a hundred miles of this new machine will hear a strange, wild, new static every time the "knife" is used.

The British Broadcasting Co.'s Position

By P. P. Eckersley, B.Sc., Chief of the British Broadcasting Company

I have been asked to make a short statement as to the position, policy, and possible future of the B.B.C. First, it is interesting to review the situation as it stands to-day.

The crux of the matter appears to be that the views of two main sections of the wireless community are not coincident; the experimenter on the one hand wishes to experiment, the ordinary buyer of a B.B.C. set wishes to enjoy the wireless concert as a concert, not as a scientific feat.

But again there are two types of experimenter, the genuine and old-established, and the pseudo experimenter who uses his self-given title as a means to an end.

Let us first consider the position of the genuine experimenter, or "amateur," as he is sometimes called.

At first it might appear that he has been badly treated. He, and he alone, brought about broadcasting. With petitions and propaganda he bombarded the authorities until the Writtle transmissions were started (10 minutes telephony a week was the original grant). The Writtle transmissions heralded the B.B.C., and suddenly the amateur finds that the genii he has summoned up have become unruly, and may, he thinks, turn unkind at any moment.

On behalf of the B.B.C. let me say once and for all that this company is kindly disposed towards the amateur, and more, the amateur now has facilities for experimenting greatly in excess of those he had formerly.

I would put forward to your readers the suggestion that if they will concentrate on the question of the reproduction of really good quality of speech in their receivers rather than concentrating on ultra-sensitivity they will be going a long way towards appreciating broadcasting in its proper aspect.

Turning now to the pseudo experimenter, to the man, in fact, who sees no way of listening-in except by making his own set, we arrive at a very difficult situation. He probably tries to get a license, fails, and does without.

I sympathise with him; he would like to "listen-in." A simple way presents itself to him, and he avails himself of the opportunity.

I would put it to all your readers who "don't see why they shouldn't," and who "couldn't afford a B.B.C. set," that they may see the fallacy of their arguments if they apply a simile.

Jones likes motoring very much. Is this to say that because he has a most excellent opportunity of taking out someone else's car for a run he should do so? The owner is away and "no one would know," and "he can't afford a car of his own," and "he doesn't see why he shouldn't."

Surely the fallacy is obvious, and for the time being "listening-in" must be looked upon as a hobby which, like motoring, or photography, or the cult of the super-gramophone, must be paid for.

Lastly, it is unfortunate that the dishonest are also ignorant, and have the power to upset our concerts by the illicit use of reaction. I appeal to their sense of fairness, and would ask them to realise that not only are they stealing property not theirs, they are also for their own selfish ends destroying other people's pleasure.

The Post Office is, however, trying to arrange matters to make it possible for all to listen-in while giving us fair revenue.

The Revenue of the Company.

There has been a good deal of misapprehension regarding the financial position of the British Broadcasting Company. It is assumed because certain large firms are associated with the company that it has endless wealth behind it, and that it can well afford to allow all and sundry to do what they like in the wireless world.

The British Broadcasting Company is not yet in a satisfactory position financially; it has a capital of £100,000 divided into £1 shares, and membership of the company is open to every bona-fide British manufacturer of wireless apparatus. Already hundreds of firms have applied for membership. It is estimated that the cost of equipment, installation and operation of each station will be £20,000 per annum. Six stations are in operation, two more are contemplated.

We have, as you know, two sources of revenue. We get half of the fee from each license issued by the Post Office; secondly, we receive approximately 10 per cent. of the wholesale selling prices of the sets which bear the B.B.C. stamp.

We have been in existence long enough to know that our anticipations regarding revenue are a long way from being realised. There are a great many sets in existence for which the owners have not even a license, and consequently those people are listening-in to our programmes without payment of any kind. Further, we know from the manufacturers of wireless apparatus in the country that a vast number of sets have been sold which are not of the approved type, and consequently which do not pay any revenue to the British Broadcasting Company except 5s. a year, half of the license fee (if there is a license). It is a matter of conjecture, of course, as to the exact number of illegal sets there are in existence, but in one district we have been informed on reliable authority that there are five illegal sets for every set bearing the B.B.C. stamp. I should not go so far as to maintain that this percentage is general throughout Great Britain, but I am on safe ground in making the statement that the number of non-B.B.C. sets in existence, for the construction of which no experimental license was obtained, is far in excess of the number of genuine listeners-in.

I do not, of course, wish to raise a cry of panic. The British Broadcasting Company is bound to continue discharging its function, but the financial position is such that it will not be possible for us to give concerts of the standard which we desire for the success of broadcasting, unless matters considerably improve.

Programmes.

As regards actual programmes, we can maintain, I think truly, that we have given you excellence and variety. If our financial position improves, and we can obtain a revenue in proportion to the numbers of those who are enjoying our shows, then, and then only, will we be able to improve the quality of our programmes: we are naturally not inclined to be satisfied; we want to get better and better.

Technical Problems.

One of our chief aims and objects is to make reproduction perfect. We are slowly improving our quality, but I would point out to many that nothing destroys our prestige more than the actions of certain people who give demonstrations with crude apparatus crudely handled. Anyone with the slightest sense can receive something from a broadcasting station: it requires considerable skill to get the quality really good. Thus, although again we may radiate perfect quality transmissions, these may be ruined by ignorance on the part of the pseudo experimenter, who knows nothing of the subject really.

We are tackling the problems of interference in a very serious spirit, and though it may be some time before we cure it entirely, we still shall try our utmost to mitigate the nuisance that is spoiling so many of our transmissions.

Possible Future.

If we have full public support there is no end to the possibilities of broadcasting.

We have not started on half the schemes we have in mind, it being difficult enough to keep things running at the moment.

By broadcasting grand opera from the actual theatre in which the performances were taking place we have shown that in Great Britain we are at least as far advanced on the technical side of broadcasting as they are in America. The possibilities of broadcasting are limitless. We hope to have permanent cables laid down to all sorts of places. There is a public demand for the broadcasting of certain public functions. There are many great events pending of world-wide interest and we should like to broadcast them, but it must always be understood that we cannot ourselves make the final decision in these matters. For example, we made strenuous efforts to broadcast the King's Speech, but for some reason unknown to us permission was refused.

The Man Behind the Microphone

How He will Entertain Australia

If Henry Lawson had lived a few years longer the vast outback of Australia, which he knew and loved so well, would have presented a new aspect for him to portray in imperishable verse (says a writer in "Radio.")

Lawson painted many fascinating word pictures of Australian life. A first-hand knowledge of its loneliness and isolation, and a close association with people who are born, and live, and die, in the vast bushland of our Continent provided him with the material which he used so well. Countless thousands were inspired by what he wrote, and if he did not actually succeed in eliminating the social distinction which separates country and city folk he at least did his share towards it.

There is something strangely fascinating in the contemplation of a peaceful existence "far from the madding crowd," but the scales fall from the eyes when one comes face to face with the stern reality. "Hills look green in the distance" is a truism when applied to the so-called pleasures of life outback.

To one who has tasted of city life with its comforts, conveniences, and, above all, its up-to-dateness, rural existance soon palls. There are no daily newspapers to tell of world doings, no concert halls where one may feast on song and music, and no picture shows to flicker stories for the amusement and education of those who are destined to enjoy but little change from their more or less monotonous existence. And yet Australia could not do without these men and women—they are the backbone of our country. Small wonder if at times they become tired of their cheerless lot, and turn to scenes that contrast pleasantly with those to which they have grown so accustomed.

Radio Solves the Problem.

The people of outback Australia may not yet realise it, but a cure for their solitude and isolation is at hand. Radio broadcasting, which has banished the gloom from millions of homes in America and England, has been launched in Australia. That it will establish a link here between the capital cities and the interior, as it has done in other countries is beyond question. No country in the world stands so much in need of a broadcasting service as Australia, and, by the same token, none will welcome it more or make greater use of it.

Home Life Transformed.

One can imagine what a transformation will be effected when, instead of a group sitting in meditative silence, listening to an oft-told story, or maybe shuffling a well-worn pack of cards, the interest is centred in a radio receiving set which occupies pride of place on the table. In fancy one can see the half-dozen members of the family seated around that table each wearing head 'phones. Their faces beam with expectancy as the hands of the clock point to the hour when, according to schedule the broadcasting station in the distant capital city is to commence transmitting. They are not disappointed. Clear and distinct, and in well modulated tones comes a voice which, judging by its quality and volume might be at the end of a landline a few hundred yards away. The first message it delivers is a general report of the State weather conditions, followed by a forecast for the ensuing twenty-four hours. Very frequently that message is of vital importance to rural settlers, and in every case it constitutes one of the items the man on the land wants to know. Later it is followed by a summary of the news of the day, which in ordinary circumstances, would take a week to reach many localities. Thanks to radio, however, the man in the Never Never who has subscribed to a broadcasting station will be on practically the same footing as his friend in close proximity to a big city. Not the least important part of the programme is still to come. The vocal and musical items, which act as a tonic to jaded nerves, form the major part of the entertainment. Radio broadcasting will make it a nightly affair, and when the man behind the microphone bids his unseen audience a cheery good-night he will have spread brightness and happiness in homes which deserve well of Australia.

IN "THE ISLANDS."

The need for better communication facilities between the Islands in the Pacific has long been apparent, but during the past year several wireless stations have been installed and others are under consideration. The latest link is the erection of a type F. station by Amalgamated Wireless (Australasia), Ltd., to the order of Messrs. Burns, Philp and Co., at Tarawa in the Gilbert Group. The distance to Ocean Island radio station is approximately 240 miles and advices state that it is giving excellent results. The New Zealand Government is linking up the Cook Islands by wireless and establishing stations at Aitutaki and Mangaia. The plant is now in Wellington and will go forward by the "Maunganui" to Raratonga, where it will be overhauled by the Superintendent, who will proceed immediately to the two islands in company with the Overseer of Public Works to install it. This outfit will assist enormously in reducing running costs and expenditure, as shippers at the Islands will be kept in constant touch with the steamers as they pass through the group and will, of course, be advised early of their time of arrival.

Radio Bug-ology

One of the Craft Sends in a Letter to "Radio News"

I have been a wireless "ham" for several years now, and consequently have had a good deal of experience. It seems to me that if we old-timers would only tell each other about our stations, our experiences, and our little trials and triumphs, it might do a good deal toward the advancement of the art in amateur circles.

(Echo answers, "It might—not.")

For this reason I am about to describe the more unique parts of my station and some of the little difficulties that I have overcome. In the first place, my aerial is of the well-known inverted "O" type, made of stranded doorbell wire. As the method of stranding is rather original I shall deal with it more fully. When I purchased the wire it was not stranded, but became stranded after I put it up. To be more explicit, after I got it up the pulleys jammed, and as yet I have been unable to get the darned thing down.

Nicely stranded, eh, what?

As for insulators, I at first used small pieces of brass rod, but finding them rather unsatisfactory, I later discarded them in favour of short sections of broom handle. Efficiency at any cost is my motto.

When I first took up wireless I experimented a good deal with crystal detectors, but am now using a vacuum tube of my own design. The following are some of the crystals I have used—galena, carborundum, radiocite, zincite, bornite, cerusite, hugmetite and settemalite, but I find my new bulb to give the best results.

This bulb, which is quite a departure from basic principles, consists of a small glass tube, open at one end, and carefully filled with vacuum. After the tube is filled the open end may be plugged up with a small cork to keep the dust out, but this is not absolutely necessary. The vacuum is the same kind as is used for vacuum cleaners and may be purchased in liquid or powder form at the nearest drug store. I have found the liquid vacuum to be rather unsatisfactory, as it has a tendency to "spill" over unless the cork is in tight. Due also to its damping effect upon the incoming wages, it is rather poor for C.W. reception. By merely substituting a good "nerve tonic" for the vacuum the result will be an excellent transmitter bulb for tonic train transmission. But let us continue. As I experienced a good deal of difficulty in securing a plate small enough to go into the tube, I resorted to using a small china saucer, which gave gratifying results. Whenever the bulb spilled over it spilled into the saucer, and thus nothing was lost.

As everyone knows, while the bulb is in operation, ions jump off the filament and gather on the plate, or rather saucer, which soon gets all cluttered up with them. When this happens the tube should be uncorked and the saucer taken out and washed in warm water. The other day an unusually large ion struck the saucer with such velocity that it broke it. Due to the high cost of china, I have been careful to prevent a repetition of this accident. Taking last Saturday afternoon off, I went out into the woods, where I surrounded, and after a short struggle captured, a number of small holes. After carefully chloroforming these, I spent all Saturday night binding them together with copper wire. The result was not unlike fine mosquito netting. I fastened this "grid," as I have christened it, around the filament, and now all the ions are strained, thus eliminating any which might be large enough to damage the saucer.

In closing I would like to add this piece of warning: don't use honeycomb coils with an audion. I did once and got stung. This is how it happened. Two weeks ago, I bought a nice new honeycomb coil, all fresh and dripping with honey. As soon as I got it home every blessed bee swarmed out of my "B" battery and started to buzz around the coil. Now a "B" battery is no good if all the bees have left it, so I started to put them back, and in doing so I got stung. Since then I have used duo-lateral coils and have had no further trouble with the bees. They sing nice duos!

Hoping this may be of assistance to those who contemplate building their own apparatus. I remain, undampt,

G. RIDLEAK, V.T.,
Lunatic Asylum.

TO WIRELESS ENTHUSIASTS

The Editor will be pleased to receive reports, and hear of results obtained in any part of New Zealand :: ::

ıuency Amplification

nted from the "Wireless World"

lue to charging or magnetising he apparatus should be consid- :red in parallel with the primary .mpedance.

Due to the large difference in :he internal impedance of the output and input circuit of a valve, it ıs essential for good amplification to use apparatus to match the impedances.

A transformer is generally used for this purpose; and as the energy to be amplified is of audio-frequency, the transformer should have an iron core.

The **amplification per stage** is defined as the ratio of the signal voltage applied to the second valve (V) to that applied to the first valve (v); i.e.,

$$\frac{V}{v}$$

The consideration of this amplification per stage is complicated by the requirement of **distortionless** amplification, which demands that

(1) anode current-grid voltage characteristic of valve be linmade for minimum iron losses and minimum leakage.

The grid potential should be adjusted so that its mean potential lies in the centre of the anode current-grid voltage characteristic. The filament temperature and anode voltage must be sufficiently high to ensure saturation shall **not** occur, and the peak of the signals cut off.

Re (2), the transformer must be built to have a flat frequency characteristic over the range required by the proper design of the windings and magnetic circuit. This requirement is met with a large iron section and a large number of turns, due allowance being made for the normal anode current which is producing flux.

(3) The normal grid voltage should be such as to ensure that the most positive portions of the signal shall not cause an appreciable current. If grid current were permitted to flow, distortion would be caused, for two reasons:

(a) Current which should pass to the anode circuit is diverted to the grid;

(b) The input voltage is lowered, due to the drop across the secondary winding of the transformer.

For these reasons it is necessary to connect one end of the secondary to the negative pole of the filament battery, or to include small dry cells in the circuit. connected to increase the negative potential of the grid.

To **secure maximum voltage per stage,** the effective impedance of the primary of the transformer and output of the valve should be about equal, and the secondary winding should consist of as many turns as practicable, so that the largest voltage step-up is obtained. Fortunately, it is not necessary to match impedances exactly, and no great effort to do this should be made.

The secondary voltage is limited through the self-capacity and resistance of the windings and through magnetic leakage and iron losses. With careful design of the iron circuit, and the disposition of the windings, the losses due to the latter cause may be made negligible. The iron core should be made of laminations having high permeability and low losses. The transformers, to be small in size, are wound with a large number of turns of fine wire, and the **resistance losses may be ONLY reduced by increasing** the size of the transformer, which is not economical.

Self-capacity is reduced by spacing the layers of the windings and by choosing the right ratio of winding depth to winding length.

The secondary winding consists of many more turns than the primary, but the number on secondary winding cannot be increased indefinitely, because beyond a certain range there is no further increase in secondary voltage.

When "R" type valves are used a usual rate is 1—4.

The impedance of the valve may be changed by varying the filament brilliancy and H.T. voltage and by grid potential variation.

It is therefore apparent that for good amplification, and in particular. for **minimum distortion,** the transformer used to couple the detector valve and the next low-frequency valve would have a **very large primary winding.** The ratio of a correctly-designed transformer for this purpose would probably not exceed 1 to 1½ or 2.

The impedance of the last L.F. valve is very much less under normal conditions than that of the detector valve; therefore the primary winding of the transformer in the anode circuit need not have so many turns, but the wire should be larger to carry the heavy current. High ratio transformers should be avoided. It is better to use a transformer with a large number of primary turns and a small ratio, than one with comparatively few primary turns and a high ratio. The latter transformer would result in a reduction instead of a step-up of voltage.

A good L.F. transformer, then, will consist of windings which will carry the working currents without overheating and undue losses; therefore, the transformer will be large and the insulation must be good.

The iron core will have a large cross-section. for obvious reasons. The size, current-carrying capacity of windings, their insulation resistance, and their ratio, are the points to be especially noted when about to purchase LF transformers. A knowledge of the resistance of the windings is of little value.

If the windings are in the same direction the beginning of the primary winding should go to **plate-battery.** End of primary winding to plate.

Beginning of secondary winding to grid to negative of filament.

But to prevent the LF amplifier setting up oscillations, it is sometimes necessary to reverse the connections of transformers. A large common H.T. is often used, and to prevent it (through its internal resistance) acting as a coupling between the transformers, it should be shunted with 2 to 4 microfarads condenser. Reactance of 2 microfarads condenser at 800 cycles is about 100 ohms.

The School Radio Club

By E. H. CHAPMAN, M.A. (Camb.), D.Sc. (Lond.), in "Junior Wireless"

Every School should have its Wireless Club. This article will tell you how to start it.

There is always a fascination about forming and running a school radio club. For one thing, there will crop up a number of those delightful surprises which make school life so enjoyable. You find, for example, that Jones of the lower fourth, whose record for school work is such a poor one, can use his fingers with all the skill of an experienced mechanic when it comes to building the school wireless set. You may also find that Smith, who has never once opened his mouth when the school debating society has been debating on the usual subjects, can speak most intelligently on a matter of scientific interest.

For the formation of a school radio club two things are necessary: enthusiasm and capital. Of the former essential, enthusiasm, there cannot be too much. With regard to the second essential, however, although it is impossible to lay down any hard and fast rules, one thing is certain, the usefulness of a school radio club may be just as easily spoiled by too much capital at the beginning as by too little. It is far and away better to start a club in a small way than to begin in a big ambitious manner. Clubs which at the commencement have few members and very little apparatus, generally succeed, but clubs which start with many members and much apparatus have a curious knack of fizzling out suddenly. The great thing to remember is that it is comparatively easy to arouse enthusiasm over a new thing, while it is a difficult matter to retain interest and enthusiasm when the newness has worn off.

At the outset a school radio club will depend for its being on two or three, not more, stalwart wireless enthusiasts. There will be many more boys who are interested, but the initial work always depends on the two or three stalwarts. First of all the radio club requires a leader. In most cases it is pretty obvious who that leader should be. One or other of the prime movers in starting the club will, by force of personality, stand above the others. He is the one to be made leader. As to the title of this wireless club leader, there is no better plan than to call him captain. All the other school clubs have a captain, and by using the same title for the chief officer of the radio club you will be giving that club some, at least, of the dignity and standing of the other school clubs.

Let us suppose that our three stalwart wireless enthusiasts are named Brown, White and Green. Let us also suppose that White, by reason of his personality, is the obvious choice for captain. Then one of the other two, Brown say, should clearly be made vice-captain and Green should be made honorary secretary.

A most important point is to enlist the sympathies of the headmaster and to ask him to become the president of the club. Interviews with a headmaster are often strikingly painful, but White, Brown and Green have nothing to fear when they approach the headmaster on behalf of the school radio club. A headmaster likes to see his boys busy and, above all, he likes to see them take the initiative. Next there is the matter of vice-presidents. If there should happen to be any other master who is interested in wireless he should be persuaded to act as a vice-president also.

Having now a complete list of officers of the radio club, a notice should be put up calling a meeting of all those interested in wireless. This notice should be signed by the honorary secretary *pro tem.*

Let us suppose that those interested have met together and that one of the vice-presidents from the chair has explained that a radio club is to be formed. The first formal business will be the election of the proposed officers. There should be no opposition. The school wag may propose a red-haired fellow for captain on the grounds that a plentiful supply of copper wire is required, but take no notice of him. Let him wag.

Other matters to discuss and decide on at this meeting are (i.) rules of the club, (ii.) subscription, and (iii.) programme for the term. With regard to the rules of the club, the best advice to follow is to keep the rules as few and as simple as possible. Circumstances vary so much from one school to another that one cannot say much about the subscription except to suggest that it be as small as possible, since there are so many calls on a schoolboy's purse these days. The drawing up of a programme for the term is an engaging and interesting task for the captain, vice-captain and the honorary secretary. Here are suggestions for the programme of a school radio club which meets weekly:

1. Lecture on capacity. Experimental illustrations. Questions and answers.

2. The construction of a simple crystal set. Open discussion.

3. Experiments with a simple transmitter and receiver.

4. Lecture on inductance. Experimental illustrations. Questions and answers.

5. The construction of a one-valve set. Open discussion.

6. Experiments on aerials, outdoor, indoor and frame.

7. Lecture on primary and secondary batteries. Experimental illustrations. Questions and answers.

8. The construction of a low frequency amplifier. Open discussion.

9. Experiments with portable aerials and portable sets with a view to the construction of a set for the next school camp.

There is scope for a great deal of careful thought in the drawing up of a programme for a school radio club. It must not be forgotten that the school scientific apparatus is a great asset. Far more experimental work can be done by a school radio club than by other radio clubs.

The Electronic Reaction of Abrams

Under the above caption, Pearson's Magazine (New York) has printed a series of articles on what is described as the most revolutionary discovery of the age—the Abrams method of diagnosis and treatment.

Dr. Albert Abrams has established a clinic at San Francisco for the purpose of carrying out his investigations into the "electronic reactions" methods of detecting and determining disease.

It is stated that hundreds of physicians from all over the United States, are sending in specimens of the blood of patients in order that the Abrams method of diagnosis may be applied to them.

Each blood specimen is placed in turn in an electrical device invented by Dr. Abrams, and the "vibratory rate" is read off by varying a rheostat—the readings indicating whether disease is present in the patient, the nature of the disease, its locality, and its history.

When the disease has been determined, a course of treatment is prescribed with another invention of the doctor's—called "The Oscilloclast," an instrument described as being capable of breaking up ordinary alternating current into various vibrations. Dr. Abrams measures these vibrations with the same instrument that measures the radio-activity of the disease, and when he gets the same vibratory rate as that of the reaction of, say, a cancer specimen, he applies this vibratory rate to the cancer specimen and has discovered that the effect is to destroy the cancer reaction.

Upton Sinclair, the great American novelist, had his attention directed to Dr. Abrams' discoveries, and, by arrangement, attended the clinic at San Francisco, to learn at first-hand just what was being done in the diagnosis and treatment of disease by the new method, and has written a lengthy pamphlet describing what he witnessed, at what he has termed "The House of Wonder" at San Francisco.

Amongst other things he quotes a letter he saw from a Dr. Wm. G. Doern, of Milwaukee, U.S.A., a physician studying the Abrams' methods. This physician describes a case of cancer of the pylorus, the opening from the stomach into the small intestine.

This was a far advanced case, and the patient was treated by the "oscilloclast," and the malignancy of the disease was destroyed, but the digestive disturbances continued because of the mass blocking the stomach, and so an operation was performed.

It was found that this cancer had degenerated, and around the edges the body had begun turning it into connective tissue, or what in everyday language is known as gristle. In the case of sarcoma of the leg bone, the size of two fists, it was found that the mass could be scooped out by the handful, and all around the edges the body was turning it into fibrous tissue. As you may know, cancer and malignant tumors are the mysterious turning of human tissue into a lower form of unorganised cell life; those lower forms of cells begin to eat up the body. But here, suddenly, the process was reversed; the mysterious power of the evil cells was gone, and the body was eating up the cancer!

What happened in these cases of cancer happens with every form of germ infection. Ascertain the vibratory rate of the disease, ascertain what current will cancel that reaction, and then pour into the body a current at that rate, and you destroy the activity of the germs. You cannot, of course, always restore tissue; if a lung has been eaten up by tuberculosis, you cannot build a new lung. But, arrest the course of the disease, and take good care of yourself, and often you will be astonished to see how far the healing forces of nature can rebuild what has been ruined.

Dr. Abrams makes a guess as to why the same vibratory rate destroys the disease activity. He tells how he once saw Caruso at a dinner party tap upon a wine glass and determine the musical note at which it vibrated, and then sing the musical note at the glass and shatter it to fragments. In this case the vibration is reinforced by new energy, its violence is continually increased, just as a swing is made to go farther and farther by each additional shove. Dr. Abrams believes that this is what happens to the disease germs, or rather, the millions upon millions of whirling electrons which compose the molecules of these germs.

The vibrations are intensified by the applied vibrations, the electrons are flung apart, and that which was a disease germ becomes something else. This guess sounds fantastic, but it happens to be closely in line with what we know of radio-activity.

One of the first developments was the breaking down of the atom.

The so-called "elements" were discovered not to be permanent; they could be changed into one another. Radium was a product of the degeneration of uranium, and was degenerating into a form of lead. Scientists of eminence, such as Sir Walter Ramsay, announced that the transmutation of metals had become a fact. We are therefore asked not to be over-sceptical when Dr. Abrams suggests that by means of a current he can change the atoms of cancer into the atoms of some other substance.

Asked if the applied vibrations might not injure living tissue, he answers that there is nothing in the normal body which yields the same vibratory rate as disease. He knows this because he has tried tens of thousands of experiments.

Dr. Abrams has ascertained that pain has a certain vibratory rate, and if you have a pain he can locate it; also he found the vibratory rate which cancels pain, and has taken the "oscilloclast" to a dentist's rooms and demonstrated to several dentists, that work, otherwise agonising, could be done practically without sensation. He has even made it possible to perform a surgical operation on the rectum, an extremely painful matter, without anaesthetics.

There has been founded in San Francisco, by some of Dr. Abrams' pupils, an International Association for Racial Purification.

The doctor, who happens by rare good fortune to be a man of independent means, has pledged the sum of fifty thousand dollars to its purpose, which is to advocate that every child upon entering school shall be examined by the electronic blood test, before the ravages of disease have made headway in the body. The treatments which remove disease will only take three or four hours and the child does not know what is happening.

Sir James Barr, Past President of the British Medical Association, has been using the Abrams' method in his practice for the past two years, and it is endorsed by Dr. Frederick Finch Strong, lecturer on electro-therapeutics at Tuft's Medical School, Boston, U.S.A.

When medical men of the calibre of those mentioned above endorse this very extraordinary "discovery," the layman is prompted to withhold his judgment until further information is available.

THE ETHER.

Scientists have formed a theory which assumes that our universe floats in, and is pervaded with, an invisible, extremely elastic fluid.

We do not know its nature. This sea of elastic fluid is not quiescent, it is troubled at all times by vibratory disturbances.

These disturbances vary in characteristics. Some recur at inconceivably short intervals, others recur at longer intervals.

We are able to both create and detect some of them. Our eye detects a few of these vibratory disturbances, and we have classified them as "light." Our bodies detect others of these ether disturbances and we have classed them as "heat." A camera will detect still others which neither the body nor the eye will indicate, such as X-rays, etc. There are many groups of disturbances in this elastic fluid—it has been named the ether—which we have not "discovered," but, many years ago, a German scientist, Hertz by name, discovered disturbances which produced electrical effects and which could be reproduced by electrical effects. These have been called Hertzian, or electric waves.

In reality they are the same sort of disturbances and, generally, exhibit the same characteristics as all ether disturbances. It is this group of electrical disturbances which is used in radio communication. The intervals between these electrical disturbances in the ether vary, as does also their magnitude. Both the magnitude and their intervals are determined by certain factors.

For example, the greater the force used in creating the electric disturbances in the ether, the greater the magnitude of the disturbances, and the greater the electrical dimensions of the machine or system used in the creation of the disturbances, the greater the interval of time between the recurrence.

All of these disturbances travel through the elastic conveying medium at the same rate of speed, which is 300,000,000 metres per second (which equals 186,000 miles, or approximately seven-and-a-half times round the world).

Knowing that these disturbances travel at a certain rate and knowing that they reach a given point at certain fixed intervals, it is seen at once that in their travels they are spaced a certain distance apart. Therefore, we may find the distance of spacing by dividing their rate of speed by the frequency of their recurrence.

The result will be an expression in metres and this is what is termed "wave length," for the disturbances are undulatory in form, like a wave disturbance on water.

Electrical disturbances in the ether which are of use in radio communication vary in frequency between about 3,000,000 per second and 12,000 per second, or, converting frequency to wave length, from 100 metres in length to 25,000 metres in length. We know of certainty that there are disturbances in the ether of much higher frequency as well as much lower frequency, but we have not yet learned how to use them in radio communication, and we cannot say that they will ever prove useful unless our present limitations are somehow swept away.

PROPER FILAMENT CONTROL

The filament of a vacuum tube is a highly important part of the tube, in fact, if it were not there it would not receive any signals. When the filament is operated at the proper temperature (voltage regulates this), the greatest efficiency is obtained from the tube. In order that this be obtained battery leads must be made of wire large enough to carry the current to the set without heating, which causes the wire to offer enough resistance to the passage of current to cut down the voltage.

The rheostat must be adjusted to the proper resistance, so that the voltage impressed on the tube will be correct for the greatest electronic emission at the value to which the entire circuit is set. For each change in wave-length the filament should be varied until the greatest volume, with clarity, is obtained.

Radio Broadcasting Problems and Their Possible Solution

By C. W. Horn

When radio broadcasting first became popular the person "listening-in" was thrilled when he recognised sounds as music or as someone speaking. This "listener-in" was generally, at that time, an amateur radio telegraph operator, as no one yet had purchased apparatus to listen to the experiments being conducted by one or two prominent radio experts.

We all remember the individuals who predicted that radio broadcasting was but a fad. "There was nothing to it and it would die out in a very short time." But radio broadcasting did not accommodate these pessimists by dying out, but has developed into a lusty infant industry which some day will be compared with the automobile and motion picture industries in its rapid growth and development. There is a reason for this prediction and that reason is that it fills a long-felt want. We needed the automobile and we needed the movie. Also, we needed something at home which would open the wide spaces and permit us to attend functions and affairs and be entertained without the necessity of putting on a stiff, starched shirt and enriching the ticket scalpers. It will be a part of every household for the same reason that the phonograph became successful. People wanted music and, instead of going to the music, had the music brought to them. But radio has none of the limitations of the phonograph or any device or mechanism developed in recent years. From my present viewpoint there is as yet no limit to what radio may be called upon to do, but it is not necessary here to repeat the many and varied activities to which radio can be applied.

As in the case of the phonograph, public enthusiasm ran away ahead of the practical development of the apparatus. This, of course, stimulated the engineers and those in charge of development work to greater effort and has been the cause of the great strides being made. One of the forms this enthusiasm has taken, and the one which has caused the greatest amount of embarrassment to the science itself, has been the desire of a large number of individuals and concerns "to entertain the people," in many cases merely to get publicity. It is of this latter phase of radio work that I am best qualified to speak and which I will discuss here. It is a very serious matter and will have much to do with the immediate future of radio and vitally concerns the public.

There were before the end of 1922 more than 600 radio broadcasting stations in existence. There were probably not more than 25 or 30 of these stations so situated in centres of population and so operated and maintained that they were giving unselfishly the best that could possibly be given at the present stage of development. This meant the outlay of enormous sums of money without any possible revenue accruing from this expenditure. The majority in this group of more than 600 licensed stations were in the game merely to spread their names over the map and to obtain for themselves all the publicity that they could. These stations may be classed as offensive billboards on the highway reserved for pleasure and education.

They obstructed the view of the person seeking to broaden himself by listening to the many fine speeches and talks given nightly over the radio and in place of these desirable talks and entertaining music which this poor listener could pick up he must listen to the "Blaa-Blaa Station of the Blaa-Blaa Company" blaaing. Generally this "blaa-blaa" station was built by some energetic amateur whose experience in radio telephony was obtained from having once seen a radio telegraph spark set on a ship.

Contrasted with these are the stations built by the large electric companies, each of which maintains a large and competent staff of engineers who have all the information there is available on the subject and the facilities and assistance of research laboratories, etc. Determine by means of an engineering commission the number of stations that can operate simultaneously on different wave-lengths without undue interference. Then very carefully allocate these stations throughout the country, paying particular attention to the large cities. The cities that are most favoured with facilities for obtaining talent, such as New York and Chicago, should be permitted to have at least four stations, each operating on a separate wave-length. These stations should all be allowed to make use of considerable power and in fact should be required to use fairly high power in order that listeners at distant points can pick them up.

All the other broadcasting stations should be put on a number of fixed wave-lengths and permitted to go on 360 to 400 metres. In my estimation, the ideal condition would be one under which it would be possible for the average person to turn his dial to a fixed point and know that he would be able to pick up a certain station without interference. Should he then find that the broadcasted material is such as to be uninteresting to him he could then turn to some other station and pick that one up again without interference.

A NOTE ON THE USE OF LOUD-SPEAKERS.

Many demonstrations, both public and private, are completely spoiled by the misuse of loud-speakers. In this note the author gives some valuable advice on how to avoid such trouble.

The "big noise" in wireless is becoming too commonly sought after nowadays, says L.B.P., in "Modern Wireless." It may be all very well for the possessor of a set who is never satisfied unless he is filling his home with clamant reproduction from his loud-speaker—regardless, of course, of sweetness of tone and sonority—but if the same individual conducts public demonstrations in the same way, the offence becomes nothing less than sheer abuse of the science, and the people who listen to it would probably be far more pleased had they listened-in on a simple crystal set. The limits of the set in use should be fairly recognised ; it is bad practice to strain the installation by unduly high voltages, high filament temperatures and tight coupling. That way lies trouble other than distortion, for the lives of the valves may be considerably shortened. These points should be borne in mind, particularly in the reception of broadcasting, and if really large audiences are to be entertained the best method undoubtedly is the use of efficient detecting and amplifying apparatus together with a good power amplifier and several loud-speakers connected in parallel. A loud-speaker, it should be remembered, is capable of giving clear reproduction only up to a point. Beyond that, when the volume of sound is too heavy, distortion plays havoc. With several loud speakers, however, the desired volume may be obtained without loss of clarity, but one must be careful to have them placed so as not to produce conflicting echoes. If possible the acoustics of the room in which the demonstration is to be made should be taken into consideration. At a demonstration recently in which two loud-speakers were used, set facing each other from opposite sides of the room, a weird effect was introduced by the sound waves from each meeting in the middle and creating a peculiar echo. It was eliminated by putting the loud-speakers in close proximity to each other and facing in the same direction.

If every public demonstration of wireless was conducted on proper lines, we should very quickly hear the last of the similarity of wireless to the gramophone. Under the right conditions speech by wireless is very much more accurate than by gramophone, while the music of practically every instrument can, by its means, be reproduced with its true qualities and features preserved to an extent which most people would describe as perfect. And that has never been done yet by gramophone.

LIGHTNING PROTECTION.

?? W7OE ??

(By Howard S. Pyle.)

In certain sections of the country, during the period when thunderstorms are common, many radio enthusiasts appear to have fears that their antenna system will attract lightning, and cause property and possibly personal damage. Such is not the case; in fact, entirely the opposite is true.

A custom which was common not so many years ago was the installation of lightning rods on homes, barns, etc., in the belief that, should lightning strike the building so protected, it would "run down" the lightning rod, directly into the ground. When it is considered that the force of lightning is so great as to shatter large trees, and even entire buildings, it will be realized that a mere metallic rod would hardly pass such monstrous currents to the ground without damage. Investigation has proved that where the protective value of lightning rods is concerned, it is not with the passing of the actual lightning bolt to ground, but acts in an entirely different way.

Lightning will be attracted to the vicinity in which the atmosphere is most heavily charged with electricity. Naturally, then, if the atmosphere surrounding a building contains considerable atmospheric electricity, it offers a better point for the lightning bolt to free its energy by a discharge to ground. Again, should one building within the charged zone be tall, and the other short almost invariably the taller building will receive the effects of the lightning discharge. But—if we provide some means of draining the atmospheric electricity from the atmosphere, we render the surrounding atmosphere more immune to the reception of a lightning discharge, due to its greater insulating qualities, and consequent more difficult path to the ground for the lightning discharge, which will then seek an easier path. This is the way in which the lightning rod serves; it provides a leakage path to ground for the atmospheric electricity, and serves to keep the air free from such electrical activity in its immediate locality.

Lightning rods are generally constructed of iron, which has fifty times the resistance of copper. In other words, were they constructed of copper, with copper connection rod to the earth, they would be fifty times more efficient. They are generally but a few feet above the roof of the building.

Now compare the average radio antenna. To serve its purpose of radio reception satisfactorily, it must be constructed of copper or phosphor bronze, both of far greater conductivity than iron. It must also be raised 10 or more feet above the building or other objects which it crosses. In other words, it should be the highest object within several hundred feet when possible. Isn't it reasonable to assume, then, that it would serve a great deal more efficiently than a lightning rod in draining the atmosphere of its electrical activity? It does, as has been proven, and a well-constructed antenna which is properly grounded during a thunderstorm is a far greater lightning protection to the property in its immediate neighbourhood than any number of lightning rods as usually installed.

A Cigar-Box Amplifier

By "Experimenter"

There are experimenters and experimenters. One type will not make a move until everything is just exactly right—bakelite properly drilled—everything fitted up in the best possible way.

It is quite all right to be an experimenter of that type, but he often finds that he has just put in a lot of good work which has to be undone in order to make some slight but necessary improvement.

The experimenter who achieves things is the one who makes anything do to try an experiment with, and then builds up permanently when the best result has been attained.

I wanted to try an amplifier and loud speaker horn. Would one stage do, or two, or three,—which? I had not the slightest idea of what was necessary to fill my room with radio concert music, and thought out the plan of using a cigar-box as the medium on which I would couple the various parts together to try one stage of audio-frequency. I procured the transformer, rheostat, a UV.201 radiotron and valve holder, and proceeded to mount them. I procured a "Monopole" cigar-box, cut off the bottom as the wood was very thin, nailed up the lid, and with my gimlet to bore the necessary holes. I had the audio-frequency unit mounted in the time I would have been thinking out how to bore a bakelite panel. I added a second unit in the same way, and desiring to know what was the maximum result I could get without distortion I tried the third stage.

I stood the box on edge and mounted the valve holders on the upper edge or side. In the centre of each end and of the top (now become a "side") I fitted a rheostat with the knob outside.

Four terminals in each end gave me the necessary connections for the "A" battery and input from the detector valve, and output to loud speaker, "B" battery positive connection and the negative line connection of "A" battery for the bottom terminal of the secondaries of the transformers. Two of the transformers have vertical cores and one a horizontal one. The latter is in the middle, and this, together with the fact that the lead wires to all connections are necessarily short, perhaps accounts for the efficiency with which the amplifier operates. The circuit is the usual one—leads from the detector to the primary terminals of the first transformer, secondary terminals to grid and negative line. The plate of the first amplifying valve is coupled to one terminal of the primary side of the second transformer, and the other terminal to the "B" battery. The secondary terminals are coupled, one to the grid of the next valve, the other to the negative line of "A" battery, as before, and so on with the third transformer.

On the left side of the box, the two bottom terminals are for the positive and negative "A" battery to light the filaments. The upper pair of terminals on that side are for the input from the detector valve. On the right side the upper pair are for the loud speaker, and to these inside the box are coupled the plate of the last amplifying valve and a connection from the "B" battery positive. This latter is connected inside to the terminal directly beneath it, the outside of which is joined to the maximum voltage "B" battery. The remaining lower terminal on the right side is attached to the negative line of the "A" battery and inside the box a wire runs from this terminal to the bottom terminals of all the secondaries of the transformers.

LOUD-SPEAKERS ON THE STAGE.

An amplifier and loud-speakers are doing more to make dreams dramatic than ever was done by Freud or any of the psycho-analysis writers. In a play showing at the Broadhurst Theatre, New York, to give full flavour to the actor's dream, twelve men back stage speak their parts before a microphone, which through the public address system that, of course, includes the loud-speakers hidden in the dark theatre on the other side of the curtain.

Where formerly the silvered screen has been used to give the audience the jumbled thoughts which go on in the dreamer's mind, the vacuum tube and microphone now do the trick more stirringly. Much like in dreams, the voices come to the audience from nowhere as they sit in the dark theatre, while the jury, which they do not see, but which the leading man imagines, solemnly votes the dreamer guilty.

No one who has attended the theatre, except a few "fans," guessed how the voices were managed, and the device employed never has been made public until now.

The hook-up and apparatus are the same as used for amplifying public speeches, as has been done in the case of Lloyd George, Clemenceau and President Coolidge. It also is used in Trinity and St. Thomas's churches for regular religious services.

DISADVANTAGES OF HIGH-RESISTANCE TELEPHONES.

It has always been considered better practice to use low-resistance 'phones in conjunction with a suitable transformer than to have high-resistance 'phones connected directly in the plate circuit of a valve receiver. The chief reason for this lies in the fact that in the latter case the insulation of the very fine wire with which the magnets are wound gradually breaks down, and allows the current to jump across neighbouring turns which may be at a widely different potential, thus giving rise to crackling noises which may be sufficiently loud to drown weak signals, and, in any case, detract immensely from the pleasure of listening to telephony.

This state of affairs may take months to come to pass, but it is almost certain to do so sooner or later if the high-resistance 'phones are connected in the plate circuit. It occasionally happens that the breaking down of the insulation is not at first accompanied by loud cracklings, although the strength of signals is very seriously impaired. For this reason, the fault may not be located, and other components of the set may be blamed for the inefficiency of the reception.

As, however, it nearly always happens that one earpiece gives way before the other, a very simple test renders it apparent.

How to Make the Test.

It should here be noticed that, as the earpieces are connected in series, a fault in the insulation of the windings of one will affect the signals in both. The test, then, should be made as follows.

The windings of each of the earpieces are short-circuited in turn by means of a piece of wire connected across the terminals of the earpiece. When the defective earpiece is shorted in this way, the signals in the other will be very much stronger than they were before, and the noises, if such were present, will now be cut out.

There is one precaution which should be adopted to lengthen the life of the 'phones—never connect or disconnect the 'phones while the H.T. and filament current are on. When this is done, the making or breaking contact causes a sudden rush of current through the windings, and this current will tend to take the shortest path by jumping from one turn to another rather than by traversing the turns. In this way, the insulation, which is necessarily very thin is rapidly destroyed in its weakest places.

However, the wisest course to be followed by those who are using high-resistance 'phones in a valve circuit is to make an iron-cored transformer with a 1 to 1 ratio, or, better still, with a slight step up.

The telephones will then last almost indefinitely.

WIRELESS AND SUBMARINE CABLE COMPANIES.

How They Help One Another.

At first thought it might appear that wireless was such an opponent of the submarine cable that they could not work in harmony.

But a little consideration will show that wireless has features that make it of the very greatest importance to the upkeep of the submarine cable.

From the time a submarine cable is laid it is subject to wear and tear. Although every precaution may be taken in plotting out the route for a new cable, at some part of its length it will cross some ridge of submarine rock on which its own weight will gradually cause wear. In the course of time a fault will develop and it becomes necessary to locate the trouble and repair it. Each cable company has a certain number of specially equipped steamers continually in readiness to undertake such repairs. The engineers by careful electrical measurement determine the distance at which the fault is located. The captain of the cable steamer is told of the distance and ordered out to commence repairs.

Before the days of wireless, once the steamer had left port there was no means of communicating with her until she had arrived at the scene of the damage, grappled for the cable, picked it up and cut in, when she would, of course, be in telegraphic communication.

In the interval far more important trouble might have developed in another part of the same cable or in one of the other cables, and it might be necessary to cancel the original orders and send the steamer to deal with this more serious matter first.

This is the first manner in which the cable companies have really come to rely on wireless, as they are now well able to move their steamers about to meet the situations that arise from time to time.

A further benefit which they are likely to appreciate soon will be the help that directional wireless will give their steamers in picking up the cable.

A submarine cable is obviously a most expensive apparatus, with its many protective coverings, and if the cable is picked up in the wrong position and tapped, the cable must be left in just as good condition as new before releasing it.

Therefore, the navigation of a cable steamer in the open sea must be more exact than that of any other kind of vessel if the cable is to be located at the right spot and repaired with the minimum of delay.

Yet in many parts of the world where such repairs are being carried out the skies may be covered with clouds for days and nights on end, thus preventing astronomical observations. Or a tropical sun may distort the horizon in such a manner as to make accurate observations impossible. Very careful triangulation by directional wireless will enable an excellent fix to be made notwithstanding these conditions.

When a new cable is being laid the navigation is even more important than at other times. If the cable-laying steamer leaves the desired course at any point, through lack of observations, not only is there a loss of money through the additional cable laid, but in addition it may cause great delay in locating the cable at some future date for urgent repairs.

Therefore, the advent of wireless has in many ways been of great value to the submarine cable.

Among the Amateurs

(By "QRK," Wellington.)

I notice that Auckland is keeping up its reputation in other ways than those mentioned by "QRM," hi! Anyhow, the second district is giving them a good run, too. Whattabout 2AC, eh? And, besides, even down here we have five stations going and two with licenses busy getting ready to get on the air. 2XA is going to build a new vertical aerial hanging from an 80ft. stick, and has invested in a 250-watter. He hopes to make some noise with the latter, though to date he has not done anything but cuss it, hi!

Round about 100 metres is the place to both transmit and listen if you want DX. The air down there is quite busy, and there's plenty of real long-distance receiving to be done. CB8, the Argentinian that 2AC clicked, comes in here very strongly. His sigs. are something marvellous: they never swing and never fade. Hw eum? 6CGW also makes plenty of noise down there, and was busy calling CQ NZ the other night, to which 2XA, 2AI and 1AO replied, but ND.

Not much "female QRM" down here, for with the exception of 2AI and 2XA junr., all our chaps are married men. Dunno about the last two, but I have my suspicions re the number of nights when they are **not** on the air. Sa, 1AC, u sure wanta get tt OW to lrn the code!! Also, don't have her around the shack when you blow the next toob!

Frank Bell has put up a new 90-foot lattice mast, but I have not heard how it has affected his range yet. Also 2AQ is another chap who is the proud owner of an Eiffel Tower stick. They sure look gd.

In the last issue there is an article about a radio quide cable. Gosh!! Hope they don't get one here! It makes me sad when I think of chaps living near one of those contraptions. Think of the QRM!!! Loose lamps that are at the base when wind blows 'em about are able to kick up a dickens of a noise, but 500-cycle bursts of current——OL!!

Have a copy of the Nelson "Mail" Radio Notes here, and notice that quite a lot is said about 2AB and 2BI. Well, it is a peculiar thing, but we never hear ole 2AB here now, and used to hear him only once in a blue moon a time back. 2BI uses a V-24 as oscillator, and two more for rectifying the town supply, and has been heard in Ashburton. He is waiting for a set from America. Why don't you build your own, OM? You get a lot more fun out of the whole game!

A great amount of amusement can be derived by looking round at some of the aerials (?) which grace the houses of this city. There are the "18-inch spreader," two-wire type, 'bout 15 feet high, and those which it is almost impossible to describe; but funniest of all are those attempts at cages. One chap had quite a decent aerial (single wire) and changed it for a horrible-looking thing which was supposed to be a cage. Now what the deuce do you want to go to all the trouble of putting in a cage for receiving? Use a good, long single wire.

WILL AMATEUR WIRELESS CLUBS PLEASE KEEP US INFORMED OF ACTIVITIES?

(By "QRM," Auckland.)

The most-sought-for honour among American "hams"—namely, the Hoover Cup, which is awarded to the best amateur station—was this year awarded to U9ZT, Donald C. Wallace, Minneapolis, Minn. The transmitter uses one 250-watter in a Hartley circuit, and is an old friend of New Zealand Yank-loggers. Congrats, O.M.!

The B.C.L.'s are very fond of complaining about the interference caused by amateur transmitters, but do these same B.C.L.'s ever think how much QRM they cause the long-suffering amateur? There is one particular breed of brainless lunatic that we want to mention in particular, namely, the silly wet that comes fluttering down when we are copying a particularly faint CW, and then starts to flip his condenser to and fro for about a quarter of an hour. We are glad to see any B.C.L.'s taking an interest in code, but this rather prevalent practice absolutely prevents everyone else copying a station, and of course it is impossible to copy while flipping a dial around. There is absolutely no sense in it, as you are not only wasting your own time, but spoiling someone else's pleasure at the same time. Some of these valves sound as if the owner is using a 50-watter to receive with. Why won't people learn that the plate voltage is usually in inverse ratio to the distance you can receive? Incidentally, it is worth mentioning that (with one exception) the Auckland amateurs use non-radiating receivers. Some of this QRM is from illegal sets, but even a three-coil set can make a lot of noise, and unless this useless noise is considerably reduced the powers that be will probably put a ban on the three-coil circuit, to

1AO has now installed his generator, and is working on considerably increased power. He prefers a UV 201A to a five-watter, and radiates point 6. His sigs are reported as QSA all over New Zealand, and he got across the Tasman the other night. 1AO can usually be heard after 10.30 p.m.

We are pleased to hear quite a lot of new sets lately. 2AR, in Hastings, comes in QSA and uses the 230-volt city supply for his plates. 2AS and 2AW also come in QSA. 3AM must have increased his power, because he makes a terrible noise now. The loudest of all the DX stations heard here is easily 2AQ (both on phone and C.W.), and 2AC runs him a good second. 2AP and 4AA are old favourites, and can always be copied through any QRM. In our opinion 2AP gets the gilded grid as the best amateur operator in New Zealand, or anywhere else. It is a pleasure to listen to him.

Nm Nw GB es CUL. QRM Ak.

THE MARCONI BEAM.

Following upon the success of the "beam" method of transmission over a distance of 2200 miles, Senator Marconi is now conducting experiments with South America, a distance of 5000 miles. The development of this beam transmission presents many interesting features, as it is a system of directional radio telegraphy, and this is as old as the art itself, for the early laboratory experiments of Hertz were carried out by means of directive apparatus. Marconi's discovery of the great increase in range obtained by the use of longer waves, and the earthed vertical aerial, practically stopped development on directional lines for the time being. The demand at the time was for increased ranges, and now that the range has arrived at the maximum possible on earth, attention is being turned to finding more efficient methods of transmission. Further, the whole scale of wavelengths are becoming fully occupied, and the time will soon arrive when practically the only way of increasing the number of possible services will be by employing systems having good directional characteristics. Thus the recent experiments of C. S. Franklin, of the Marconi Company, and his assistants, on the beam method of transmission, may possibly render present methods of trans-oceanic radio communication obsolete.

In the new method reflecting systems with wave-lengths of 20 metres and less are used. The short wave transmitting set is connected in the centre of a vertical cage aerial of small height. This transmitter is placed at the focus of a reflecting system consisting of a series of vertical, insulated wires which are distributed around a paraboloidal arc. The radiation from the aerial strikes this reflector and is reflected back in the form of a parallel beam. The action is similar to that in a searchlight, where the light from an arc is placed at the focus of a paraboloidal mirror and is all reflected back along a narrow beam giving an intense concentration of the light. Light consists of waves of the same nature as wireless waves, the only difference being that light waves have an exceedingly small wave-length. Hence, for the radio waves a special wire reflector is required. The size of the wire reflector is determined by the wave-length and would be so large as to be impossible to make for long waves. Hence short waves are employed.

At the receiving end a similar reflecting system is constructed and the reception apparatus is placed at the focus of this reflector. In this way all the energy of the beam is concentrated at the receiving set. With this directional arrangement all the energy is conveyed along a comparatively narrow beam in a required direction, so that there is no waste of energy, and therefore small power is required to cover a given range. Secrecy is obtainable to a certain extent, and the interference due to atmospherics, which are usually directional, may be almost entirely eliminated. The results of the first commercial station erected on this system will be awaited with interest.

A WONDERFUL TUBE.

One of the most unique receptions of a radio concert ever staged in the history of radio was successfully accomplished by two professors at the Morgan Laboratory, University of Pennsylvania, recently, while conducting experiments to determine the construction of nitrogen molecules.

They used a specially-designed two-element nitrogen-filled tube to study the spectrum of the blue light emitted by the tube, made incandescent by passing through it a current of electricity.

"I knew," said Dr. Witmer, "that this tube could oscillate like those used to detect radio signals. By inserting a special transformer and headphone in the plate circuit, we were delighted to hear a broadcast from a local station."

The most remarkable thing about the reception of radio concerts with the nitrogen tube, is that no special apparatus of any kind was used to tune in a station, the nitrogen tube and its circuits acting as a rectifier. No aerial or ground was employed, the long leads incased in conduit and coming underground from a storage battery in an adjoining building serving as a loop antenna and also supplying the necessary inductance. The current from the battery was applied to the plate of the tube. A high resistance coil was bridged across this battery and a sliding arm was connected to the minus of the filament. This stabilised the plate circuit.

The nitrogen-filled tube was designed at the Morgan Laboratory, where experiments are now being conducted with similar tubes to ascertain the number of electrons in an atom of nitrogen.

Although the tube contains only two elements, it was made to oscillate. The head phones were connected to the secondary of a transformer, and the pulsating direct current set up in the secondary acted on the diaphragms of the phones and produced sounds.

Correspondence

Correspondents are asked to make their letters as brief as possible, avoiding "slang" phrases and controversial matters.

To the Editor.

Sir,—I have just received a letter from U 6ATN, in which he states that he heard Z 4AA calling CQ at 11.20 p.m., Pacific Standard Time, on March 18, which is the same as 6.50 p.m. on March 19 our time. I have no entry in my log to correspond with this, but as I was doing a lot of testing, using about 80 watts input, at this time, it is quite possible that I forgot to enter a brief "CQ" call. I write this with the slender hope that some of your readers may have logged me as calling "CQ Z 4AA" at ten minutes to seven on the evening of March 19. If any-one has done so, a postcard would be very welcome.

A test has been arranged by Mr. Cox, 3BD, Melbourne, between Australasian and South African amateurs, to be conducted on a wave-length of approximately 200 metres. The schedule has been broadcast from this station several times, but for the benefit of those who have not heard about it, will be repeated here.

The test has been arranged so that South African and Australasian amateurs transmit on alternate weeks, the times of transmission throughout being 5.30 to 8.30 a.m. N.Z.T., and the wave about 200 metres. From May 17 to 24, South Africans transmit. From May 25 to June 1 Australasians transmit. Next week South Africans repeat, and following week N.Z. and Australian amateurs repeat.

Mr. Cox tells me that the South Africans are as keen as mustard about the test. Personally I think we have a much better chance of reaching to South Africa than to U.S.A., as the distance is rather less and conditions for reception there should be about as good as our own. Also, signals between the two countries have not to cross the tropics, and in this case will probably follow a great circle route near the South Pole.

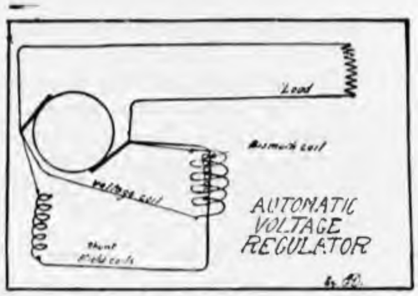
I do not know whether the Afrikanders will use the international intermediate system as advocated in "QST." If so, they should prefix their calls with the letter "O." Listeners should remember that at this hour of the morning it is quite possible that European amateurs might be heard. This is added as an additional inducement for the DX ham to crawl out of his cosy bunk at the atrocious hour of 5.30 ack emma.—Yours for Radio,

FRANK D. BELL.

Waihemo, Palmerston South, Otago, May 15, 1924.

To the Editor.

Sir,—Enclosed is a wiring lay-out for an automatic shunt regulator, which should interest all experimenters. Its purpose is to cause the voltage of a shunt dynamo to remain constant when the speed is raised or lowered. Although the writer is not in a position to try it out, it is so simple in theory that it cannot fail, and is an adaption of the bismuth spiral used for measuring the density of magnetic fields. The resistance of bismuth increases when placed in a magnetic field up to a certain point in direct proportion to the strengh of the field, and with this knowledge it is a simple matter to understand the action of this regulator. Bismuth, being very brittle, cannot be drawn into a wire, and so a bismuth spiral must be cast in plaster. This spiral is connected in series with the shunt coils and placed in the centre of a solenoid connected across the brushes as shown in sketch. This solenoid may be called the voltage coil. The action is as follows:



When a steady potential exists across the terminals of the brushes the field strength of the solenoid is steady. If the voltage is inclined to rise the strength of the solenoid rises. This likewise causes the resistance of the bismuth coil to increase, and so less current flows in the field coils, thus weakening the field and so causing the E.M.F. to drop to normal. If the voltage drops below the normal, the action is reversed. This may suggest other uses for this metal, and I shall be glad to give any assistance I can regarding it through the medium of your valuable magazine.—Yours, etc.,

E. DONOVAN.

Auckland, May 29, 1924.

CALLS HEARD.

To the Editor.

Sir,—KGO, Oakland, California, and KHJ, of San Francisco, still come in with great volume on two valves. Operating my Amplion speaker on the three valves, KHJ does not come in so loud as KGO, although he is as loud as some of the N.Z. broadcasters. Orchestral selections by the orchestra of St. Francis Hotel have proved enjoyable. 2FC, Farmer's, Ltd., and 2BL Sydney Broadcasters, are receivable on a single valve, besides all N.Z. broadcasters. About three months ago I altered my set to operate with five valves (two stages radio-frequency (tuned anode), detector, and two of audio-frequency). I very seldom use the radio-frequency side, owing to it being so difficult to handle; but I propose shortly to replace the tuned anode with the neutrodyne. Jacks have been inserted in the circuit so reception can be made on any number of valves. Wireless is taking on very slowly up here. The number in the Pahiatua district has now crept up to six. Another amateur and I hope to make a move shortly by giving a radio demonstration. 1YA is easily the loudest station received here, with 2YM, 1YB, 2YB, 2AQ, 4YA, KGO, 2FC, 2BL closely following. All other N.Z. broadcasters come in with about the same volume, including 2MJ. —Yours, etc.,

F. W. STAPLES.

Mangatainoka, May 9, 1924.

To the Editor.

Sir,—In view of our old friend's (2AC) successful communication with Argentine CB8, I am forwarding a copy of two pages of my log-book with reference to same, and which may be of interest to other hams:

Friday, May 30.

7.55 p.m.: CQ ur CB8 called about six times. Signals clear and steady; not very loud.

8 p.m.: CB8 rz 2AC QSO U.S.A.? ar k. (No need for remarks on these. I passed a few, having got them in the ear using three valves and head-set.)

8.5 p.m.: Heavy QRM from piano through wall. Sent QRT verbally; no response; finish.

Saturday, May 31.

7.55 p.m.: CB8 to ARRL—greetings and congratulations; sig braggio—CB8.

8 p.m.: ARRL ur CB8 here Nr 1 from CB8 to ARRL—greetings and congratulations—sig braggio.

8.5 p.m.: ARRL ur CB8—test North America saludos to northern brothers from CB8.

8.10 p.m.: CQ ur CB8 ar k.

Signals on the latter evening were very much louder, being read quite plainly on loud speaker at ten yards, and I could not credit for some time that this was being transmitted over such a distance. However, the transmission was very slow, and as every word was sent three times, there is no doubt as to their origin. Would like to know if he is so QSA with other hams. I am using three valves. 1 v. 1 with plug connection to second L.F. amplifier for loud speaker, the circuit being the ordinary three-circuit regenerative. Wishing you every success with your excellent periodical.—Yours, etc.,

GEO. E. MACE.

Mangaiti, Thames Line,
May 6, 1924.

To the Editor.

Sir,—I should like to thank, through the columns of this valuable paper, Mr. Frank C. Reardon for his support of my remarks some issues back. In addition I would like to bring to the notice of those proposing to build transmitters, that if they come to a difficulty, or require any more information, by communicating with me I will endeavour to assist them as best I can. Wishing you every success with this paper.—Yours, etc.,

GEOFF. SHRIMPTON (2XA).

38 Rongotai Terrace, Wellington,
June 11, 1924.

IN THE POLAR REGIONS.

An interesting illustration of the value of wireless as a means of enabling a ship, in whatever part of the world she may be, to communicate with land, is provided by the fact that two Norwegian vessels, one in the Arctic and the other in the Antarctic, have been in telegraphic touch with their own country. The Norwegian flag was, until recently, represented further north and further south than that of any other country, by the "Maud" and the "Sir James Clark Ross." The "Maud," Captain Amundsen's vessel, which is attempting to drift across the North Polar basin, is now lying off the New Siberian Islands. She is equipped with a Marconi valve transmitter set, and by this means is in communication with the Spitzbergen radio station, more than a thousand miles away. The "Sir James Clark Ross" lately returned from a whaling expedition in the Ross Sea. Her wireless apparatus also includes a Marconi valve transmitter, which enabled her to communicate with the Awarua radio station, New Zealand—1,700 miles to the northward. At 3 p.m. on January 22, when the "Sir James Clark Ross" was in latitude 78 degrees 30 minutes south, a message was handed in at the Christiania telegraph office to be forwarded to the vessel. This was sent via England, Australia and Awarua radio. The reply by the same route was received in Christiania at 5 a.m. on January 24.

ARGENTINE STATION OPENED.

The new wireless station which has been built at Monte Grande for the International Trans-radio Wireless Telegraph Co., Argentine, for the purpose of placing the Argentine in direct wireless communication with North America, Europe, and the Far East, was officially opened by the transmission of an inaugural message from the President of the Argentine to King George V. Direct services will be carried out between Monte Grande, New York, Paris and Berlin. It is intended to extend this direct service to England as soon as possible, but as Great Britain does not possess a wireless station sufficiently powerful to communicate with South America, this service cannot be brought into operation until a suitable station is available in this country. The transmitting station at Monte Grande, 12 miles from Buenos Aires, covers an area of 1,200 acres. There are ten steel towers 500 metres apart, each tower being 690 feet high. The power of the station is 800 k.w. The receiving centre is at Villa Eliza, 25 miles from Buenos Aires and the same distance from the transmitting station. The telegraph office, from which the transmitting station is automatically controlled and to which the receiving station is connected with telegraph lines and an automatic linking device, as is the case in the Marconi system in England, is situated in the centre of the commercial quarter of Buenos Aires.

Questions and Answers

This column is reserved for subscribers only, and we can only publish matter of interest to all readers. Not more than three questions received from each correspondent. Questions answered by mail at the rate of 2/. for each question. If questions entail considerable research work a special charge will be made, and correspondents will be informed as to charge before question is answered. Write clearly on one side of paper only. No attention paid to pencilled matter. Sketches, diagrams, etc., must be on separate sheets. Be brief.

Wm. W. (Waitara).—The terms "Reflex" and "Dual Amplification" are, to all intents and purposes, the same. The energy is first amplified at radio frequency, rectified by a crystal and then amplified at audio frequency, the same tube or tubes being used. A variocoupler has the primary tapped, and the secondary, which revolves inside the other, fixed. The variation is obtained by loading with a variometer or shunting with a variable condenser. A two-coil tuner has either both coils tapped and the secondary sliding inside the primary, or else uses plug-in coils tuned by condensers. Our next issue will illustrate and describe a number of standard circuits.

M. S. A. (Tai Tapu).—On further looking over your question, we find that there is insufficient information. Will you please communicate with us, giving primary and secondary voltages, frequency of supply and current required from the secondary, at the various taps?

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