



T. & R. Bulletin

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The Journal of the Inc. Radio Society of Great Britain

(BRITISH EMPIRE RADIO UNION)



Vol. 4. No. 10. April, 1929 (Copyright)

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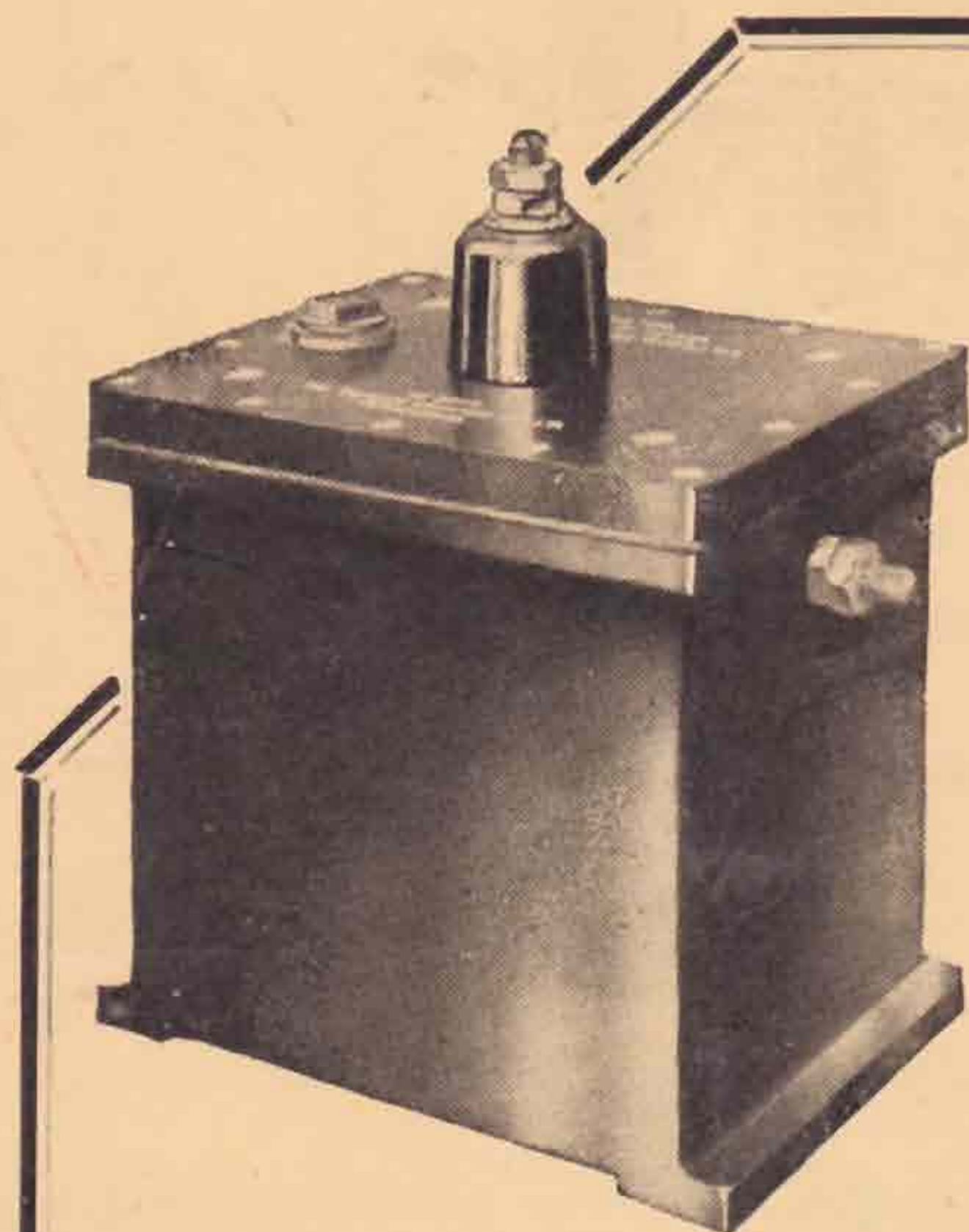
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APRIL, 1929.

Vol. 4. No. 10.

EDITORIAL.

We who prepare this BULLETIN for you each month look upon it as a pleasant duty: a duty because you have elected us to this editorial office, and pleasant because we feel you do appreciate our efforts and look forward each month to see what we have to offer. If it was felt that such was not the case our duties would be decidedly irksome and a seeming great waste of time. We use the word prepare, though it must be clearly understood that the BULLETIN contains what *you* give it. We do not pretend to fill it with our own ideas, though, of necessity some paragraphs come from the editorial pen. Without your help the BULLETIN would be worthless; it is the only British radio journal run by amateurs for amateurs. The same can be said of the Society as a whole. Two of the main features of the BULLETIN are dependent each month, not from the pen of one, but from the pens of many: we refer to the Contact Bureau notes and District Reports.

The C.B. notes are, as you probably know, prepared by the manager of C.B. from the resumé of the monthly letter budgets circulated among the groups. Here is an instance where each individual member contributes monthly to the notes. We venture to suggest that, of all the BULLETIN, the C.B. notes are read with the greatest interest. The

British amateur is essentially an experimenter, and C.B. does stand for definite progress on the various lines of work for which its groups are formed. It would be thought that, such being the case, the letter budgets would be a very complete account of the month's work at individual stations. This we know is far from correct, the reason for such slackness or negligence we can but guess at. A C.B. group is formed by the manager of C.B. from the requests of individual members of the Society to be put into a group working on their own particular subject. Yet we do know of cases where a member of a group has not taken the trouble to send in a single useful report to his Group Centre: one member reported he was too busy to give any time to radio, and a few weeks later we hear of his request to join *another* group working on *another* subject. Such people are a definite hindrance to the work of C.B., as they are taking the place of some more worthy member. Then, again, we hear of one Group Centre having to write to every member in his group in order to piece together a monthly budget. So, to the members of C.B., we would say that, having asked to be allotted to a group, it is up to you to play the game: the group centres will do all they can, but they must have your help. There can surely be no better method

of banding together members of this Society who are interested in a common subject. "Ploughing the lonely furrow" is a poor job at the best of times, and nothing will do more harm to amateur radio in general and to this Society in particular, than that each member shall try and live aloof from his fellow members, totally disregarding any attempt made to keep members in personal contact with each other.

* * *

It is with great regret that we have to announce the resignation of Mr. T. P. Allen (GI6YW) from the position of Honorary Organiser of Contact Bureau. This resignation has been forced upon him by pressure of business and the increasing size of the work involved.

We should like to take this opportunity of placing on record our extreme appreciation and gratitude for the splendid work that Mr. Allen has so ably carried on. Contact Bureau from small beginnings has now grown to enormous proportions, thanks to the indefatigable efforts and unequalled organising abilities of our enthusiastic and hard-working friend Mr. T. P. Allen.

It will be remembered that Mr. Allen began his association with Contact Bureau in November, 1927, and despite many weary months of continual pleading for support, he stuck to his guns, with the result that C.B. has now become the foremost organisation of its kind in the world.

Our acknowledged lead in 28 M.C. work is due entirely to the organisation that Mr. Allen has built up with the co-operation of few enthusiasts, and this fact brings home to us the need, not only for co-operation, but also for careful and efficient organisation.

In conclusion, we would thank Mr. Powditch (G5VL) who has kindly agreed to take up the onerous duties of Hon. Organiser.

* * *

In connection with the recent discussions on the Area Notes, we have received (amongst numerous others) a letter from Mr. Hayes (GI2WK), in which he outlines a scheme for materially improving the usefulness of these notes. We are publishing his ideas *in extenso* with the object of obtaining further comments from our members, so that, by the time Convention arrives, we shall be in a position to discuss the matter in an authoritative manner.

* * *

The Council have pleasure in recording that Mr. E. J. Simmonds has been elected a Vice-President in recognition of his past work on behalf of the Society.

* * *

Owing to lack of space we have been obliged to hold over a few articles until next month. It is hoped that contributors will not think that their efforts are not appreciated, but except in special cases articles are published in the order in which they are received.

Second District Conventionette.

We have pleasure in publishing a report covering the recent conventionette held in Leeds. It will be noted that the members in this area have decided to refrain in future from contributing to the district "Notes and News." Whilst agreeing that these notes are, on the whole, rather useless from a scientific point of view, we cannot but think that they have in the past kept up the social and more intimate side of radio in this country. We have recently asked for opinions in regard to these notes so that the matter may be well ventilated prior to Convention, but for the present the Committee do not think that these notes should be abandoned. We shall be glad, therefore, if any members within the No. 2 District who wish to continue reporting their activities will, in future, send their reports direct to Headquarters.

We are glad to note that several interesting topics were discussed at Leeds, and we are particularly pleased to note that Mr. Woods (G6WD) and Mr. Hartley (G6YR) have agreed to co-jointly manage their district.

C. L.

The Second Northern District Conventionette was held on March 23, at the Queen's Hotel, Leeds, when the following attended under the chairmanship of Mr. J. Porter (G5JA): G2HD, G2KM, G5UB, G5TQ, G5AD, G5CX, G5LW, G6DR, G6OO, G6NG, G6BX, G6QA, G6LU, G6YR, G6UJ, G6NP, G6LN, G6WD and BRS26.

The Chairman, in opening the meeting, said that he hoped the members present would express their views on the subjects to be discussed so that their collective opinions could be forwarded to Headquarters. He mentioned that on this occasion station visiting would not take place as so much time would be lost to the more serious matters of business.

The following topics were discussed during the day:—

(1) Should the area notes be abandoned?

After much discussion it was unanimously decided, in view of the fact that the notes generally were of little value, to abandon them and suggest to Headquarters that the space be devoted to further Contact Bureau activities.

(2) Should 7 M.C. band be split as suggested by ARRL?

Many opinions were expressed and finally, on a proposition made by Mr. Hartley, it was decided that the meeting should show its complete disagreement with the suggestion of splitting up the band. Mr. Hartley, in moving the resolution, pointed out that the splitting up would crowd all British and Europeans into a very small frequency band and at certain times of the day the part reserved for American stations would be unoccupied as far as Europe was concerned. G2HD, in seconding, drew attention to the fact that if a split was made, the local QRM would be doubled as the same number of stations would still remain active.

(3) Should fone be permitted on the 7 M.C. band?

After much discussion, it was decided to recommend that telephony be permitted on this band.

(Continued on page 239).

**YOUR ARTICLE WILL
BE APPRECIATED!**

"Some Experiments on 30,000 K.C. and Above."

By E. MEGAW, B.Sc. (G6MU).

These notes are based on the results and experiences of a few days' experimenting on the higher frequencies and are put forward in the hope that they may be of interest or assistance to others who are new to this work. The communication aspect of ultra-high frequency work is not dealt with at all as the writer has as yet had no opportunity of doing anything in this direction, and this side of the work was ably dealt with by other contributors to a recent issue of the BULLETIN. The interesting problems which are encountered when the well-beaten paths of our ordinary communication frequency bands are left for the higher frequency regions are by no means confined to sending test calls and listening (not always successfully) for replies.

To start with, it is desirable to have a receiver or, failing this, a simple valve oscillator with a grid condenser and leak (so as to rectify reasonably well) and some standard of frequency from which detectable harmonics can be obtained up to a frequency of the order of 50,000 kc. A simple crystal oscillator is the most convenient, but a self-excited valve oscillator whose frequency is approximately known is better than nothing and, as a rule, it is only necessary to know frequencies exactly when the communication stage is reached. Many excellent designs for receivers for the ultra-high frequencies have been given recently in the BULLETIN and other journals,* and there is no need to enlarge on the subject here. The principles of receiver design are the same fundamentally for any frequency, and if these principles are applied in a common-sense way to the particular case in hand a good receiver usually results. It is, however, natural that if one has been used to operating a receiver only over one particular range of frequencies the modifications involved by a large change in frequency may at first be rather surprising, but this is as true of 30 kc. as it is of 30,000 kc. All this is equally true of the transmitter, only in this case the surprises are apt to become both more numerous and more obvious. By transmitter we mean, at the moment, any power oscillator or amplifier whether it is literally used for transmission or not, and here our experiments begin.

The first essential for the transmitter is the valve, and the efficiency and reliability of the whole transmitter will probably be more dependent on the valve than on anything else. It might perhaps be helpful to digress for a moment to touch upon some of the reasons for which valves which are entirely satisfactory at relatively low frequencies sometimes cause trouble when used at frequencies higher than 10 or 20 megacycles. In the writer's opinion one of the chief causes of trouble is due to the unfortunate fact that valves of the thoriated filament type, which are so

economical and satisfactory at frequencies lower than those mentioned, show (almost invariably) a definite tendency to become soft and to lose emission when used at their normal rating at very high frequencies. Another cause is that the losses in the glass of the valve are very much greater at the higher frequencies and the glass may (1) crack and destroy the vacuum; (2) become so hot that it liberates gas in the inside of the valve which in turn causes the filament to cease emitting or to burn out; or (3) increase the total losses in the radio frequency part of the circuit to such an extent that oscillation is impossible. For this reason valves which have the leads from the three electrodes brought out through the glass close together are liable to be troublesome. In order to avoid the risk of collapse of the glass when high voltages are used (and the stresses in the glass are therefore also high) it is usual to make the seals of large area and of suitable design to distribute the stress evenly over a large area of glass in valves which are intended for high-frequency operation. The ideal valve for the purpose should therefore have the lead-out wires widely spaced with liberally designed seals, and should be rated so that there is no chance of the glass becoming overheated in normal operation. This last applies particularly if thoriated filaments are used, though the writer is doubtful whether, at the present state of development, the use of thoriated filaments is a true economy for frequencies over, say, 15,000 kc.

Another feature which is very desirable in a valve for high-frequency work is a low internal capacity. This internal capacity consists, properly speaking, of two parts: the inter-electrode capacity path, properly so called, in which there is no solid dielectric and therefore no appreciable loss, and the capacity path through the glass at the seals, etc., in which the losses are extremely high. It is obvious enough that the second should be kept down to a minimum (by proper spacing, etc.), but the reason for a small inter-electrode capacity being advantageous is sometimes overlooked. There is, however, a twofold reason: (1) The inter-electrode capacity is subject to slight variations with temperature and operating conditions, and, in order that these variations shall not seriously change the tuning of the oscillatory circuit, it is essential that they should be of negligible magnitude compared to the total tuning capacity. This means that if the inter-electrode capacity is large the tuning capacity must be correspondingly large, which in turn means increased losses in the oscillatory circuit (in general). (2) If the inter-electrode capacity is very large the circulating current through the seals may be so large as to cause serious additional heating of the seals with increased losses and the possibility of fracture. This current may be easily calculated if the inter-electrode capacity is known and is given (in amperes) by: (capacity in farads X 6.28 X frequency in cycles X voltage). (As an approxima-

* See T. & R. BULLETIN, Contact Bureau Notes during past few months, and "QST," November, 1928, p. 9, "High Frequency Receivers for the Coming Year." (Hull).

tion the radio frequency voltage across the oscillatory circuit may be assumed equal to the H.T. voltage.)

The points to be looked for in a valve for ultra-high-frequency work have now been indicated, but it is not intended to imply that specially designed valves are a *sine qua non*. "Super power"

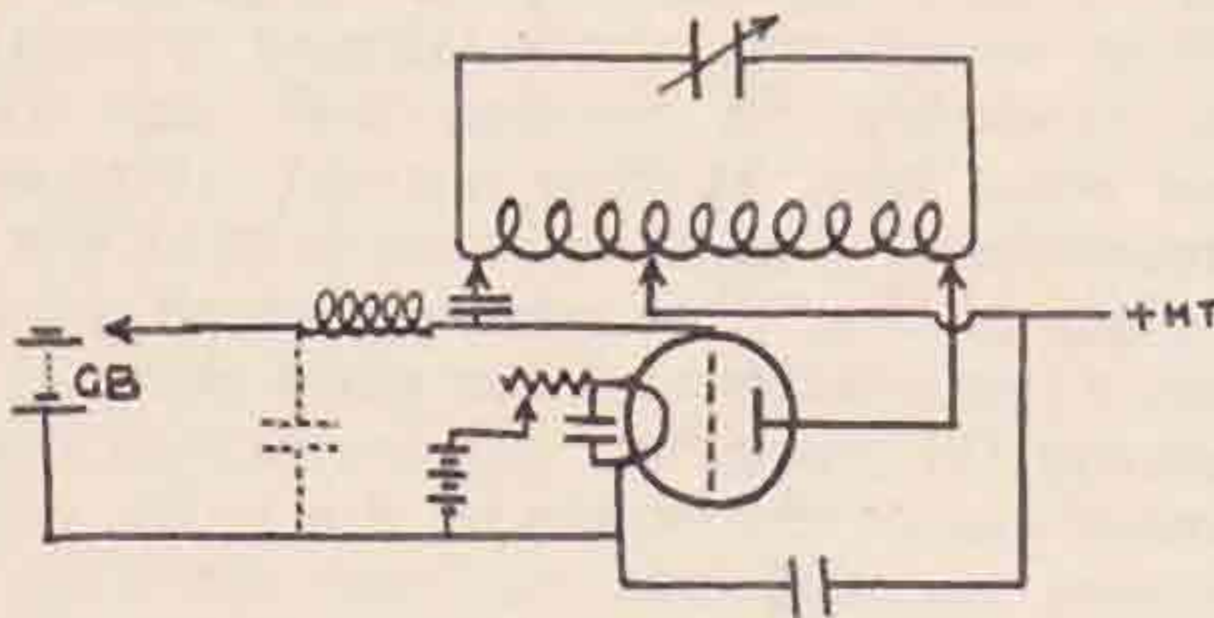


Fig 1

receiving valves such as are commonly used for transmission on the lower frequencies, with inputs of the order of 10 watts, have been used with considerable success up to frequencies of 50,000 kc., and even higher as power oscillators, but they are almost always inefficient and have short useful lives. However, if care is taken to see that no part of the valve is overheated, and if low efficiency does not matter, they will often give quite useful results. Transmitting valves designed for lower frequencies will usually give some results at the frequencies in question, but the safe maximum rating is normally greatly decreased and the lives of thoriated filament valves are, as already indicated, in most cases short even if precautions are taken.

The question of the circuit arrangement for our transmitter arises next. The writer's experience in this direction is that although some form of oscillator-amplifier arrangement is very desirable when the communication stage is reached, it is much better to carry out a few preliminary experiments with a self-excited oscillator of the simplest type possible. As has been pointed out on many occasions there is no particular virtue in any particular "circuit," Hartley, "T.P.T.G.," Meissner, etc., are all just different ways of doing the same thing and, if correctly used, will all produce equally good results; the advantages of any one over any other are simply a matter of convenience and, sometimes, of personal experience in the adjustment of one particular circuit. The writer used a Hartley arrangement in his tests as it is simple mechanically and may be rapidly and easily adjusted. Fig. 1 shows the circuit diagram and Fig. 2 the arrangement of the apparatus, which is commended to any who may be interested. The shunting condensers shown dotted in Fig. 1 are not always essential, but they are an improvement in some cases. They may be omitted in the preliminary tests. As will be seen from Fig. 2, the oscillatory circuit is mounted on a quartz rod or tube which forms the only solid dielectric in the circuit, so reducing losses to a minimum which is fixed by the coil. The coil should not consist of anything lighter than gauge 10 wire, and copper tube of from 1/8 in. to 1/2 in. in diameter is preferable at these frequencies. Copper strap is also suitable.

The tuning condenser consists of two metal discs about 2in. in diameter, one of which is mounted on a threaded rod. Care should be taken to see that the condenser supports are as rigid as possible. The electrical connection between the condenser supports and the ends of the coil should be well made as the circulating current may be quite a number of amperes. The grid condenser and choke are mounted directly on one condenser support. The choke may consist of a 1/2 in. diameter winding of No. 40 cotton or silk-covered wire, spaced roughly a few diameters, and 2in. or 3in. long. The grid condenser (and any other by-pass condensers) may have any value over about .0001 mfd. The clips on the coil should make a low-resistance contact as the circulating current through the valve

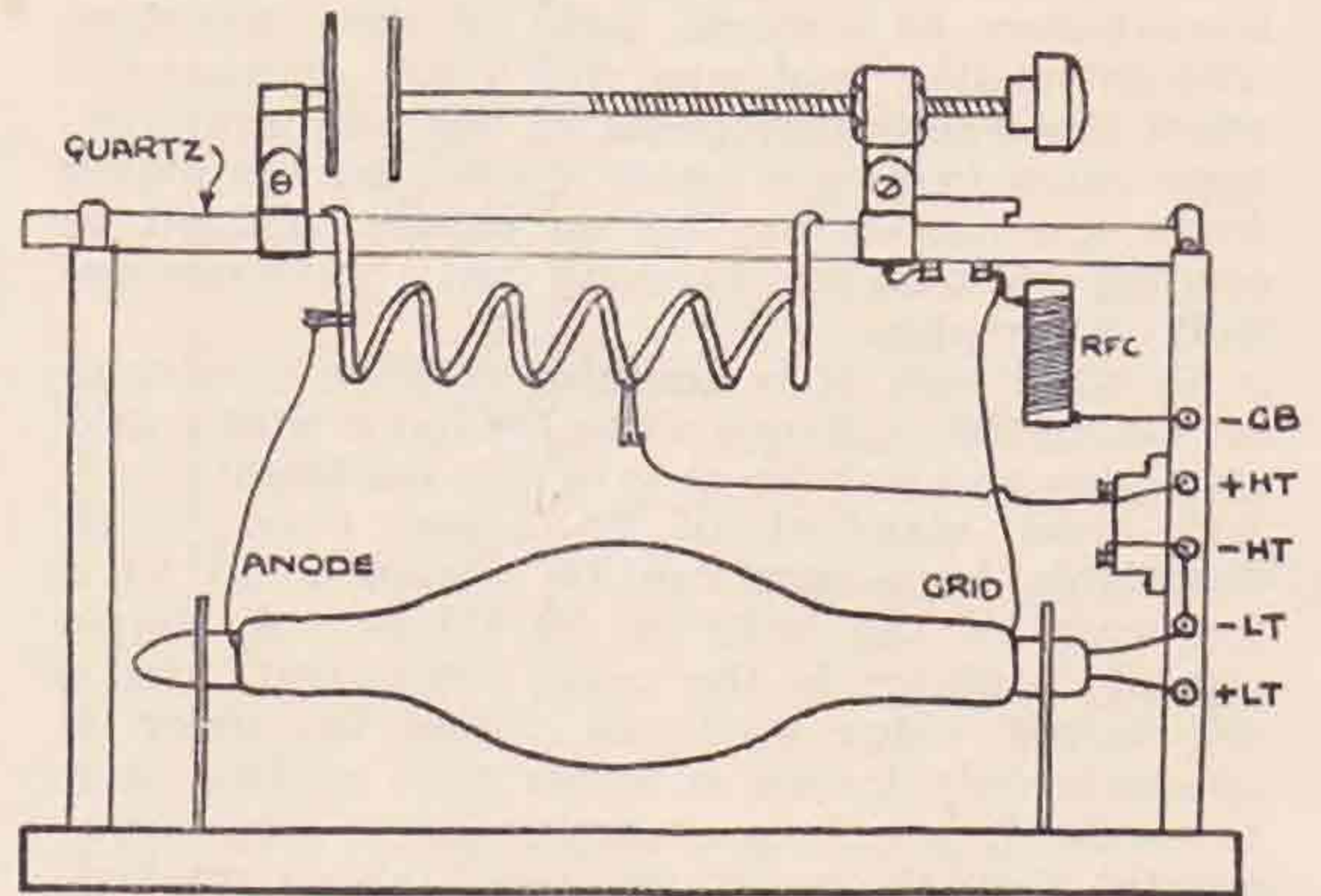
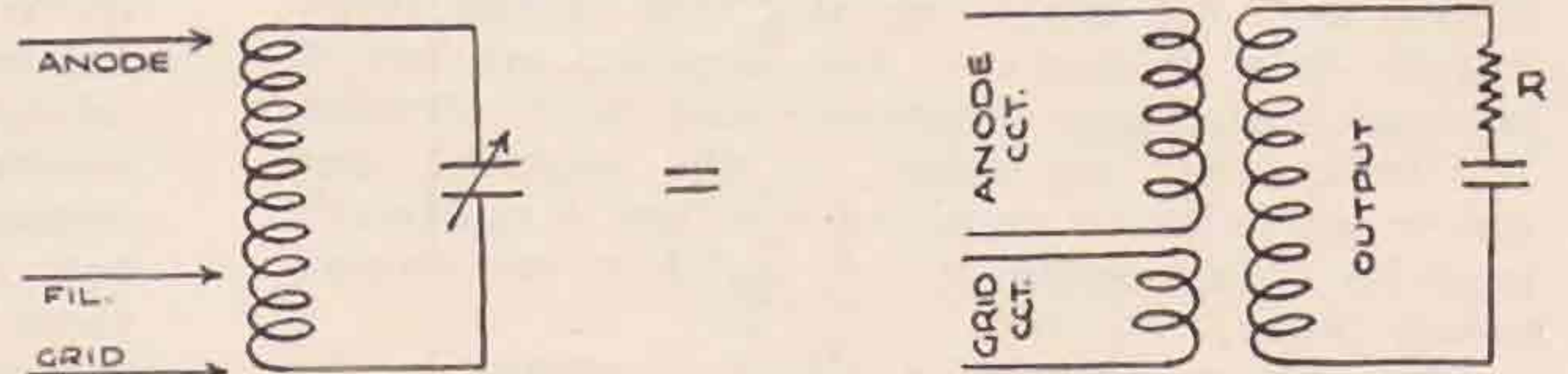


Fig 2.

may, as already shown, be considerable. The number of turns required on the coil for a given frequency depends on the exact design of coil used and on the internal capacity of the valve. A seven-turn coil 1 1/2 in. in diameter should tune to 30,000 kc. with the condenser plates fairly close together, using a valve of reasonably low internal capacity. It is, however, an easy matter to construct the oscillatory circuit so that the coils may be easily changed.

The adjustment of the oscillator is the next point



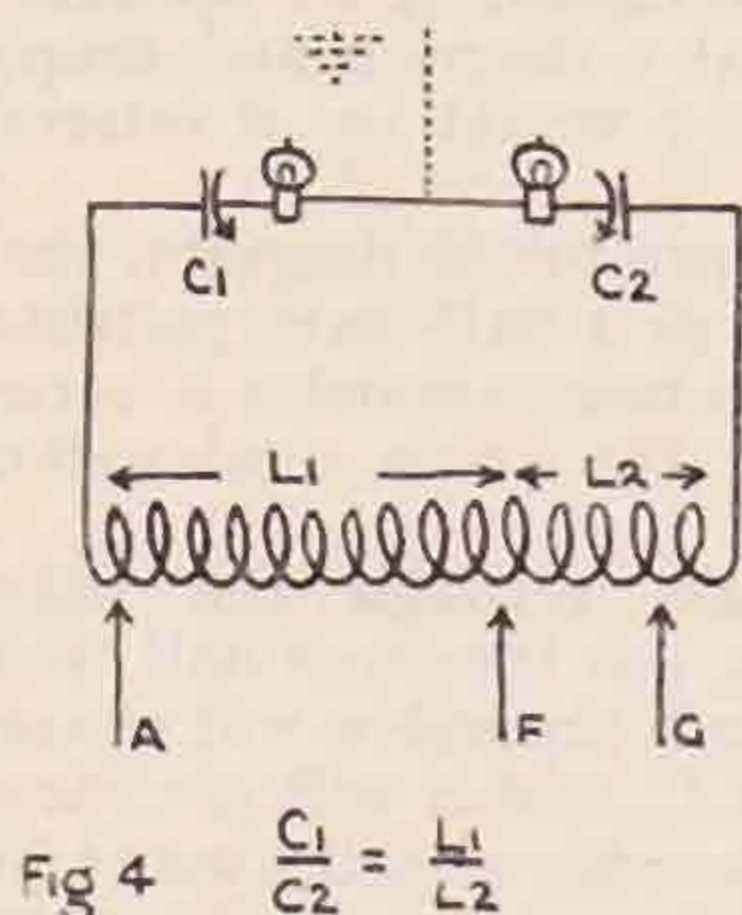
R = EFFECTIVE LOAD RESISTANCE

Fig 3

to receive attention. The writer does not propose to deal in detail with the adjustment of the Hartley circuit, but for the guidance of any who may be rather vague about it the procedure is, briefly, as follows: The filament clip on the coil is put about one-third of the way from the grid end, the tuning condenser at an intermediate position, and the anode and grid clips at their respective ends of the coil. A safe value of grid bias for the valve in use should be applied (a grid leak may be used if preferred, but accidental overloading is less likely

to occur with the battery bias). Suitable voltages are applied to filament and anode, and a milliammeter should of course be used in the anode supply. Any of the usual tests for oscillation may be applied and when satisfactory oscillation is obtained the condenser should be varied over the whole range, while the anode milliammeter is watched for any sudden change of current which might indicate resonance of the grid choke. If

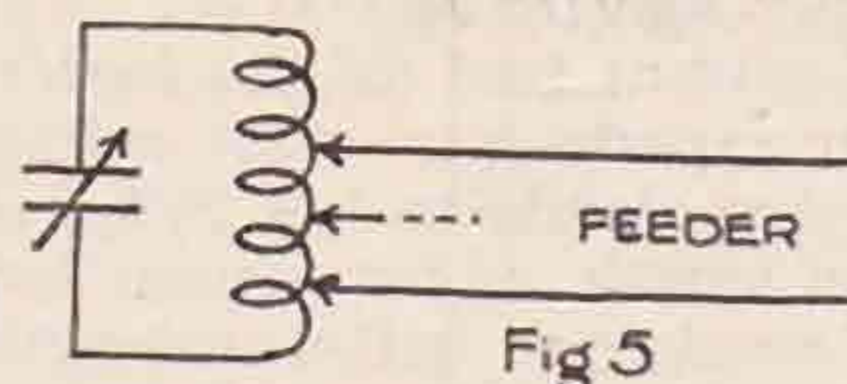
this occurs different chokes should be tried until the trouble disappears. Care should be taken to see that there are no other circuits in the neighbourhood of the oscillator which may resonate with it. The anode current should normally increase gradually as the capacity of the tuning condenser is increased. The next step is the accurate



adjustment of the filament clip. Quite a sound method is to adjust its position until the anode current reaches a minimum value. This adjustment usually coincides fairly closely with that for optimum value of grid excitation. A rather more satisfactory method is to use a Neon lamp as a voltage indicator. It is an interesting and useful fact that the sensitivity of the Neon lamp used in this way increases very considerably with an increase of frequency, and its use at very high frequencies is possible with the voltages developed by valve oscillators with inputs of only a few watts. An interesting paper on this subject from the physical point of view appeared in *Experimental Wireless* recently.* In this case the lamp should be held near the anode end of the oscillatory circuit and when the peak voltage developed across the circuit reaches a certain value the gas in the lamp will become ionised and give the familiar orange glow, the brightness of which will depend on the magnitude of the voltage. It will usually be found that the position of the filament tap to give maximum voltage will be slightly nearer the anode end of the coil than the position to give minimum anode current. It may be mentioned, in passing, that the maximum frequency will be obtained when the filament tap is at the centre of the inductance, for any given value of the tuning condenser. It may not be out of place to note exactly what is the effect of varying the position of the filament tap. The Hartley arrangement is really an auto-transformer version of the more usual oscillating valve circuit in which there are separate coils in grid and anode circuits. The power is supplied to this transformer by the anode circuit, and we can therefore regard the part of the coil between anode and filament taps as the primary and the whole coil as one secondary which supplies the power to the output circuit (which so far consists simply of the oscillatory circuit itself), and the part of the coil between grid and filament taps as a second secondary which feeds back to the grid circuit a fraction of the voltage developed across the whole

coil. The position of the filament tap therefore does two things: (1) it controls the voltage of the grid excitation and (2) it controls the voltage applied to the output circuit. It will be seen that as one is decreased the other is increased, and a convenient compromise can be arrived at by making the adjustment in either of the ways suggested above. Fig. 3 should make this clearer.

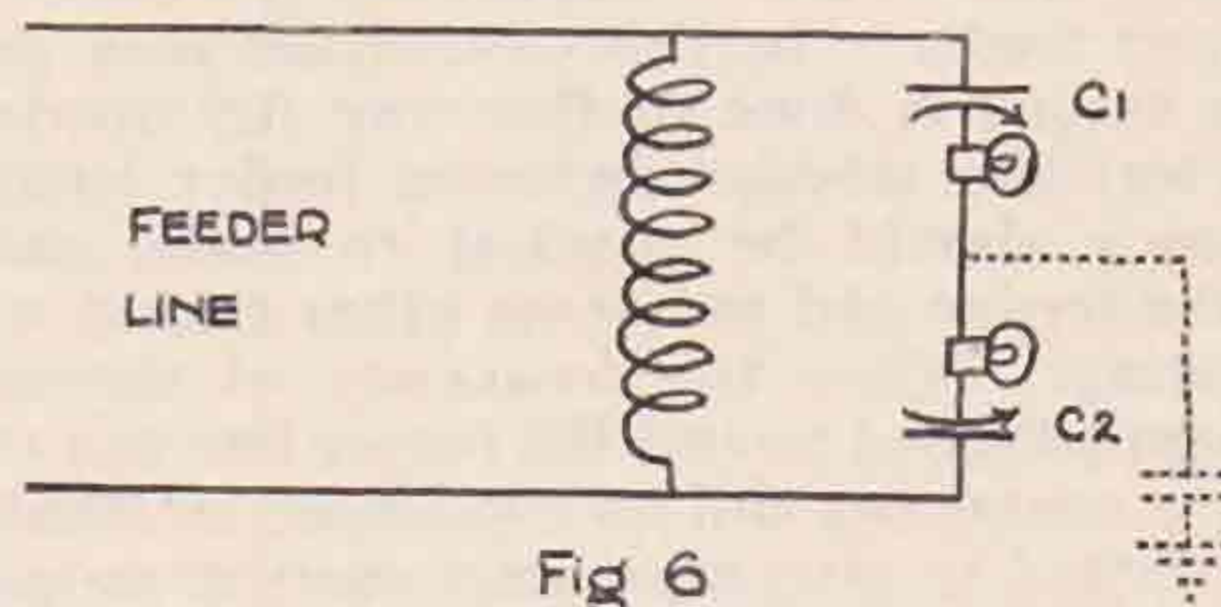
When the oscillator is working satisfactorily its frequency range should be checked by means of the receiver and the harmonics of the constant



frequency source. If a direct reading frequency meter for this range is available so much the better. If the frequency range is too

high or too low it may be adjusted by altering the size of the coil as required. It is well to start by comparing a few grid chokes to make sure that a reasonably efficient one has been found. If the note is bad the shunting condensers shown dotted in Fig. 1 should be tried and grid bias and filament tap adjusted until an improvement is effected. (The note will tend to become worse as more of the coil is included in the grid circuit, and a compromise between large output and purity of note is usually necessary.) The writer recently carried out some efficiency tests at frequencies of the order of 30,000 k.c with an oscillator of this type, the method used being a modification of that described by him in the BULLETIN some time ago.*

An artificial load consisting of motor head-lamp bulbs was used in series with the tuning condenser. These make a very useful load as the maximum current through the load is conveniently indicated by maximum brilliancy. For lower power flash-lamp bulbs can be used. Fig. 4 shows how the oscillatory circuit can be modified, if desired, to keep the bulbs at earth potential. A Mullard SW50 valve was used in these tests and efficiencies of about 40 per cent. to 50 per cent. were obtained on frequencies between 25,000 kc. and 55,000 kc. Anode voltages up to 1,200 were



used at about 30,000 kc. with inputs up to 80 watts. The 40 watts output was not, however, dissipated in the two 4-watt bulbs used in the arrangement of Fig. 4!

Some experiments were carried out with feeder and aerial systems starting with a simple pair of Lecher wires (double feeder) at a height of a few feet from the ground. It is quite a simple matter to measure the approximate wavelength on such a pair of wires with the aid of Neon lamps, the half

* "Experimental Wireless and the Wireless Engineer," Vol. V, No. 60, p. 503 (Sept., 1928); "Some New Applications of Short Radio Waves" (James Taylor and Wilfrid Taylor).

* T. & R. BULLETIN, Vol. 3, No. 1, p. 5 (July, 1927). "A Method of Measuring Transmitting Valve Efficiency." (Megaw) and Vol. 3, No. 8, p. 15 (February, 1928), "Transmitter and Aerial Efficiencies" (Goyder).

wavelength being the distance between consecutive points of maximum or minimum brilliance. The wavelength found in this way should be slightly less than that corresponding to the frequency of the oscillator as the speed of propagation along the wires is less than in free space.* The most satisfactory way of connecting the feeders to the oscillator is by direct coupling, as indicated in Fig. 5. Each feeder tap should be exactly the same distance from the filament tap, and if one turn is included between the feeder taps the coupling is usually amply tight at 30,000 kc. This is, of course, a case of current feed (of the feeder), and for the Lecher wire experiments or for voltage feed of an aerial the feeders should be $1/4$, $3/4$, $5/4$, etc., of a wavelength in length, or for current feed of an aerial an exact number of half-wavelengths in length, the wavelength being taken as 3 divided by the frequency of the oscillator with the decimal point in the appropriate place.† It should be remembered that direct-coupled feeders will usually be at the full H.T. voltage (D.C.) above earth, and precautions should be taken accordingly. Series condensers in the feeders can be used if desired.

The next stage was to add an artificial aerial, consisting of a simple tuned circuit with two more lamps in it at the end of the feeder (see Fig. 6). The maximum brilliancy of the lamps for a given input should be almost the same as when they were connected directly in the tuned circuit of the oscillator, and if this is so the feeder may be taken to be efficient and the system correctly adjusted. The best way to adjust the artificial aerial circuit is as follows: first disconnect the circuit from the end of the feeder and hang a Neon lamp on the end of one feeder wire and tune the oscillator to give maximum brilliancy in the Neon lamp. This adjustment will be quite critical as the resistance of the open feeder with no aerial load connected to it will be quite low. If sufficient voltage to light the Neon lamp is not available at the end of the feeder the resonance adjustment may be obtained by tuning for maximum load on the oscillator as indicated by the anode milliammeter. It is very probable that two maxima close together will be obtained, due to the "coupled circuits effect" with the open feeder. In this case either may be used. If the tuning is done in this way (by anode milliammeter) the relation between feeder length and frequency should be checked to make sure that it is the feeder and not some other circuit which is resonating. When the frequency of the oscillator has been adjusted to suit the feeder line the artificial aerial is connected and its condenser, or condensers, are adjusted to give maximum current as indicated by the lamps. This adjustment should also give maximum glow in the Neon lamp at the end of the feeder. The conditions now obtaining resemble closely the state of affairs with a transmitter and radiating aerial system.

* T. & R. BULLETIN, Vol. 3, No. 7, p. 14 (January, 1928): "The Design of Short-Wave Transmission Aerials" (Megaw).

† If one or both ends of the feeder terminate in an impedance equal to the characteristic impedance of the feeder so as to prevent reflection, the feeder may have any length.

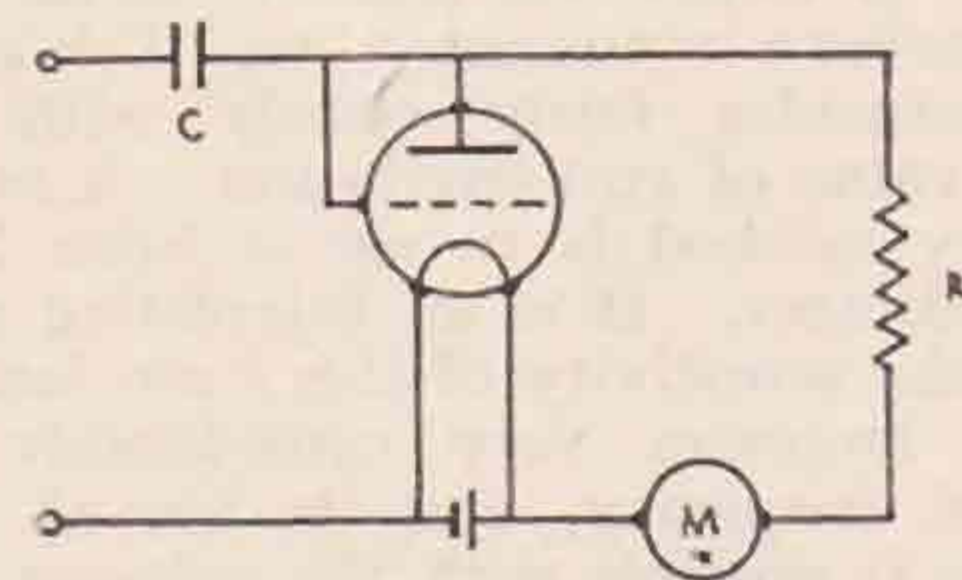
An A.C. Peak Voltmeter.

By Capt. K. HARTRIDGE (G5CB).

An A.C. peak voltmeter can be used for so many interesting measurements in connection with radio telephony, L.F. power amplifiers, R.K. speakers, etc., that it is thought that a diagram and simple explanation of such a meter would be of interest to all amateurs.

It will be seen, by reference to the diagram, that there is a valve connected as a half-wave rectifier, and in shunt to this valve a microammeter in series with a high resistance R. The whole combination fed through a condenser C.

One-half cycle will pass through the valve without affecting the meter, but the other half cycle being unable to pass through the valve will charge up the coupling condenser C, which will discharge through the resistance R in series with the meter M. Knowing the value R and the reading M it is easy to find the applied voltage.



C = .01 - .1 MF MICA.

R = 2 MEGOHMS.

M = MICRO-AMMETER 0-250

In practice the valve may be any general purpose valve, such as D.E.L.210. The resistance R a good grid leak of 2 megohms and the meter a microammeter 0-250 supplied by F. C. Heaybird & Co. at a very reasonable price. With these constants the scale readings of the micro-ammeter will be volts A.C.

With such a voltmeter the A.C. voltages generated across the iron core choke used in choke control modulation may be measured and, when compared to the D.C. voltage used, form a reliable guide to the percentage of modulation.

Calibration Service.

Calibration signals will be transmitted from G5YK on April 28 and May 26 as follows:—

13.00 G.M.T. 7,050 K.C. (nominal).

13.05 G.M.T. 7,250 K.C. (nominal).

A similar schedule will be transmitted on May 12, commencing at 09.00 G.M.T. The call will be R.S.G.B. DE G5YK, followed by a two-minute dash and the frequency used. The accuracy may be taken as better than plus or minus two kilocycles.

Where is your Article?

THE WHEATSTONE BRIDGE.

BY W. F. FLOYD.

(An Introduction to a series of Articles to be published later in the year.)

This instrument was invented by Christie, but it bears Wheatstone's name because he applied the original instrument to the measurement of resistances. It consists essentially of a network of wires, shown diagrammatically in Figure 1, in which a current derived from a constant potential source is split up and balanced among the various "arms" of the bridge. When a condition of balance has been obtained a simple relation exists between the different "arms" of the bridge.

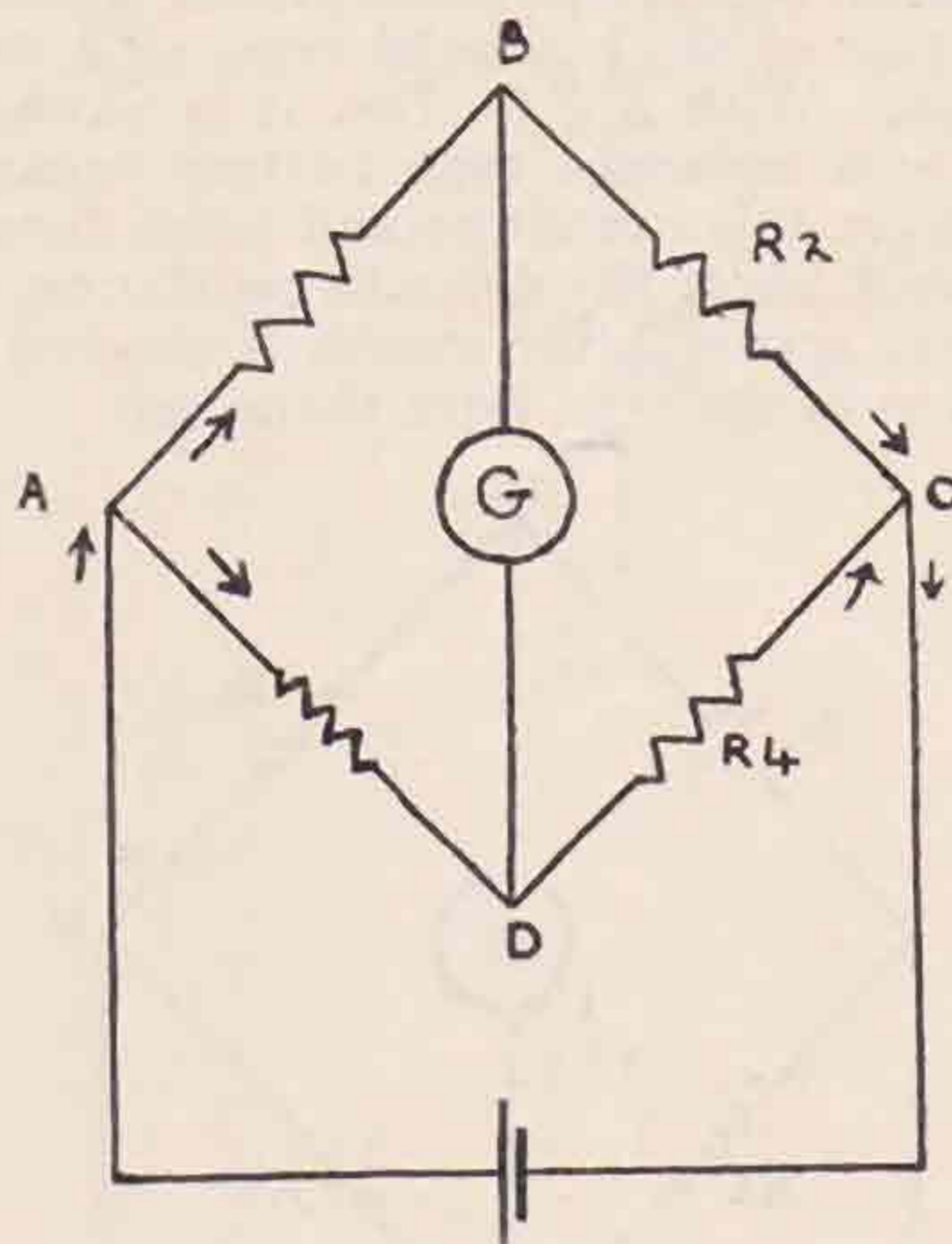


FIG 1

Referring to Figure 1, the current from the battery enters the "net" or "bridge" at A, and divides itself between the two conductors AB and AD. Now, the condition of balance is that no current shall flow through the galvanometer connected to B and D, that is, there shall be no deflection on the needle of the instrument. Thus

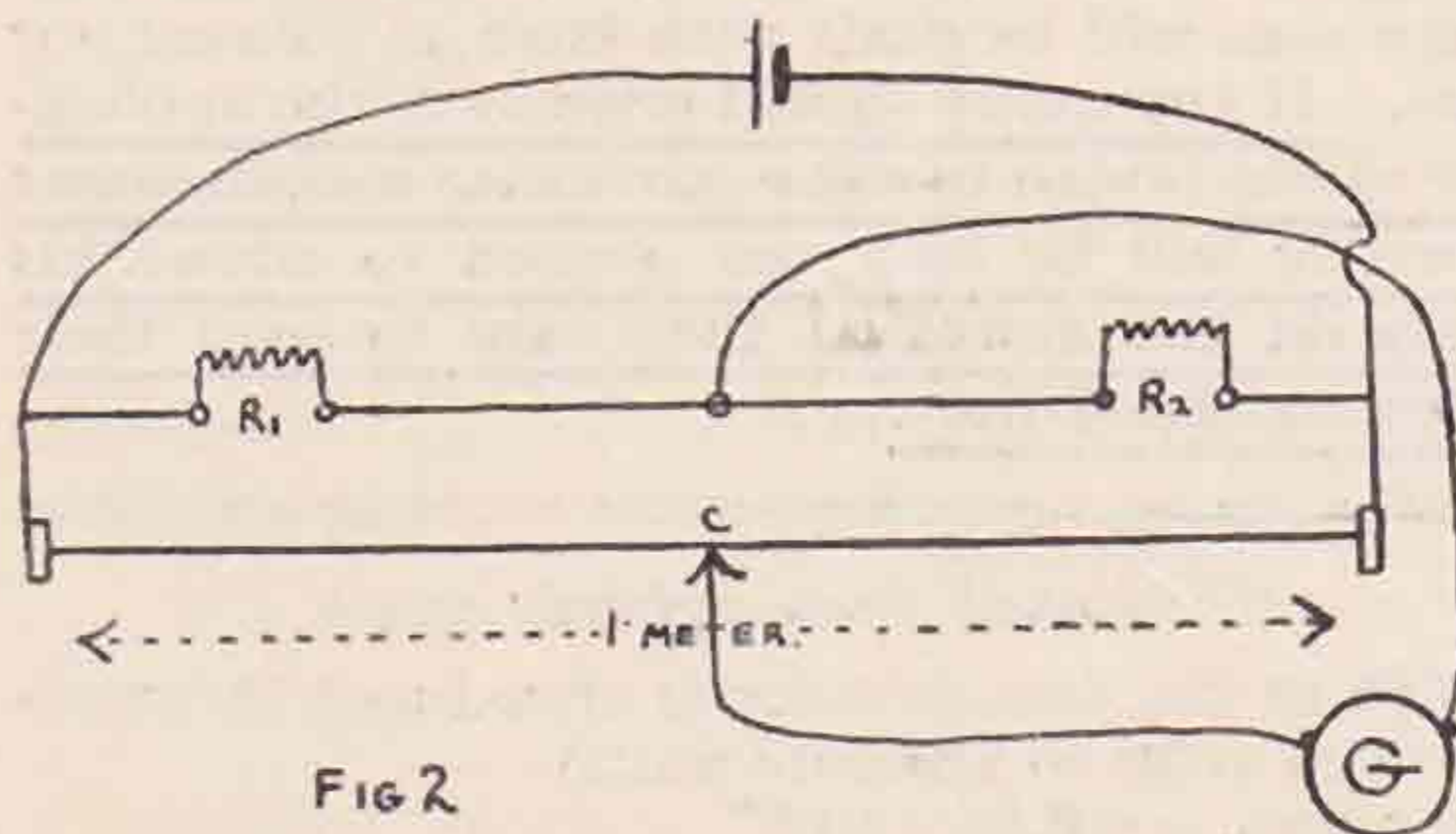


FIG 2

when the two currents in AB and AD reach B and D respectively they do not split up further, and the whole current continues to flow into the "arms" BC and DC. The two currents join again at C, and complete their path back to the battery.

In the balance condition no current flows through the galvanometer, therefore there will be no difference of potential between the two terminals of the instrument. That is, there is no difference of potential between the points B and D in the figure. Thus the potential between A and B must equal that between A and D, similarly, that between C and B equals that between C and D. Let these potentials be E_{ab} , E_{bc} , etc., then if R_1 , R_2 , R_3 and R_4 be the resistance in the four arms of the bridge, and I_{ab} , I_{bc} , etc., be the currents, then the following equations hold:—

$$E_{ab} = I_{ab} \times R_1; \quad E_{bc} = I_{bc} \times R_2; \quad E_{ad} = I_{ad} \times R_3;$$

$$E_{dc} = I_{dc} \times R_4, \text{ and } E_{ab} = E_{ad}; \quad E_{bc} = E_{dc};$$

$$I_{ab} = I_{bc}; \quad I_{ad} = I_{dc},$$

i.e., $I_{ab} \times R_1 = I_{ad} \times R_3$, and $I_{bc} \times R_2 = I_{dc} \times R_4$,
whence by division, $R_1 : R_2 = R_3 : R_4$.

This ratio of the resistances is the simple relation which exists between the arms of the bridge in the balance condition. If three of the resistances be known then the fourth can be computed, or if only the ratio of two be known and the absolute value of a third be known, the fourth can be found.

Consider the condition : $\frac{R_1}{R_2} = \frac{R_3}{R_4}$

If the ratio of R_1 to R_2 be 1,000 to 1, and if R_4 be the unknown resistance then the accuracy to be obtained is sufficient for all ordinary purposes, and for many laboratory measurements.

There are two common forms of the Wheatstone Bridge, the Metre Bridge and the Post Office Box. The former is so-called because the whole instrument is about a metre long and makes use of a metre of resistance wire to balance the potentials. A rough diagram of the instrument is shown in Figure 2.

AB is the metre wire, and a moving contact C divides it into two portions AC and CB, whose resistances are proportional to their lengths since the diameter is constant. The battery and galvanometer are connected as before, and R_1 and R_2 complete the "arms" of the bridge. The balance condition is the same as above, viz. :—

$$\frac{R_1}{R_2} = \frac{\text{Resistance AC}}{\text{Resistance CB}} = \frac{\text{length AC}}{\text{length CB}} = \frac{l_1}{l_2}$$

Thus if R_1 be an unknown resistance and R_2 a known resistance, R_1 can be computed by measuring the lengths of AC and CB in the balance position. It is usual when making measurements with this instrument to take several readings and average them all. This reduces the error of the single observation. Also the two resistances R_1 and R_2 should be interchanged to balance out any "end correction" due to the inconsistency of the wire AB.

The Post Office Box is a more sensitive modification of the Wheatstone Bridge, and is also more portable, having been designed for the use of the Post Office engineers when tracing faults, etc., in telephone, telegraph, and other lines. The P.O. Box (as it is usually called) has been adopted into most laboratories nowadays, and is used for many electrical measurements. The resistances at R_1 and R_2 in Figure 1 are enclosed in a box with another arm of resistances corresponding to R_3 in Figure 1. R_1 and R_2 can only be used in simple tens ratios. (i.e., 10 : 1, 100 : 1, 1000 : 1.)

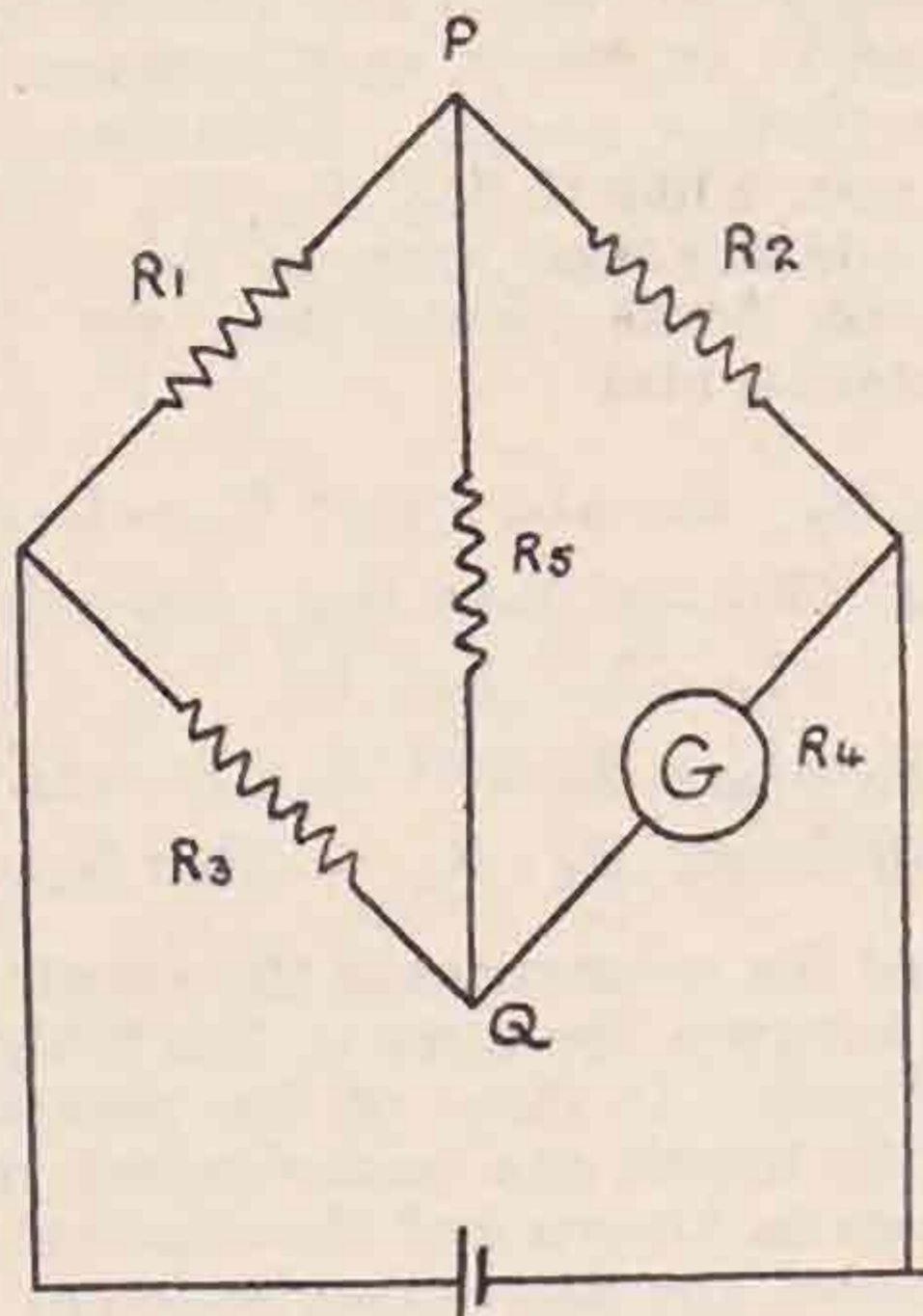


FIG 3A.

The resistances R_3 range from .1 to, usually, 4,000 ohms.

Undoubtedly the better instrument to use for D.C. measurements is the P.O. Box, but it is exceedingly expensive, and it has a limited use from the point of view of the radio experimenter. It cannot be employed for radio frequency measurements unless very great precautions are taken to balance out its stray capacity and inductance effects. The Metre Bridge, on the other hand, is eminently suitable for radio frequency measurements because it can be constructed with a view to its application in this direction. A series of articles dealing with this will be published later in the year. At the moment we must deal only with the various applications of the bridge to D.C. work.

Capacity and inductance measurements can be made with a D.C. bridge, but these depend upon the swing of a ballistic galvanometer for their accurate determination, and even then the results are not of much interest to the radio man, because the frequency correction would be as large as the measured capacity or inductance, if not larger.

Often it becomes necessary to measure the resistance of the galvanometer, or the internal resistance of a battery. This is done with a slight modification of the circuit of Figure 1. The new arrangements are shown in Figures 3A and 3B.

The conditions of balance are, for 3A :—

$$\frac{R_1}{R_3} = \frac{R_2}{R_4} \text{ when the deflection shown by the galvanometer is independent of whether PQ is}$$

connected or not. That is, the deflection is constant when PQ is connected and disconnected. The use of a large resistance R_5 between P and Q is to give some slight latitude to the position of balance. Without the resistance the balance point is so critical that it is almost impossible to find it and hold it.

The balance conditions for 3B are :—

$$\frac{R_1}{R_2} = \frac{R_3}{R_4} \text{ when the deflection shown by the galvanometer is independent of whether MN is}$$

connected or disconnected. The large resistance R_5 is inserted for the same reason as R_5 in the previous case. It will be seen that the balance is independent of the value of R_5 in each case.

In the case of 3A R_4 is the resistance of the meter, and in 3B R_1 is the internal resistance of the cell. It is usual in all these experiments to use a small two-volt cell either of the leclanché type, or a two-volt accumulator. With a P.O. Box it is advisable to employ only a leclanché type battery because the amperage from this cannot exceed small dimensions and so cannot harm the delicate resistances inside. The two-volt accumulator would, if shorted across some sections of the box, burn them out.

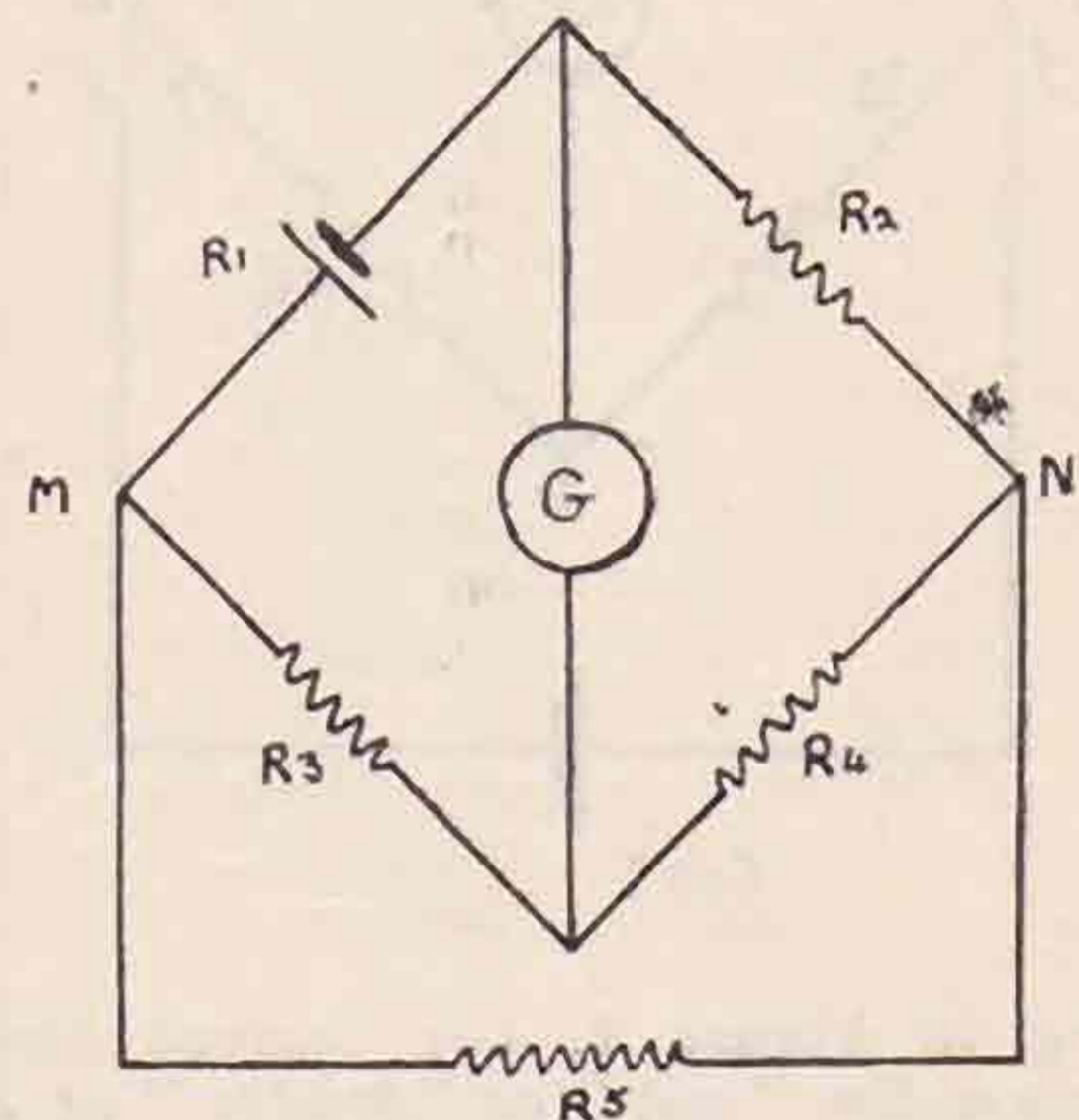


FIG 3B.

There are many other applications of the Wheatstone Bridge, but these are not so frequently met with as the forerunning and the writer does not propose to deal with these now. The radio frequency uses will be dealt with later as pointed out before. If any query should arise as to the applicability of the bridge to some particular measurement the writer will be only too pleased to advise his readers on the matter if they care to send their queries to the Editor.

(Continued from opposite page)

(the 300 in the denominator is introduced to transform from volts to absolute units)

$$\text{Therefore, } h = 6.56 \times 10^{-27}.$$

This value of h is found to agree very favourably with that determined by totally different methods, and theories, e.g., heat radiation.

So Einstein's prediction is verified in every particular, and another method for the evolution of h .

The Photo-Electric Effect.

By T. A. CROWLEY, B.Sc., A.R.C.Sc.I.

Though at the moment television is not so much to the front as it was even some months ago, it is recognised as being the direction from which the next "big push" in wireless will arrive, so we can be excused a few words about the photo-electric cell on which the new science depends, though what follows is more connected with the theoretical side than the practical.

The name of Einstein has received such prominence on account of his theory of relativity that it is probably news to most people that, even apart from that theory, he could be numbered amongst the foremost mathematical-physicists of the day. It was he who first propounded, in 1905, the Quantum Theory of Radiation, though the first idea of quanta of energy is attributable to Planck. Einstein, more from intuition than deduction, made the bold assumption that a source could emit and absorb radiant energy only in bunches or quanta. That is, any electro-magnetic oscillator does not emit radiation continuously as one would expect, but emits it "a bunch at a time" with an interval between the bunches; and the same applies to reception. Further, he assumed that the bunches or quanta are all equal to fh , f being the natural frequency of the emitter and h a constant for all emitters. From this he predicts that when light falling on a surface causes the emission of electrons (the photo-electric effect), the energy of emission of each electron will depend on the frequency of the light. In this case the incident light is the electro-magnetic radiation, an accepted theory, and the particles of the substance, the oscillators.

Now, the energy of an escaping electron equals $\frac{1}{2}mv^2$, where m is its mass and v its velocity of emission.

If we bring the electron to rest by making it travel against an electric field this energy must be used up in doing work and will equal ve where v is the potential difference against which it is just able to drive itself, and e is the charge on the electron. Furthermore, the electron probably does some work before it leaves the surface of the substance.

Let us denote this work by "p." Hence, Einstein writes the equation:—

$$\frac{1}{2}mv^2 = ve = fh + p.$$

p should be independent of the frequency of the light.

At the time when this prediction was made no experimental evidence could be adduced as to its correctness. This evidence is now available and vindicates the correctness of Einstein's "guess."

The obvious experimental procedure to verify the equation is to vary the frequency of the incident light and to determine the potential difference (voltage) required between the surface and another one to just prevent the electrons reaching the second surface. Also, it is necessary to use a wide range of frequencies.

It is found that the ordinary metals exhibit a photo-electric effect only under the action of ultra-violet light, hence their use did not allow a wide range of frequency.

The alkali metals—sodium, potassium and lithium—however, show the effect in the visible spectrum from below the red rays as well as in the ultra-violet. Accordingly these metals were selected for the present purpose.

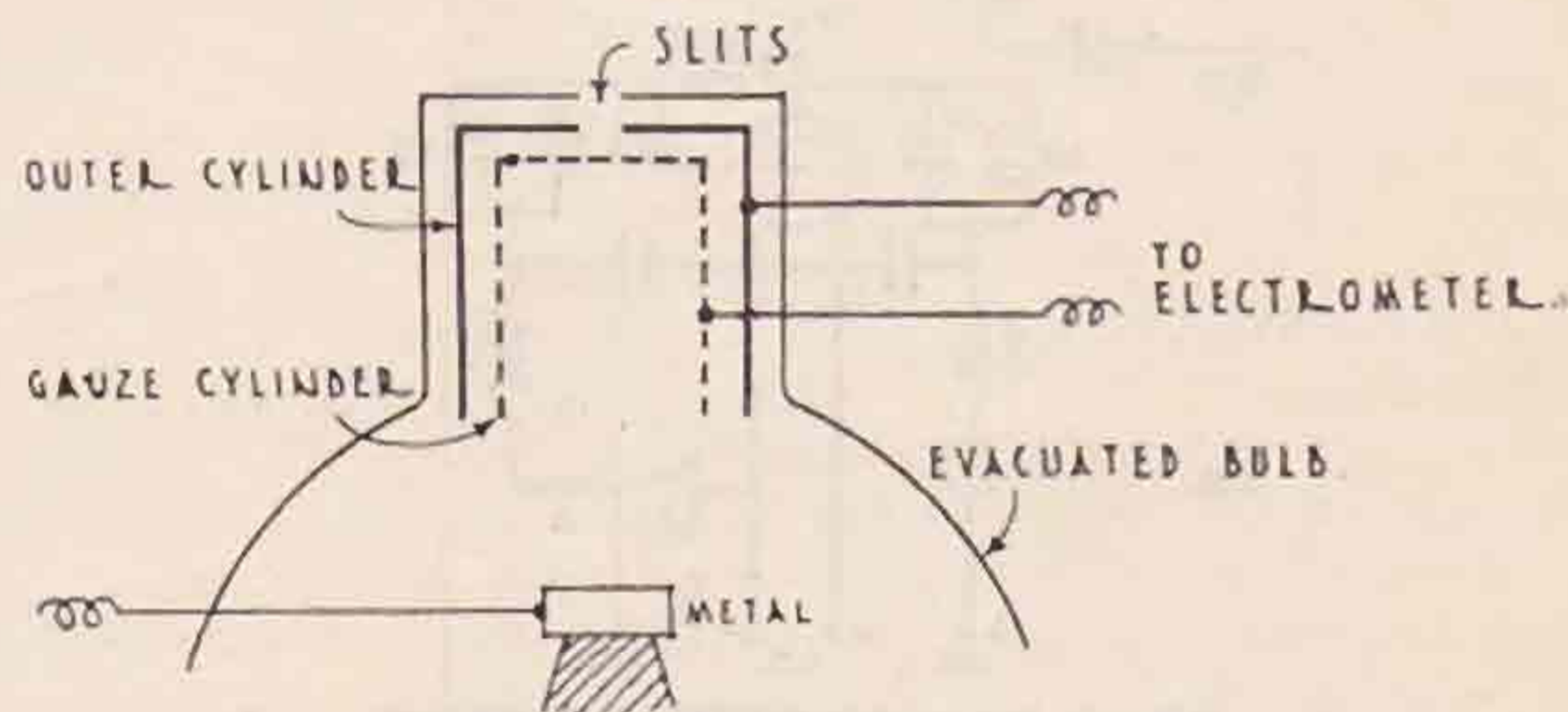
The whole work had to be performed in a high vacuum, and, as only freshly-cut metal surfaces might be used, the experimental difficulties were tremendous.

The apparatus finally has been described as a machine shop in vacuo. The outside control of the "machines" was effected by electro-magnets. The fundamental idea is illustrated.

The surface of the metal is positively electrified with respect to the outer cylinder shown in dark line. The inner gauze cylinder is connected to an electrometer to indicate when the electrons cease to reach it.

The light is admitted from a spectrometer through the slit, and the voltage varied until there is no indication of gain of negative charge in the electrometer, *i.e.*, until the positive potential difference just prevents the electrons reaching the gauze.

This procedure is performed for lights of varying frequencies both in the visible and ultra-violet spectrum.



Now, Einstein's equation tells us that v and f have a linear relation between them, because:—

$$v = \frac{h}{e}f - \frac{p}{e}$$

$\frac{h}{e}$ should be a constant; also $\frac{p}{e}$

When these quantities are plotted together a straight line graph should result. Furthermore,

the slope of the graph should equal $\frac{h}{e}$ and knowing e ,

the electron charge, h may be calculated.

On plotting v and f a perfect straight line was obtained; the slope of this line was found to be 4.124×10^{-15} .

Assuming $e = 4.774 \times 10^{-10}$, the value obtained by Milliken in his oil-drop experiments,

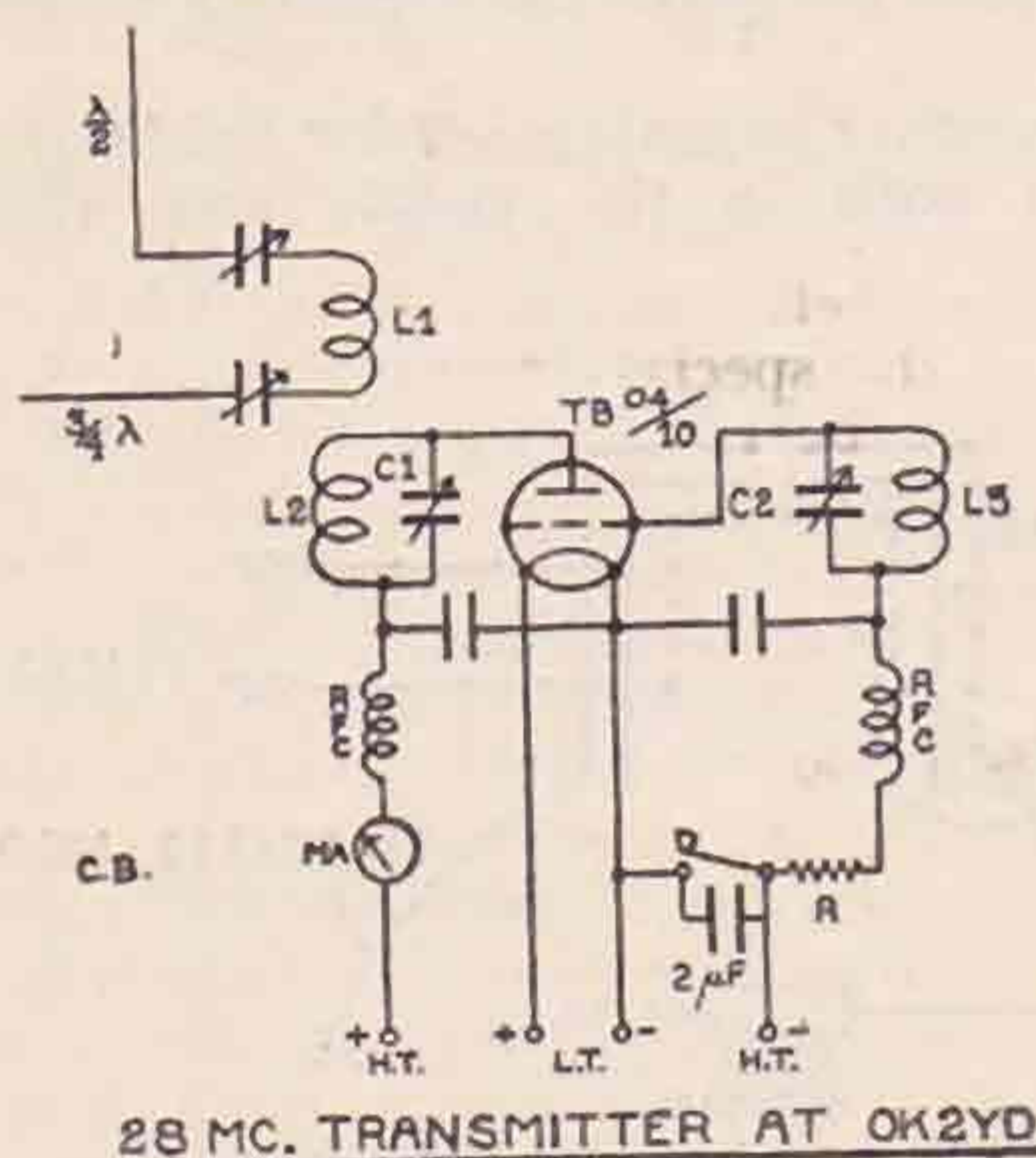
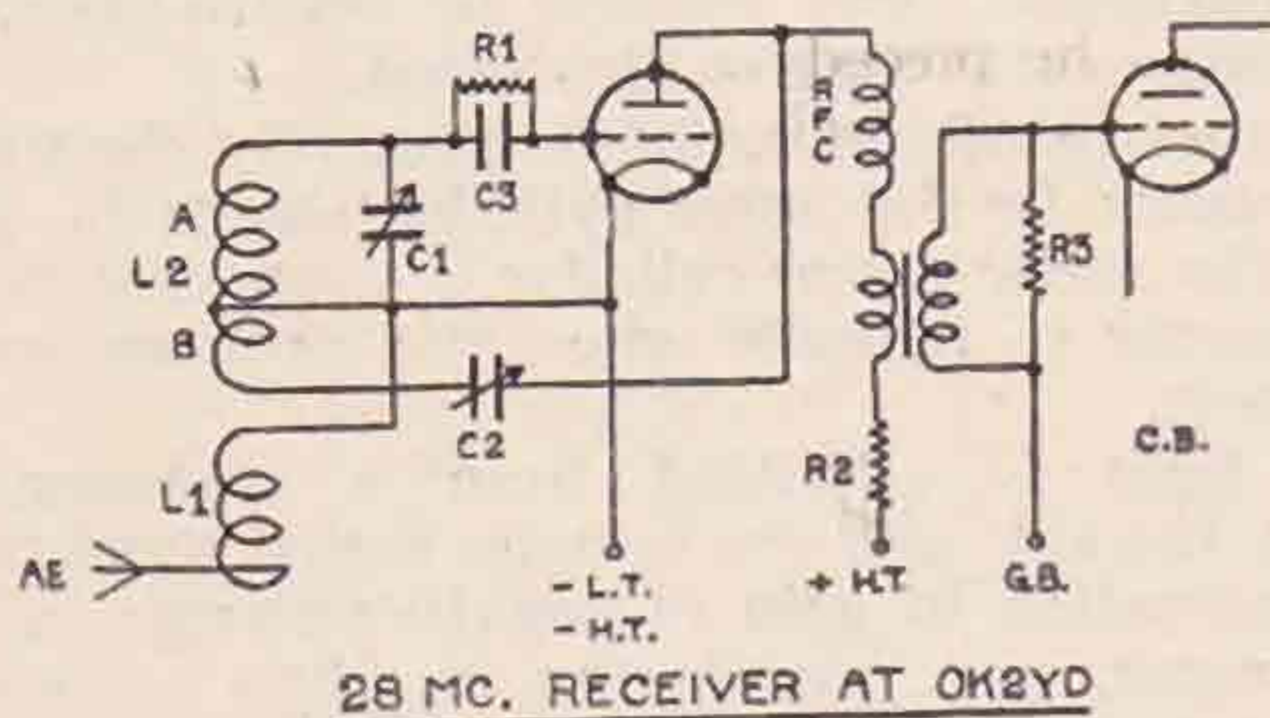
$$h = \frac{4.774 \times 10^{-10} \times 4.124 \times 10^{-15}}{300}$$

(Continued at foot of previous page.)

Contact Bureau Notes.

By T. P. ALLEN (G16YW), MANAGER.

At the time of writing the 28 M.C. tests are in progress, but it is hoped to have some preliminary results published elsewhere in this issue. Although conditions on March 10 were anything but good at G16YW, four G-W contacts were heard, which showed that something was being done. Notices in "J des 8" brought in several queries from French amateurs, and it is hoped that they will merely be the advance guard of many others to swell the ranks of CB.



OK2YD sends the details of his 28 M.C. transmitter and receiver, the diagrams of which are given. In the transmitter, OK2YD says that chokes in filament leads are useless, and gives the following values for the components: C1 and C2, two fixed and one moving plate condensers, homemade. L1, four turns copper tube 6 mm. diameter, diameter of coil is 3 ins. L2 has $3\frac{1}{2}$ similar turns. L3 has $1\frac{3}{4}$ turns of 2 in. diameter, and all turns are spaced with $\frac{1}{2}$ in. of air. Coils are mounted on glass rods. C3 and C4, 0.001 mfd. fixed. R, 8,000 ohms inductively wound, RFC, 120 turns 36 S.S.C. section wound (10, 30, 20, 40, 20) on $\frac{3}{4}$ in. glass tube. Aerial is a $\frac{1}{2}$ -wave vertical Zepp with $\frac{3}{4}$ wave feeders. Loose coupling of 2 to 3 ins. is used. The receiving aerial is 12 metres long with no cpse or earth connection. R1, 8 megohms. R2, 50,000 ohms. R3, 120,000 ohms. C1, 5 plates (three fixed and two moving). C2, 0.00025 mfd. C3, 0.0001 mfd. L1, one turn 0.8 mm. D.C.C. of diameter 2 ins. L2, four turns (part A

has one turn and part B has three turns) same size and diameter as L1. RFC, 2 ins. of 0.2 mm. D.S.C. wire on 1-in. tube.

G2HH has been doing some very good work on picture reception from 5XX. Should that have been G5XX? G2HH is anxious to get into a group on this work, or one on the transmission of pictures, but as yet there has been no demand. Is anyone interested? G2HH has an eye on some old phonographs which can be cheaply obtained and are useful for driving the cylinder.

Upon further reflection, BRS125 and the writer have decided to make the conditions of his prize for 5-metre (I thought of it in megacycles, but it looks too hard!) work a little easier and fairer. Here is the new story: "Radio gear to the value of £3 3s. or a cup, at choice of winner, will be presented to the first British transmitter in Great Britain and Irish Free State whose signals are reported from a distance of 10 miles or more, and a small souvenir will be presented to the receiving station, whether it be British or foreign. In the event of a QSO (either British or foreign) the prize will be of the value of £2 10s. and a similar one will be presented to the other station by the donor." Now, all is clear and claims may commence rolling in any time.

BRS125 sent me a notice of some tests being carried out by ZU6C, but these were too late for inclusion in last month's BULLETIN. If you hear him, please report to BRS125; his wave is in the 14 M.C. band, and he is using QRP.

I am grateful to BRS125 and OK2YD for "QTC" (the S.A.R.R.L. magazine) and "Czechoslovak Radio-world," respectively.

G6XP has found that frequency trebling is quite easy; he has had a frequency trebler followed by a frequency doubler going, and is now getting a crystal which will allow this method to be used on 28 M.C. Work along these lines may simplify the use of CC for the higher frequencies and is deserving of attention.

F8LX, old F8YNB, is on 28 M.C. every day from 13.30 G.M.T. till 13.45 G.M.T., and would be grateful for reports.

AF1B (Indo-China), using 200 watts A.C., is also on the 28 M.C. band.

Mr. Coombs, of S.A.R.R.L., wrote to say that he was giving our tests publicity in South Africa and enclosed some copies of their publication. "QTC" is a very well turned out little paper and has an intimate chatty atmosphere, which is very refreshing. They seem to be a real bunch of lads down there. Mr. Coombs, known to the members as "HOS" (Hon. Org. Sec.), says that they have a very sympathetic P.M.G., and at the moment are working very satisfactorily with him in maintaining emergency communications with Verneuk Pan. "HOS," if he will pardon the familiarity, really due to reading "QTC," promises to do everything possible to help us if we will let him know when an occasion arises.

G6YL informs me that ZS4E, old FO-A9A, is transmitting on 28 M.C. every Sunday at 06.00 G.M.T., and 14.00-16.00 G.M.T., and wants QSO with Europe.

Some time ago a list of queries was published in these columns with regard to certain CC problems but as there were no replies I asked G2QY and CB134 to give some information on the points in question. These two short articles should clear the air a little on a couple of the questions, and, perhaps, someone else will provide further articles along the same lines.

* * *

A Partial Answer.

By G2QY.

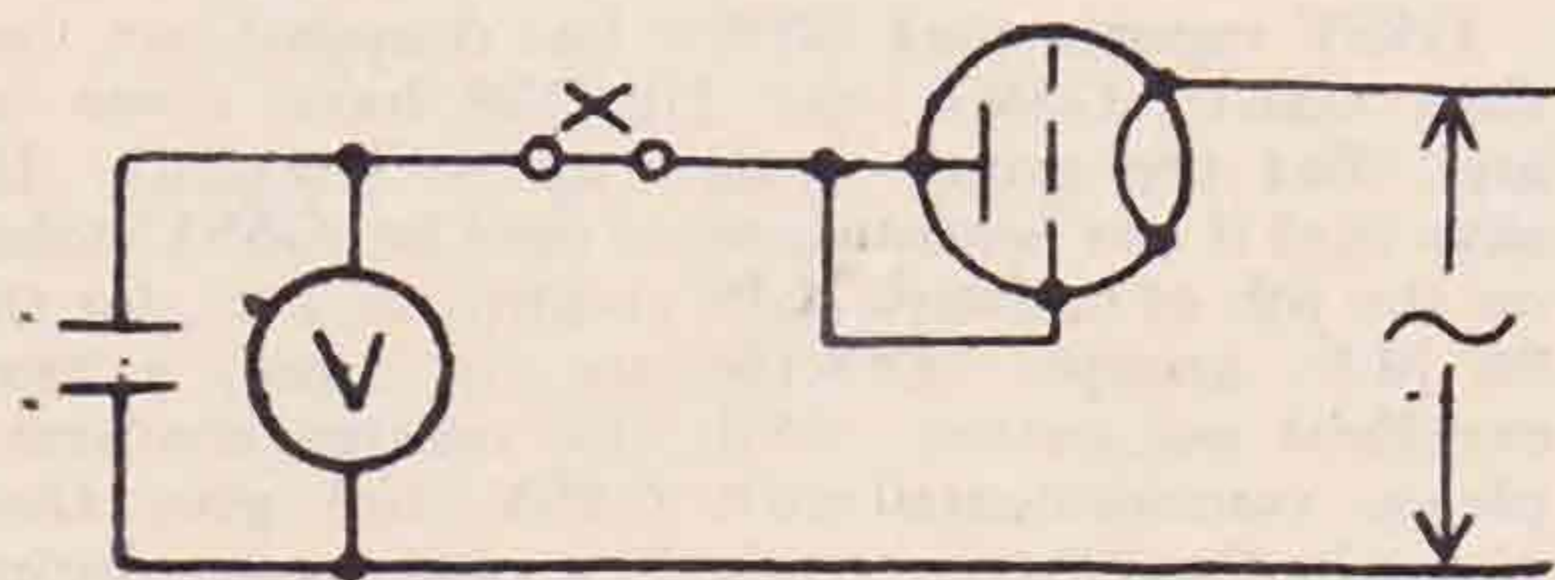
QUERY.—How can grid excitation be measured continuously and cheaply?

Because this question is so brief, several additional factors must be read into it before an answer can be attempted. For instance, whatever meter be chosen must not markedly upset the circuit conditions. Then, again, cheapness is a relative term, and the average amateur is rather inclined to consider a piece of apparatus costing about £4, an expensive item. So all that can be done in an article of this kind is to indicate the possible alternatives, leaving the final choice to the individual reader.

The characteristics of the three main systems of measuring high-frequency voltages may be briefly summed up thus:—

(1) The Moullin voltmeter, which is essentially a valve to whose grid the voltage is applied, and whose resulting plate current is calibrated in terms of grid excitation. Such an arrangement is common in two uses of the crystal oscillator. With free grid, the plate-current gives a measure of the grid excitation, which, however, is not of much practical use. The frequency-doubling stage admits of a more satisfactory calibration. The crystal oscillator, with applied grid bias, can also be calibrated, though when used with grid-leak only very little accuracy would be attained. In the case of self-excited transmitters, the voltmeter valve would have to be larger than the oscillator. In all these cases, a Moullin voltmeter could be realised at the cost of the calibration.

C.B.



**PEAK VOLTMETER
CONNECTIONS**

(2) Then there is the neon lamp without the series resistance, such as can be obtained from the G.E.C. with ordinary bayonet cap. The striking voltage (at which the lamp commences to glow)

is something less than 170 volts, but the actual figure depends upon the frequency, and when a polarising battery is added, the two lamp electrodes, if of different shapes, have different striking voltages. For serious work the neon lamp requires calibration, and some ingenuity must be exercised in making the voltage to be measured just equal to the striking voltage. A lot can be done by putting a polarising voltage on to the neon lamp, not forgetting that a grid bias will also polarise the lamp. The self-capacity of the bayonet cap lamp and holder is similar to that of a valve and holder, so that the use of the lamp will not seriously upset circuit conditions until the lamp lights up.

One or more neon lamps can always be arranged to strike at a predetermined A.C. voltage, and the behaviour of an associated milliammeter will generally know if the A.C. voltage has materially decreased.

Both of the preceding methods call for an initial calibration upon high-frequency, which ordinarily is a difficult matter, and apt to be expensive. The writer is greatly indebted to Mr. Megaw (GI6MU) for introducing him to, and helping him with, a third method which is open to no serious objection, that of the peak voltmeter. Here an electrostatic voltmeter is wanted, and one with a special scale (which afterwards proved somewhat unnecessary) was obtained from Mr. Ernest Turner, of High Wycombe within ten days at no increase in price.

(3) The peak voltmeter. The valve should have a good emission at very low plate potentials. Terminals are provided at X for the insertion of a biasing battery, since an E.S. voltmeter is practically useless below about a fifth of full scale. In the case of the special instrument, nothing below 100 volts can be read, but between 300 and 400 volts, even a single volt produces an easily readable deflection. C is a fixed condenser of 0.006 mfd. or larger. All the components shown, and also the L.T. battery for the valves, must be very carefully insulated from earth. The theory of the instrument is perfectly simple. The peaks of any A.C. applied to the terminals are rectified by the valve, which charges up the condenser to the highest peak voltage applied. This steady D.C. voltage is read by the voltmeter, which was calibrated upon D.C., and only has to read D.C. Consequently the reading is independent of frequency. The only error introduced is that due to leakage. By working from a false zero, this can be largely eliminated, though in any case it should not be serious.

The capacity of the instrument as hastily assembled was about 9.0001 mfd. In the case of ordinary tuned or self-excited circuits, this would not matter, provided the variable condenser could be reduced by that amount. But a few crystals actually refuse to work with all this extra capacity in parallel, and the results with any crystal would be impaired. In any case, a neon lamp or Moullin voltmeter could still be calibrated by using a derived source of voltage (for instance, a tank circuit coupled to the plate coil).

The cost of a peak voltmeter would be about 66s. 8d. for the E.S. meter, plus a few small oddments, the valve and battery being borrowed for the occasion. When not used for this special purpose, the E.S. meter could very well be placed across the plate supply, in which position it should alone be worth the money.

An Answer.

By CB134.

QUERY.—Why expect a crystal-controlled valve to act as frequency-doubler as well?

A question of this type cannot be answered unless the conditions of use are known. In a publication such as this, it is necessary to give the main reasons underlying the use of such valves, so that individual readers may decide whether at their stations they depart from the conditions postulated.

Take the curve connecting grid volts and anode current for your particular valve and H.T. supply. All you have to do is to light the valve at the correct filament voltage, and read off the plate current for various values of grid bias (both positive and negative) when the valve is not oscillating.

If you happen to know the approximate grid-swing given by your crystal, use that figure in the subsequent graphs, otherwise assume that the grid-swing is a quarter of the anode voltage, and see how you get on.

With centre vertically below the value of grid bias that you have found most successful in operating the C.C. unit, and radius equal to half the grid-swing, describe a semicircle. Draw radii at equal angular intervals (30° apart will generally suffice). Project upwards from the ends of the radii on to the grid-volts-plate current curve, then horizontally along from the intersection. Along the base-line, mark off equidistant intervals (any scale) equal in number to the radii, and mark the intersections of correspondingly numbered projections and vertical lines. An example is given on the diagram.

The result of all this effort is an approximation to the shape of the anode current curve, when the grid is supplied with a pure sine-wave, which is substantially what always happens when a crystal is supplying the grid excitation. The actual shape depends a lot upon the grid bias, the grid excitation and the valve curve. Generally it is more or less rectangular, but may be nearly triangular. In any case it will not look very much like a sinecurve.

As a check upon the work so far, the average height of the curve should be taken. In the absence of a planimeter or acquaintance with Simpson's Rule, it is sufficiently accurate to cut a similar curve out of thick cardboard, and place it in letter-scales against a rectangular piece of the same cardboard of the same horizontal length. By reducing the height of the rectangular piece till the weights are equal, the average height may easily be obtained. Of course, this average height ought to agree with the anode current observed when the crystal is oscillating.

Now although it is painfully obvious that the anode current is not a sine-wave, the determination of the nature and amount of harmonics present is not very easy. A lot can be done by trial and error. A likely-looking sine-wave is drawn on top of the actual current curve, the differences between the two are plotted again to form another curve. If the latter does not obviously contain much fundamental, a second-harmonic sine-wave is plotted over it, and the procedure is repeated. It will then be seen that the following conclusions are more or less justified:—

(1) The amount and proportion of the various harmonics depends upon both grid-bias and

grid-swing. Comparatively small alterations in either will greatly alter the amount of second harmonic present.

- (2) The greater the grid-swing, the more harmonics are present.
- (3) The amount of fundamental will not increase very much beyond a certain value.
- (4) The amount of second harmonic may reach 30 per cent. of the amount of fundamental.

To make full use of these conclusions, we require two other results for which there is no space here to give proof:—

- (1) It is the value of grid-swing which largely determines when the crystal will crack.
- (2) With 400 volts H.T. it is rarely possible to generate enough voltage across the crystal to damage it, though the margin of safety is low.

Now we can start to answer the question. With a 10-watt valve using 400 volts H.T., we may expect either about 6 watts of fundamental or 3 watts of second harmonic. Provided the crystal will oscillate at all, the fundamental is always present, and the power is, in the practical case, only very slightly affected by changes of grid bias or grid excitation. On the other hand, the second harmonic does not appear until the grid is badly over-excited, and the power varies enormously with very small changes in grid-bias or excitation.

Thus, by making the crystal do the work of controlling 10 watts, incurring the expense of such equipment, and having the trouble of extremely critical adjustment, an output of 3 watts of second harmonic may be expected, which may justify the means adopted.

On the other hand, by letting the crystal control a 1-watt valve, and making the output therefrom control a 4-watt frequency-doubler, precisely the same output would be expected, with the additional advantages of a very generous factor of safety for the crystal, less expensive valves and current supply, and freedom from critical adjustments.

As the reports from the groups are drifting in from the 7th, the proper date for them, until after these notes go to press, and it is necessary for me to write them up just as time permits, I must present them in anything but their proper order. To balance things, I have indicated the subject of each group.

GROUP 1B (28 M.C.).

G5SY reports that G6WT has dropped out, but that G5LU, G5ML and BRS136 have come in, and that the group is now up to strength. He says that it has been suggested that he (G5SY) takes on the job of collating WX conditions, etc., for the 28 M.C. groups. This is, to my mind, a very excellent suggestion. Will the centres concerned please communicate with G5SY and give their views? Conditions seemed pretty poor during February. G5VL QSO'd a few W stations, and logged a few, but generally on the poor side. G6LL, who also had 'flu, logged VT2KT (he has probably made contact by now). G5ML has worked nine W stations and VT2KT! He uses a vertical $\frac{1}{2}$ -wave aerial tapped directly to plate coil. G5LU has had exam. QRM. BRS136 finds conditions poor. G5SY still on $\frac{1}{2}$ -wave Zepp, but no results yet. The group is making some attempt to collate WX

conditions with DX and is producing a map each month showing conditions and results for each station. They would be glad of information from other stations.

GROUP IC.

This group is now reorganised under G6VP, and consists of G6VP, G5YK, G6WN, BRS15, PAODU and possibly OK2YD.

G5YK has been doing a lot of work with his C.C. set, so ably described in the September BULLETIN. There is one variation: the PA is not now neutralised as he finds it impossible to efficiently swing the SW/50 without self-oscillation. A 2/2 Zepp of the vertical type is used.

G6WN, two operators, have put a C.C. set into operation and are also experimenting with a T.P.T.G.

BRS15 has a fine 28 M.C. RX and has logged W6UF.

PAODU is studying WX conditions and on February 3 he heard W2JN, W2NM, W8ZG, W2ALW, W9BLT, W1ZZ, W1BW, W1CMF, W1AQD; on February 10, W2BG, W1ZZ and W2JN; on February 17, no stations heard—the conditions showed a high pressure advancing from the N.E., but very low pressure westwards, also snow and fog.

G6VP has been visited with the popular complaint, but now has his TX controlled from the dining-room after years of fireless operation!

GROUP ID.

A short note from CN8MB is included in their letter budget this month, and shows that there is one station at least in North Africa which is active on 28 M.C. He has been heard on sked at EI7C QSA2/3 RAC while using a Mesny TX.

GI5MO hopes to QRO from 3 watts to 10 watts soon and use his vertical aerial. GI5D proposes to modulate his accumulator H.T. and has a half-wave Zepp ready. GI5OT supplies some information on beam systems, but their complicated construction rather prohibits them being suitable for amateur work. G6GC reports poor conditions, but has a 10-watt station ready for the tests. 2AAK has a bit of bother with AC hum in his receiver and intends using anode rectification, which proved quieter for BC work. Can anyone assist him in cleaning the hum from the receiver? EI4D has to build an accurate frequency meter before the IFS Post Office will give him a temporary permit for the tests; another injustice to Ireland! EI7C has a reflector behind the Zepp, but its usefulness is not yet proved to his satisfaction, though W2JN has been worked before other G stations were heard and after they faded out. He has had an experimental CC rig going, but is not using it regularly. Group ID congratulates G5ML and G5YK on their excellent work with India.

GROUP IE.

G2XY has resigned from IE, but G5HS comes in to complete. G2OD says that March 3 seemed a good day for 28 M.C.; he worked W8AXA, W2ALW and W2JN. He still finds that with his double-wave aerial his signals are heard longer in U.S.A. than other G stations using smaller vertical aerials, but the smaller aerials put signals into U.S.A. earlier in the day. W2JN bears this out in his reports to G2OD. G2OD's signals pass through the peak period as twilight passes over

the station, as would be expected from results at other frequencies. G2OD informs me that W2JN uses 300 watts input to the last stage and a multi-wave horizontal aerial without reflector. W2JN appears to be the most consistent W station at this frequency.

GROUP IF.

G6HP has had two good reports from OH and VT. He has had a spot of bother with RX on 28 M.C. BRS25 logged 10 W stations on February 10.

G2CX has erected a new 2/2 wave horizontal Zepp and bought an LS5D for the tests. Both mechanical and electrical interference from buses make 28 M.C. a problem at G2CX. The receiver is being totally screened, batteries as well, and the TX and RX are slung on rubber strips. G2CX did splendid work for the 28 M.C. tests by writing personal letters to 17 W stations. Very many thanks, OM!

G5WK has not been on the air much, due to 14 M.C. temptation, but has done some work on a new aerial. A later note shows that G2CX has QSO'd W for the first time on 28 M.C. He worked W2AYR on March 10 and found conditions "best ever." Sorry that the same was not true of Irish conditions on that day! "Dud" at Belfast and Dublin.

GROUP IG.

G5LP and G5GU are on the air, but no news of QSO's yet. G6BW is busy with R.M.A. work. G2YU also busy, especially with frozen pipes!

GROUP IH.

G6OO not only comes in as a centre, but provides his own group! He brings along G6UJ, G5DR, G6NG, G6DR. All are keenly interested in the 28 M.C. tests.

GROUP 2A (SKIP).

BRS98 is working on Skip skeds with G6LN. G2YU finds that different feeder positions make a difference. One position gives good sigs. in W but poor in Europe; another gives fair results in W and good in Europe. Please write to GI6YW, in confidence, and tell me the secret of the good sigs. in W!

GROUP 3A (C.C. WORK).

'Flu seems to have upset the work of this group for the month, but I hope all are well again. G2QY provides a lot of information which accompanies this article.

GROUP 4A (BEST RECEPTION TIMES).

2AUH never fails to have the DX Guide here at the appointed date. Will those who use or appreciate this feature please write a card to him so that we may know the extent of the demand for it.

GROUP 5A (3,500 K.C. FADING).

Results are very meagre, but G2HH has made some interesting observations on fading and the direction of propagation.

These are the last CB notes from the pen of the present writer, and before I sign off I must thank all who have contributed to the building of CB. I have had every encouragement anyone could wish, and the shortcomings of CB must be laid at my own door. Had time permitted I had hoped to develop CB along various lines, but I must now leave that to my successor, and hope that you will often gladden his heart as you have done mine

by your support and cheery letters. The friendships I have made through CB are greatly valued, and I hope to renew them from time to time "on the air."

I wish to thank EI7C, especially, for doing the "art work" for these notes; also Mr. Megaw for representing me at H.Q.

My last action at CB is to join it myself!
Cheerio, and every good luck to you all.

Group 4A DX Guide.

(ALL TIMES G.M.T.)
APRIL 20—MAY 20.

	14 M.C.	7 M.C.
Australasia	06.00—09.00 19.00—21.00 and various	06.00—09.00 19.00—21.00
North America	East 14.00—09.00 West 02.00—09.00 and various	21.00—09.00 05.00—09.00
South America	05.00—06.00 19.00—24.00 and later	20.00—23.00 and later
Africa	North 10.00—15.00 and later Central 19.00—21.00 South 17.30—22.00	19.00—23.00 19.00—23.00 19.00—22.00
Asia	15.00—20.00	19.00—23.00

LATE NEWS.

G5UM is anxious to have the help of amateurs interested in 155 metres. He is about to carry out some interesting tests on that wave.

G2ZN suggests a group of ultra-QRP men using 2 watts or less at all times. Any offers?

NEW MEMBERS.

G5HS, F8MPL, F8LX, F8VLP, G6UJ, G5DR, G6DR, G6NG, G2ZN, G5UM, G6YW—total, 172.

Preliminary Report on 28 M.C. Tests.

With the exception of one day, the conditions during the period of the tests were the worst on record. This is a great pity, for amateurs abroad were trying to make contact with us, and had we been given good conditions, it is probable that much information would have been available about the varying conditions of this band.

I think that the poor conditions and consequent lack of contacts by many were the cause of such a disappointing return to CB in the way of reports. On the 28th, the last day for receiving reports from British amateurs, the number of reports at CB was only seven. One wonders if it is worth while to spend time and energy organising tests when the members will not do their part; it is certainly unfair to the foreign stations and organisations which have very kindly assisted in the arrangements.

To attempt any detailed summary of the preliminary results would be foolish, both from the point of view of number of reports and the very bad conditions. Later, when foreign reports come in, it may be possible to draw some conclusions from the reports, but at present it would be misleading.

I will just state the achievements of the various stations reporting:—

G6LL.—QSO W2BHQ, W2JN; heard W2XAW, FVM2, W2BOK, W9DHK, W1ZZ, W3ADY, NKF.

G6WN.—No contacts; heard W2ACN, W2JN, NKF, W2XAW.

BRS190.—Heard W2ALW, W2AYR, W1ZZ, W2BVG, W2JN, W2ACN, W1RY, W5YG, W2BHQ, W9DHK, W1BAE, ZS5C (perhaps ZS5U?), W1AQD, NKF.

BRS25.—Heard W2ACN, W2JN, W2BOK, W1ZZ, W2AYR, W2ALW, W2BHQ, W3ADM, W2BVG, W9DHK, NKF, W2WL.

BRS36.—Heard W2JN, W2ACN, W2AYR, W2ALW, W2BHQ.

G6OO.—Heard RKV and W2XAW.

G2OD.—No contacts, and unable to participate until March 18.

G16YW.—Heard FM8RIT, W2BHQ, W2JN, W2BVG.

G5YK.—QSO W2JN. Heard EU2FA, ? 2AI, W1BAE, W1ZZ, HJO.

E17C.—QSO W2JN. Heard SUZ, GLH, MJC (?), W2BHQ, W2BVG, W2JN.

G6DH.—No contacts; heard FVM2 (harmonic), W4NH, W2JN, W2ACN, W2BOK, W2AYR, W2BHQ, W2ALW, W3ADM, W1ZZ, W1AQD, W1BAE, RKV.

It will be noticed that certain W stations appear to be received at many parts of the country, while others are only heard by a few stations. Had more reports been received it is possible that some conclusion could have been drawn from this fact.

Several British stations were in contact with purely local stations, but these contacts have not been given above as they do not appear likely to add to the knowledge of the propagation of 28 M.C. signals.

If sufficient reports come in from DX stations, a further notice concerning the tests will appear in next month's issue.

The reception of ZS5C (?) by BRS190 would appear to be the first reception of a South African station, and I hope that verification will be received.

Strays.

ZLIFT transmits as follows: 28,000 K.C. every Sunday, 20.30-22.30 G.M.T.; 14,000 K.C., every Sunday, 03.30-05.30 G.M.T.; 7,000 K.C. every Saturday, 05.30-17.30 G.M.T.

* * *

The REF are holding a Congress in Paris on Saturday and Sunday, June 1 and 2. By leaving London late on Friday night, it would be possible to attend nearly the whole Congress and get back to London at 9.3 a.m. on Monday morning. Cost about £5 inclusive. Please apply to me for further details. If sufficient numbers apply, a special party would be arranged, but please let me know *now*, at once, if you are intending to go, and for how long you can get away from London.

SUPPORT THE SOCIETY AND TRADE ONLY WITH YOUR SUPPORTERS.

Efficiency in Chemical Rectifiers.

By MAURICE GIBSON (2BAA), F.T.S.

In *Amateur Wireless* of June 28, 1924, I read an article in which it was stated that the rectifying and smoothing circuit at the radio experimental station, 6GM, was as shown in Fig. 1. It occurred to me that this was a cheap if very inefficient form of obtaining power; with 400 volts of applied A.C. there was a D.C. output of only 200 volts—a loss of 50 per cent. In the course of my inquiries I obtained a circuit that had been experimented

These were my readings showing that anything above 250 volts applied A.C. overloaded the rectifier, very much reducing the efficiency; the losses, however, in the first and second readings, were only 29 and 62 volts. These readings were taken with a sensitive moving coil instrument and their accuracy is beyond doubt.

In time, however, it was found that the rectifier deteriorated and had to be scrapped.

Recently, a new form of rectifier was devised; this consisted of a 1-lb. jam jar filled with an electrolyte of a saturated solution of sodium phosphate, the electrode being a No. 12 S.W.G. galvanised iron wire grid of the shape shown in Fig. 4. and a semi-circular aluminium plate (a fixed vane from the old type of variable

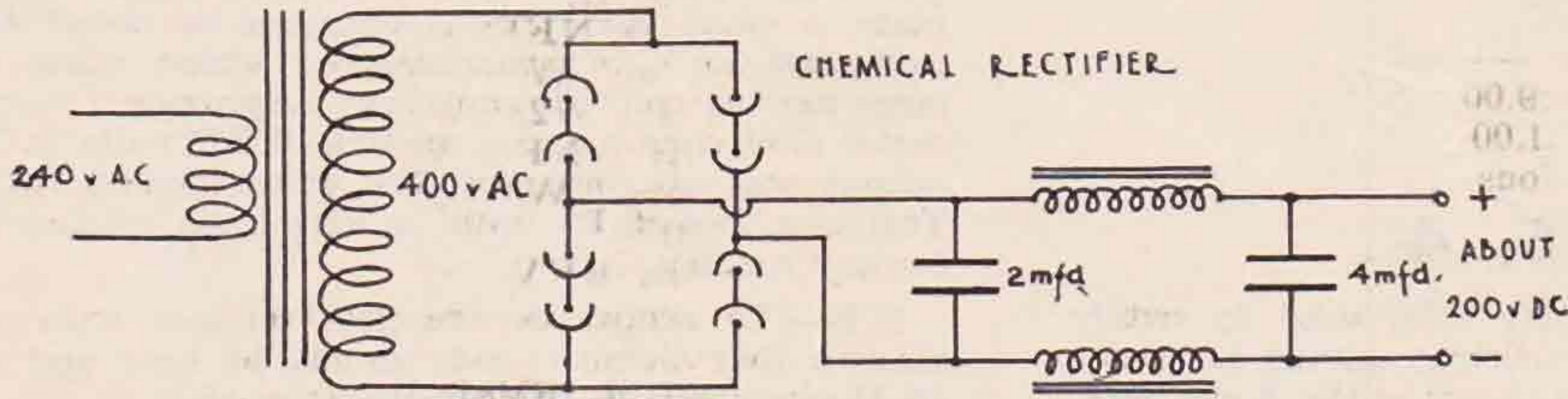


FIG. 1.

with for the transmission of C.W. (see Fig. 2). The electrolyte being a saturated solution of sodium bicarbonate, this rectifier was said to pass 60 per cent. of the applied A.C.

I next found information concerning the construction of chemical rectifiers in No. 5 of *Harmsworth's Wireless Encyclopedia*. Using four 2-lb. jam jars filled with an electrolyte of a saturated solution of ammonium phosphate with 16 S.W.G. aluminium and galvanised iron wires dipping 1in. below the surface as the electrodes, I used a transformer from which I could get 154, 182, 192, 227, 346, 409 volts applied A.C.

These voltages were obtained by using on a 100-volt A.C. main a transformer with a 110 and a 130-volt tap in the primary, and a 200 and a 250-volt tap in the secondary, as shown in Fig. 3. With 154 volts applied A.C. I obtained 125 volts D.C.

.. 227	..	..	..	..	165	..
.. 346	..	..	..	..	170	..
.. 409	..	..	..	..	220	..

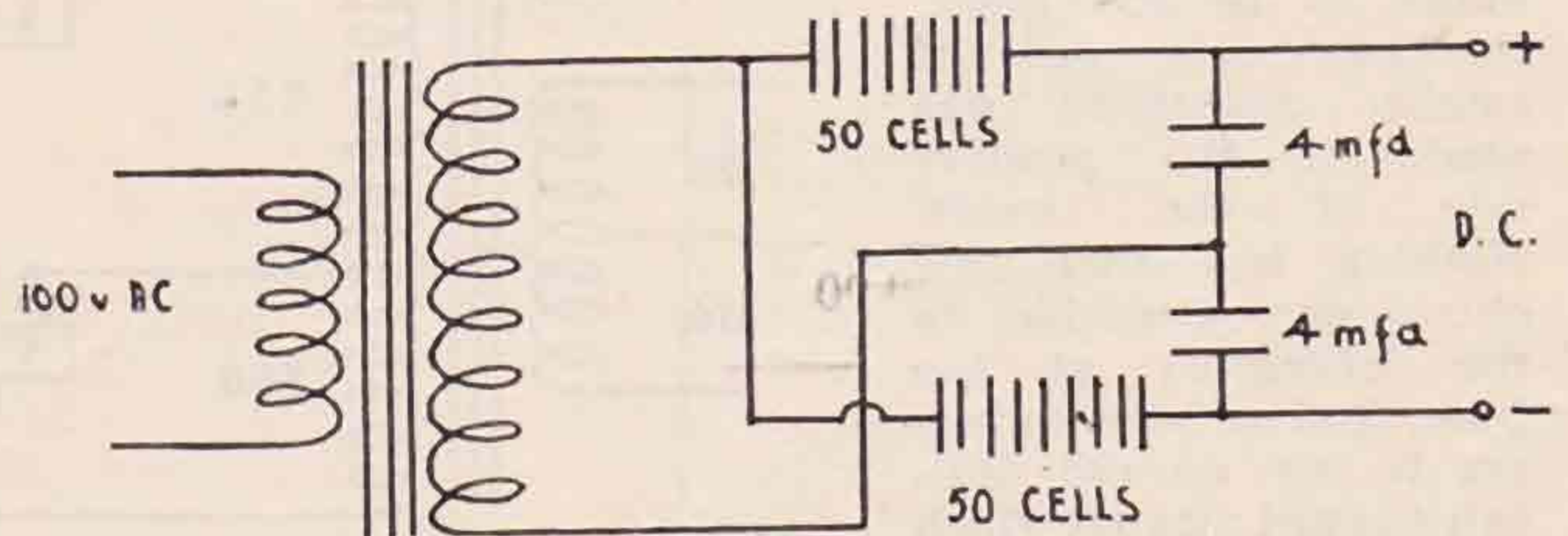


FIG. 2.

condenser). The electrodes were immersed in the liquid with only their terminals projecting, and had a separation of about 2in., some crystals of sodium phosphate being left at the bottom of the jar to ensure complete saturation of the electrolyte.

Numerous experiments were made with one cell without transformer or smoothing circuit to determine the degree of rectification obtained. On

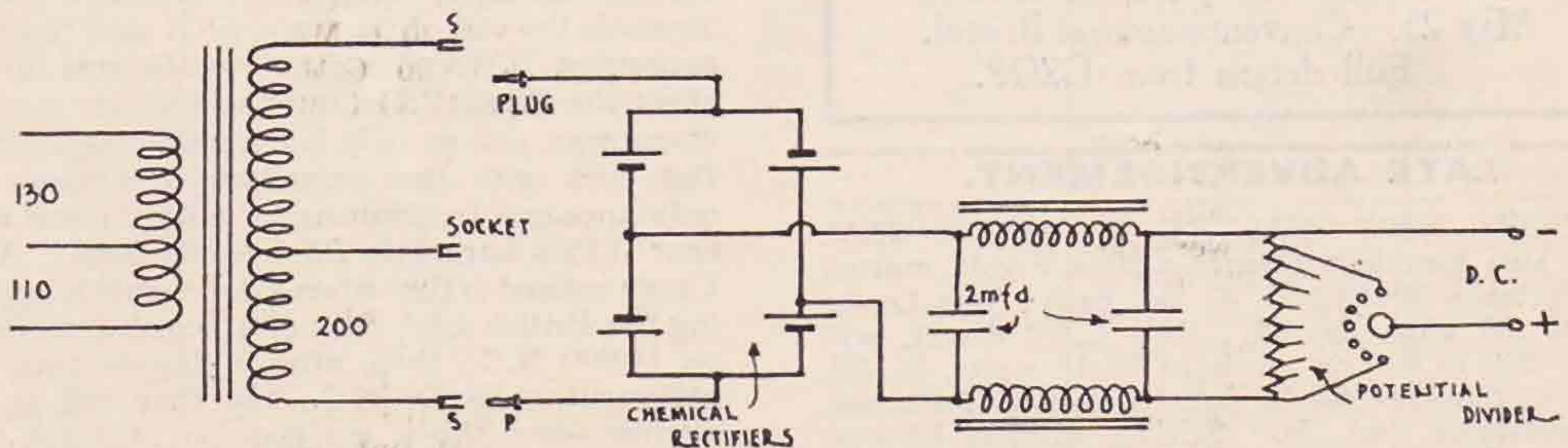


FIG. 3.

100-volt A.C. main, using one cell, a moving iron volt-meter when placed after it read 90 volts; this showed that the loss was not great in passing through the cell.

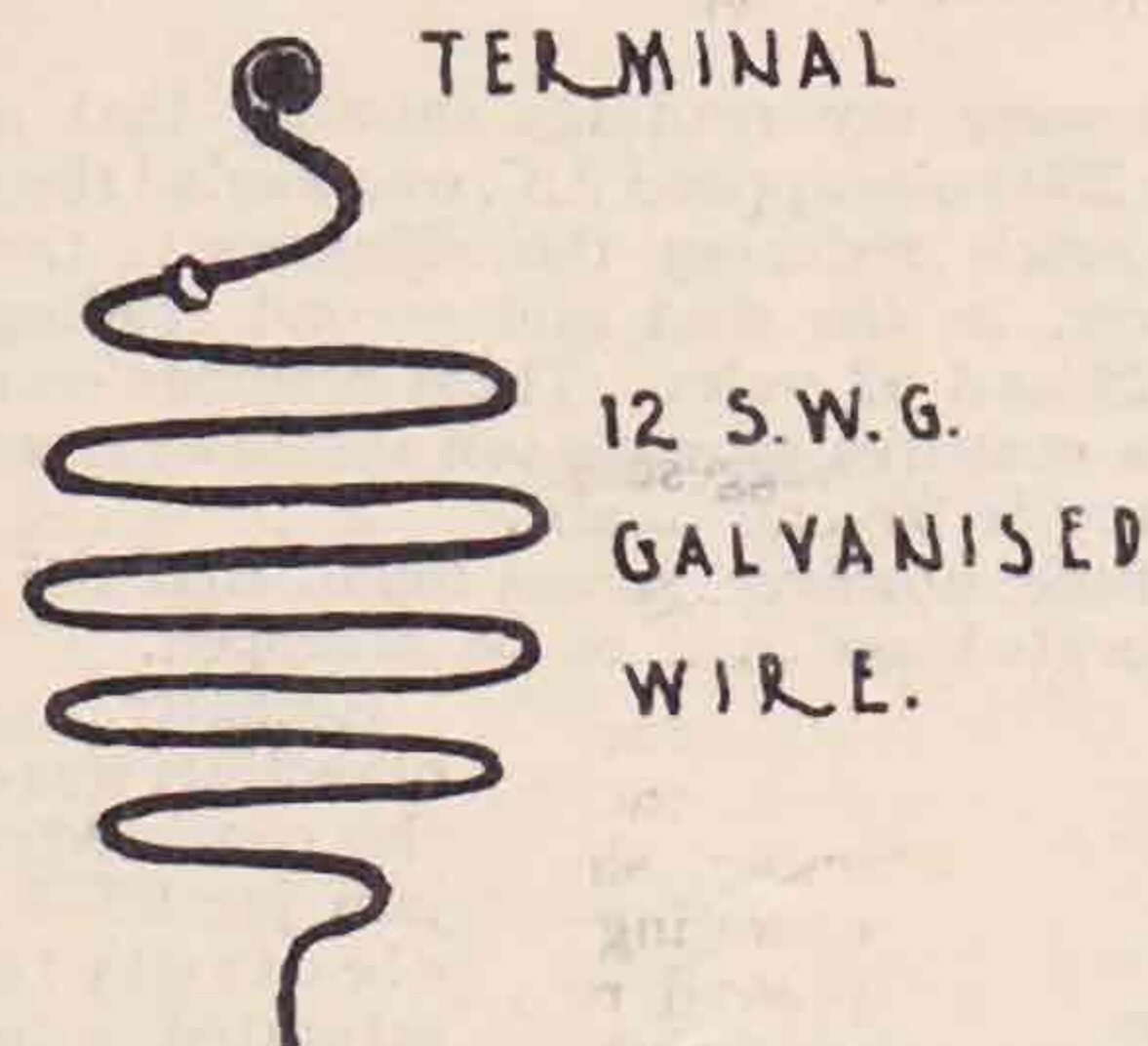


FIG. 4.

Two chemical cells were then used to rectify both phases of the A.C. current, giving full wave rectification. The circuit shown in Fig. 5 was used.

The smoothing chokes in the original circuit had each a D.C. resistance of 500 ohms; this was found to be too great, therefore only one of smaller resistance was used on the positive side of the circuit. Nothing less than 500 ohms was available in the laboratory at the time, and it was necessary to use an old indicator board magnet which gave quite good results; although this has a low in-

ductance, its D.C. resistance is also low, and these are usually well constructed of D.S.C. wire.

It was decided that with such an adaptable transformer the potential divider was unnecessary D.C. resistance, and as there is frequently considerable loss at the contact studs of the divider, this was omitted for ordinary work. Employed in conjunction with a laboratory C.W. and telephony transmitter no mains hum at all was experienced in a local receiver.

The rectifier is so efficient that it is hoped that even 409 volts applied A.C. will not overload it to any degree.

Using an old type of 4-volt radio micro (.06 amp.) receiving valve, with 200 volts on the plate, a plate current was obtained of about 45 milliamps for C.W. transmission, whilst using a large moving coil "Everett and Edgcombe" volt-meter (250 volts max.) a reading of 212 volts D.C. output was obtained for 227 volts applied A.C. This is a loss of 15 volts, a very high efficiency for any rectifier.

N.B.—To adapt the rectifier to use with a receiver four chemical cells should be used and a 40 Henry choke in the smoothing circuit.

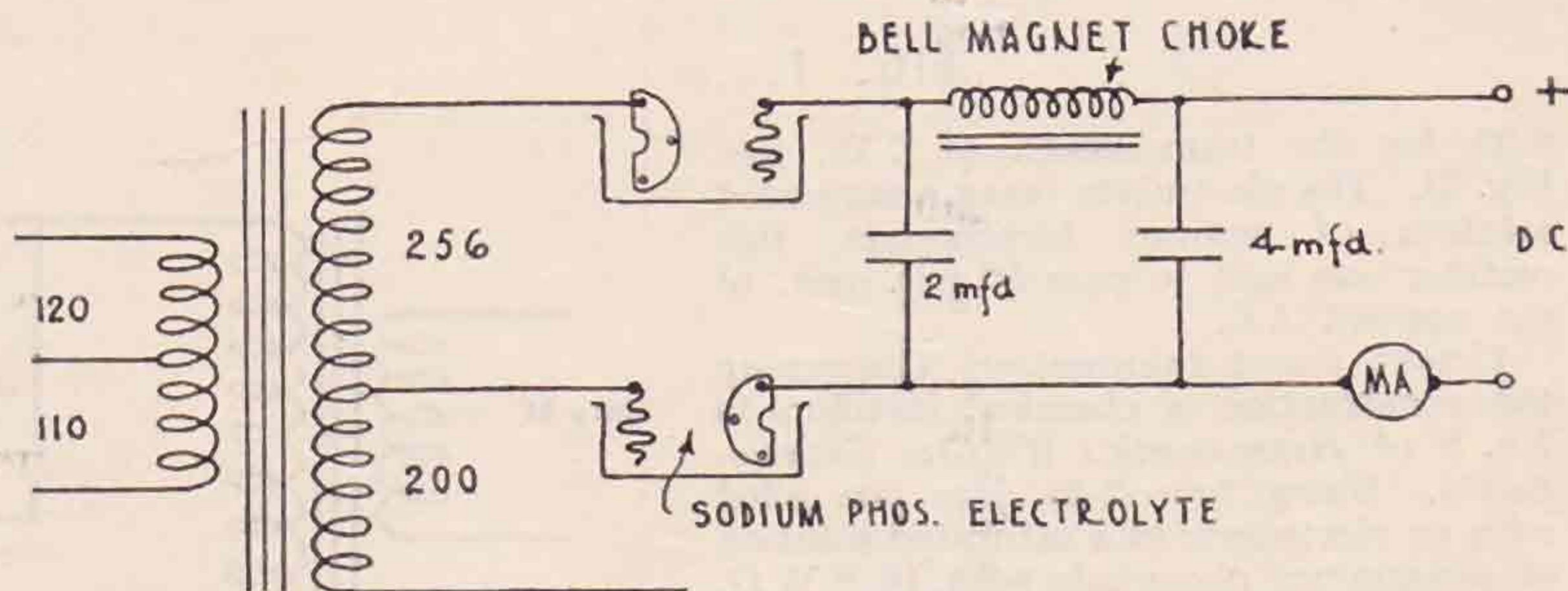


FIG. 5.

Forthcoming Events.

- MAY 24.—Lecture at the Institution of Electrical Engineers by Mr. A. Hinderlich, M.A. Subject to be announced later. 6.15 p.m., tea at 5.30.
- MAY 25.—Conventionette at Bristol. Full details from G2OP.

LATE ADVERTISEMENT.

BRAND NEW VALVES for sale at 2XV. Two American Cleartron 20/a, 5-volt, mutual conductance 00050 MO, 4s. 6d. each; one Loewe 3-volt .06 amp, 2s. 6d.; two L.S.2 6-volt, will stand 500 to 800 on anode at 10-15 watts, 5s. 6d. each, or take 18s. for the lot. Brown's A2 Phones, one ear-piece dud, 5s.; Stirling Lilliput Phones, perfect, 7s. 6d.; 100 unselected quartz Lenses, 6s. dozen..

ACTIVITIES ON 28 M.C.

(Continued from opposite page.)

had a report from 2ABK, the distance being 25 miles: this would appear to be unusual DX for the ground wave.

G6DH, writing about the weather during the tests, says: "A good size anticyclone came and settled over the British Isles, and, of course, there was ND. Towards the end of the tests, 5XX said there was a depression S.W. of Iceland which was likely to affect the British Isles, but this blighter moved the wrong way, and we only had a small secondary to it. But even with this secondary depression, which only appeared to affect us for a day, I was able to hear WIY's harmonic R5-6 on the 23rd. A thing I have noticed is that when a depression is approaching the British Isles, first of all conditions improve on 14,000 K.C., then, after a day or two, things get good on 28,000 K.C., and they end in a like manner—first things get poor on 14,000 K.C. and then, in a day or so, they become likewise on 28,000 K.C."

Activities on 28 M.C.

Another country has been worked on 28,000 kc. This time Canada, G6LL having hooked VE2AC. Come on, we'll soon work the world on this frequency.

The first two week-ends of March started off good on this frequency, but the last two have badly disappointed us, and it would appear as if the bad conditions have seriously interfered with the excellent CB tests.

VT2KT appears to be a very useful relay station for any 28 M.C. notes for Australia. He says the VK's are showing a renewed interest in this band and are trying to get over here in our mornings. ZS5U is on every Sunday from 14.00 to 15.30 G.M.T. ZL2AC has been listening for us from 16.00 to 21.00 G.M.T. according to a report from W2JN.

W9CHE is on every Sunday from noon to dark, and would be very pleased to have any reports of his sigs. W2ALN has been running an automatic sender every day on 10.6 metres from 14.30 to 15.00 G.M.T., and would like to know anyone who can listen regularly at that time.

ZLIFT is on the air every Sunday from 20.30 to 22.30 G.M.T. on 10.5 metres. D4YT is transmitting every morning and evening on approximately 29,000 kc. from now until April 25. Times, 07.00 to 08.00 and 13.00 to 15.00 G.M.T.

G6DH says he thinks best 28,000 kc. conditions occur when the barometer is fairly low and the moon about full; he forecasts good conditions about the end of March (Hi!). He has been hearing VT2KT and F8KF's harmonic. Calls heard follow.

On March 17, G6WL heard HJO R8 on two valves, increasing up to a maximum strength at about 18.00 G.M.T., when he closed down.

Calls heard on 28,000 kc. during end of February and March:—

By BRS190.—G2OD, G2CX, G5HS, G5BY, G6HP, G6LL, G6SM, NKF, W1IZ, 1RY, 1BAE, 1AQD, 2JN, 2NM, 2ACN, 2ALW, 2AYR, 2BVG, 2BHQ, 5YG, 8AXA, 9DHK, VE2AC (ZS5C?).

By BRS25.—March 3: W2JN, 2BVJ, 2NM, 2ACN, 8AXA, 2AYR, 9ETA, VE2AC. March 10: W2JN, 2ACN, 2BOK, 1ZZ, 2AYR, 2ALW, 2BHQ, 3ADM, 2BVG, 9DHK, 2WI, NKF.

By 2ABK and BRS191.—W2JN, W2KU, W2NM, on March 3. Nothing on the 10th.

By G6LL.—VT2KT, VE2AC, FVM2 (harmonic), NKF, W2JN, 2ACN, 8AXA, 2AYR, 2ALW, 2BOK, 2BHQ, 9DHK, 1ZZ, 3ADY, 4AEF, 2XAW.

By G6DH.—W2KU, 2ACN, 2AYR, 2JN, 1XAM, 8AXA, 1ZZ, 1BW, 1CMF, 2BG, 2AOL, 1AQD, 2ALW, F8KF (harmonic).

By G6WL.—F8KF, W2JN, 8AXA, 2AYR, 2BHQ, SOK, FM8EV (probably not a harmonic as he was heard working W2BHQ).

By G2CX:—W1BOH, 1ZZ, 2ALW, 2AYR, 2ACN, 2BVG, 2JN, 9DHK.

G2CX worked W2AYR on March 10, this being his first contact outside England on 28,000 K.C. His sigs were reported R3, and a report of QSA3 has also been received from W1XV. G6LL has

(Continued at foot of previous page).

CONVENTIONETTE (Continued from page 224).

but that it be regulated to the convenience of the Society's membership.

(4) How shall signal strength be given over the air?

It was decided to support the suggestion given in the Editorial notes of the March BULLETIN, i.e., use QSA followed by the old QRK strength.

(5) What attitude should be adopted towards non-members of the Society?

The Chairman suggested that every effort should be made to induce non-members to join the Society, but if such persons, after consideration, did not agree with the objects of that organisation, he suggested they be debarred from taking part in any Society function, and he further recommended that Society members should refrain as much as possible from co-operating in experiments with them.

Mr. Porter expressed regret that only one BRS member was present and urged that in future the transmitting members should personally try to interest these members in the social life of the District.

(6) Are Conventionettes worth while?

The general opinion of all present was unanimous in that such functions are essential towards creating a healthy co-operation between members.

After tea had been served the Chairman announced that Headquarters had suggested that the members gathered at the Conventionette should elect a successor to Mr. S. R. Wright as District Representative. Mr. George Woods (G6WD) was unanimously elected, and in his reply thanked the members for the honour accorded to him, but pointed out that owing to business pressure he would be unable to carry on unaided. Mr. Hartley (G6YR) was accordingly elected as Assistant D.R. in charge of the Yorkshire county.

It was later suggested that a small gift be subscribed to by the members of the District to be presented to Mr. S. R. Wright in recognition of the work he had done as Northern Area Manager during the past four years. The meeting expressed their willingness to support such a project and it was agreed that all contributions should be sent to Mr. Hartley (G6YR), 10, Claro Avenue, Harrogate, not later than April 27.

Two interesting talks were given during the day, the first by G5DA on "Crystal Control," and the second by Mr. F. King (G5AD) on "28 M.C. Operations." Both talks were followed by interesting discussions, and Mr. Porter, on behalf of the members present, accorded the speakers a special word of thanks for their kindness.

The helpful remarks made by Mr. Bevan Swift at the Northern Convention held in 1928 were well remembered and it is hoped that this Second Conventionette will be the forerunner of many to be held in the future.

The success of the meeting was shared by Mr. Porter, who so ably took over the duties of Chairman, and by Messrs. Wood and Pill, who were responsible for the preliminary arrangements.

The example set by Mr. Wright in the past will be followed up by the new D.R. and his assistant, and in concluding this short account they ask that the members in their district will support them as much as possible in their efforts to make No. 2 District *nulli secundus*.

Some Experiments Upon Zincite Oscillators.

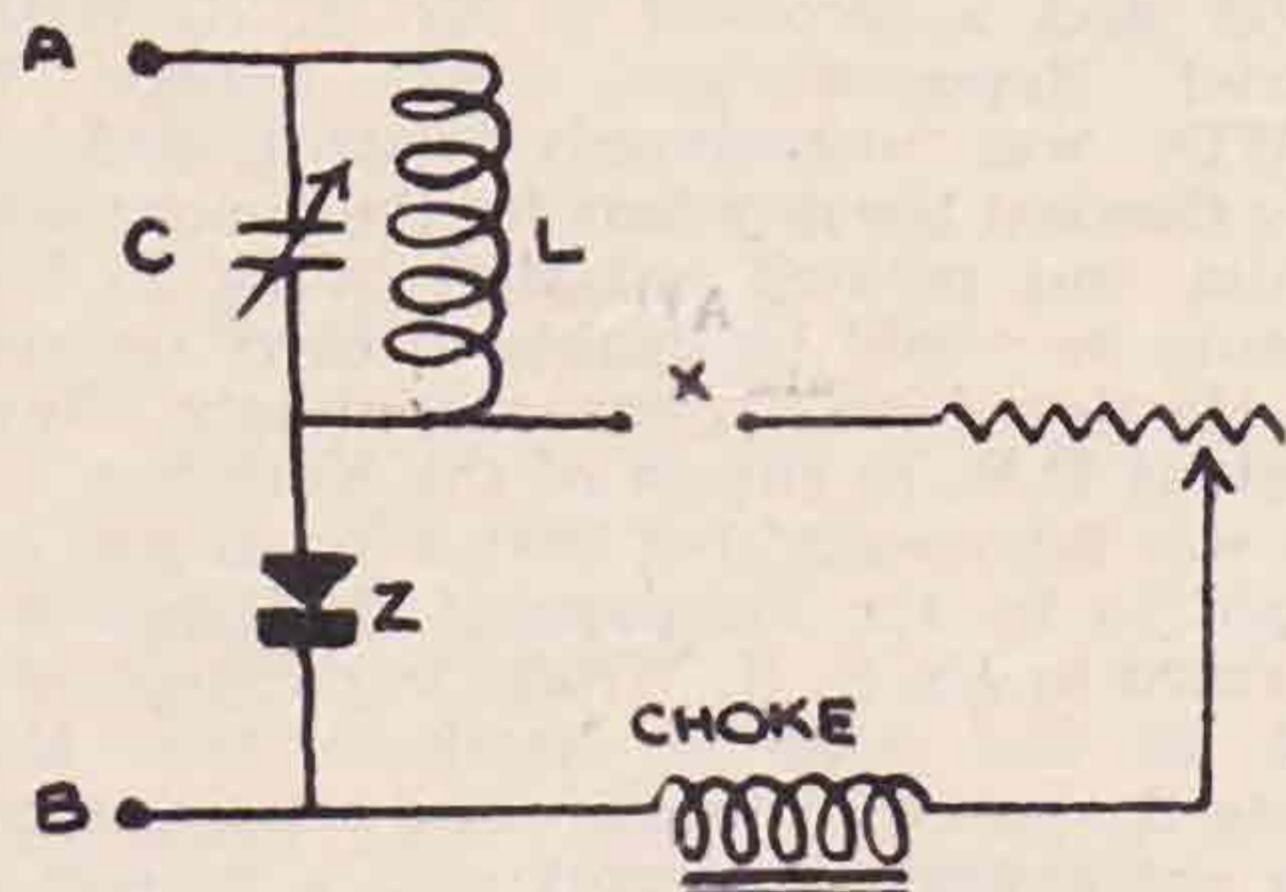
By R. L. VARNEY (2ARV).

Since April of 1928 the writer has spent many interesting hours upon a comparatively little-known method of obtaining H.F. oscillations—namely, by using a piece of natural zincite crystal in a suitably arranged, tuned H.F. circuit.

The main object of this method is, of course, to transmit messages through the ether using an almost infinitesimal power.

The circuit that was ultimately used by the writer was as shown in the figure. It will be noted that no method of speech modulation, or of interruption of the emitted wave, is shown—but more of this anon.

The actual transmitter, as may be seen, is extremely simple. The components are all standard receiving ones. The inductance L may be a suitable plug-in coil and the L.F. choke may conveniently be one winding of an old L.F. transformer. The variable resistance R should have a value of 400 ohms. In this connection a "Lissen" base-board mounting type is recommended. The condenser C may be any good make. The choice of the crystal holder is rather important and this component must be capable of easy adjustment and of remaining "set."



Indeed, the most important adjustment of all is that of the crystal contact. This operation often takes half an hour to complete—the result *may* last for a few hours, or a few seconds!

Probably the greatest difficulty of all in connection with the operation of a zincite crystal transmitter is its great instability, and, no doubt, it is this fault which prevents the arrangement from being widely exploited by amateurs.

The method of use at 2ARV was to listen to the zincite oscillator upon an 0-V-1 receiver situated nearby. When the zincite oscillator was adjusted, a note was taken of the signal strength in the receiver. A special T.P.T.G. valve transmitter was then switched on and its signal strength recorded. This was the "standard" with which the signal strength of the zincite oscillator was compared.

The input to the valve transmitter was 1 watt of pure D.C.

Both transmitters were tuned to a wave-length of 160 metres. (It has been found impossible to coax the zincite crystal to oscillate unaided under about 150 metres.) The average signal strength of the zincite oscillator was R4 to 5 (in the old

code), while the valve oscillator was consistently R9 in the receiver. However, this was hardly a fair comparison, as the distance between the transmitting and the receiving apparatus was negligible. Therefore, the writer cannot at present say whether the carrying-power of the zincite oscillator is in proportion to its signal strength at his station, or whether the signals are inaudible at a comparatively short range. In order to obtain data upon the audibility of the zincite oscillator at various distances, the writer intends to apply for permission to use a radiating aerial. If this permission is granted, a series of tests will be arranged in which listeners will be asked to send in reports upon the signal strengths of both the transmitters in order that comparisons may be effected.

In this connection, a special method of power-amplifying and frequency multiplying will be used in conjunction with the zincite oscillator. This arrangement is the outcome of experiments with the valve transmitter, and promises to be very successful.

When the zincite oscillator was used alone it was found almost impossible to key the circuit for Morse transmission owing to the fact that the variation of load thus caused was enough to throw the zincite out of adjustment. Telephony has not yet been attempted with the zincite alone. However, it is almost certain that the damping effect produced by any form of modulating system would be sufficient to cause the zincite crystal to cease oscillating.

The zincite-valve combination completely overcame these difficulties, it being possible to transmit both C.W. and telephony successfully. In connection with the zincite crystal itself, a rather curious point was noticed; it was this: Throughout the experiments the writer noticed that the "redder" the zincite crystal was the better were the chances of its oscillating. Indeed, the best piece of zincite that the writer possesses is of a dark, rich red colour.

In conclusion, the writer would say that this article has been written, primarily, as a change from the general run of articles in the radio press, and that if it has interested, even in only a passive way, his fellow amateurs, he will be more than pleased. Further, 2ARV would like to express his sincere appreciation of much valuable information upon the subject of zincite oscillators from G5UM, and of practical help from BRS72.

Reports Wanted.

In accordance with the letter and footnote on page 220 of March, 1929, BULLETIN, the following is a list of stations who desire reports from England on the subject stated:—

G6SV.—Very low power crystal control on 14,140 K.C., desires reports on quality of note and fading.

G2ZN.—Is investigating skip-distance, *particularly at dusk.*

Will all stations who desire to be included in future lists send their call-sign, frequency used and subject on which they desire reports to us by the 25th of the month prior to publication. Stations should say whether they wish the announcement to appear in a number of issues, and, if so, for how long as otherwise there will only be one insertion.

Membership.

- E. C. TALINTYRE, 133, Kyverdale Road, N.16.
 A. C. BULL (G2AU), 25, Fairland Road, West Ham, London.
 R. D. JENNINGS, 3, Cambridge Mansions, Woodland Road, Bristol.
 L. W. HOLDING, 56, Kenley Road, Merton Park, S.W.19.
 K. C. LAY (G5LY), 3, Brands Hill, Colnbrook, Bucks.
 W. MULLHOLLAND, c/o Messrs. Vickers-Armstrong, Ltd., Dartford, Kent.
 R. H. RIGG, 36, Fairfield Lane, Barrow-in-Furness.
 A. L. SLEDMERE, 60, Rue St. Antoine, Paris.
 J. A. FARRER, "The Willows," Park Road, Buxton.
 W. B. MACKRILL, 15, Courtenay Gardens, Upminster.
 R. E. JAMES, 55, Orston Drive, Wollaton Park, Notts.
 C. A. MATTHEWS, 30, Moorland Road, St. Austell, Cornwall.
 G. BEAZLEY, Boxdale, Walton-on-the-Hill, Surrey.
 G. STEPHENS, Lodge Place, Great Chart, Ashford, Kent.
 I. CLOVER, The Chase, Southbourne, Bournemouth.
 H. J. LONG, Stanton, Harcourt, near Eynsham, Oxon.
 C. J. EVERS, St. Ann's Road, Faversham, Kent.
 C. H. BOLTON, Cruckton, Salop.
 L. A. MOXON (G6XN), 5, Pembroke Mansions, Canfield Gardens, N.W.6.

B.R.S. NUMBERS ISSUED.

- 241.—E. C. TALINTYRE, 133, Kyverdale Road, N.16.
 242.—R. D. JENNINGS, 3, Cambridge Mansions, Woodland Road, Bristol.
 243.—L. W. HOLDING, 56, Kenley Road, Merton Park, S.W.19.
 244.—R. H. RIGG, 36, Fairfield Lane, Barrow-in-Furness.
 245.—J. A. FARRER, "The Willows," Park Road, Buxton.

B.R.S. NUMBERS RELINQUISHED.

- 227 (now G2ATI).—A. F. W. PARSONS, 358, Beverley Road, Hull.
 117.—G. F. WILSON, Heath House, Ossett, Yorks.
 20.—J. HOLLINGWORTH, 16, Fox Lane, N.13.

QSL Section.

BY A. HINDERLICH, G2QY.

With the exception of those for Jugoslavia and RWX, every card at the Section on March 19 was sent off during that week. Some of you may have been slightly annoyed at getting your envelope with less than the stipulated number of cards, but this was inevitable if the scandal of single cards sticking here for years was to be avoided. Instead of the normal traffic of 50 envelopes a week, ten times that number had to be dealt with.

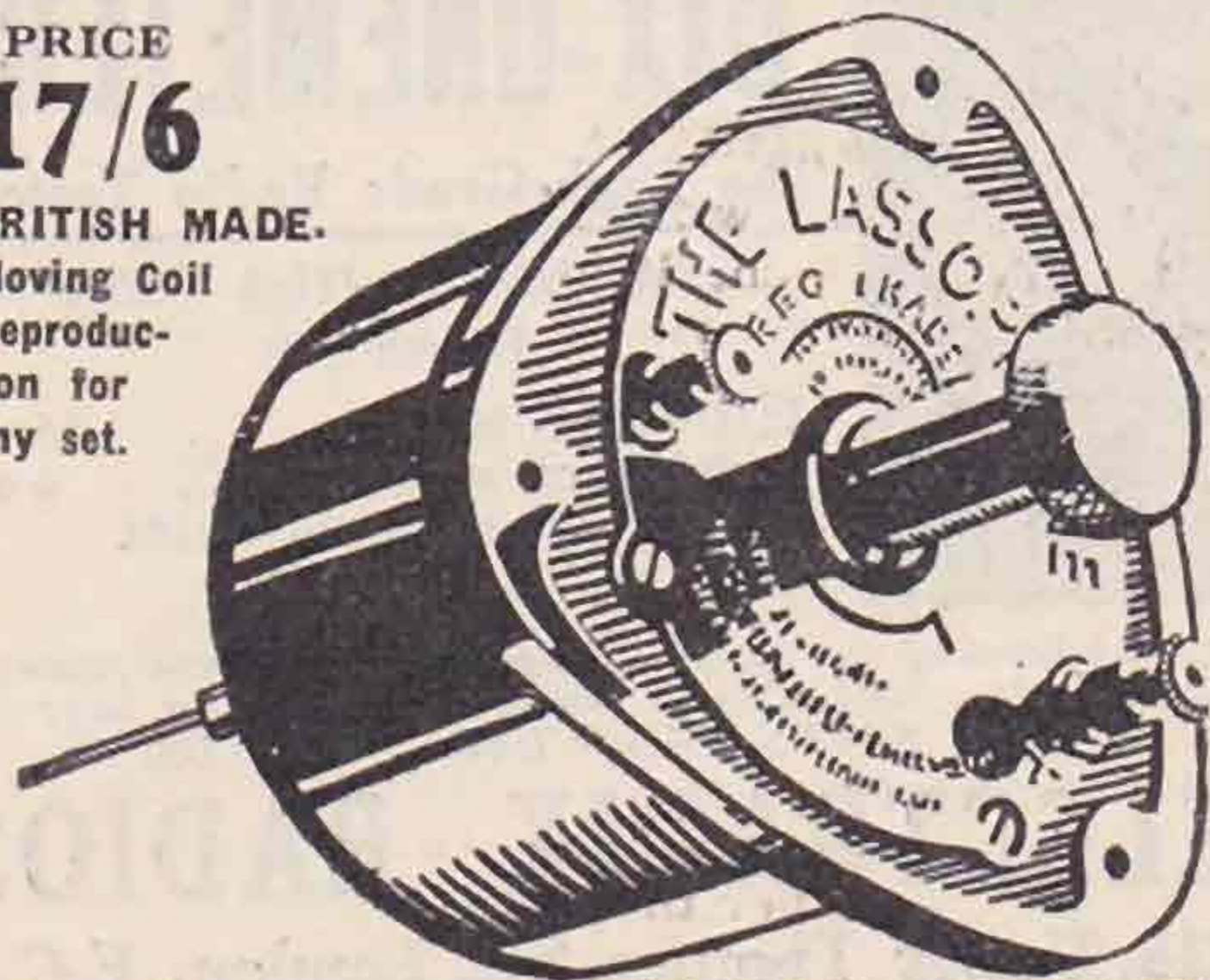
About half of you fellows copy out the addressee's call-sign on the back of the QSL card. Unless you all do this (and there is no reason why you should, as far as I can see) it is waste of time and trouble. Cards are sorted by the call-sign appearing on the front. It is this call-sign which must be altered if necessary to the new legal nationality prefix. Except possibly in the case of Switzerland (when cards are not to be sent *via* DFTV), routing instructions are now quite unnecessary. Cards for abroad go to the recognised amateur society, or if none exists, to some individual who has undertaken QSL work for the whole of his country.

It really seems as though a few owners of dud transmitters, in despair at gaining attention on their merits, have been allotting themselves illegal nationality prefixes, or have been deliberately continuing the use of the out-of-date ones, and so attracting the attention of our wallpaper-collectors. To mention only a few, AU, EU, AR, ET are illegal, while EB and EF are Spanish. There is a close analogy between collecting wallpaper and postage stamps. Any philatelist will tell you of the thousands of album-weeds in existence—forgeries, reprints, false cancellation marks, false date stamps and so on. If you haven't got a genuine EB card, you won't get one now—it'll be either modern Spanish or a pirate.

As for the Russians, they do not yet appear to have awakened to the fact that their calls are out of date. I know that a lot of them still believe that our calls start with EG. Might I suggest that if you persist in addressing them thus,

PRICE
17/6

BRITISH MADE.
Moving Coil
Reproduction for
any set.



The Latest Scientific Discovery in Cone Units

The Lassophone Triangle Double Reed Fork Cone Unit is a triumph of British inventive genius and workmanship. Reproduces all frequencies equal to a Moving Coil Speaker. Guaranteed not to overload on the most powerful set and sensitive enough to work on a two-valve set. If your dealer cannot supply, send P.O. for 17/6 direct and we will forward by return.

The LASSOPHONE Triangle Double Reed Cone Unit

Manufactured by:

H. H. LASSMAN (G. 2.P.X.), F.R.A., A.M.I.R.E.
429, Barking Road, East Ham, E.6.

RK2AI DE G2QY, it would expedite the modernisation of their ideas?

Another point. A few cards have been coming in from abroad, bearing rubber-stamps, beer-labels or slogans of a distinctly political nature. As amateurs of the science and art of radio communication, we have nothing whatever to do with politics or religion, and we consider it is entirely contrary to the spirit of amateur radio to make any reference to controversial questions that may be raised in the outside world.

The Committee have recommended that the QSL Service be free to members. Please note that, being a recommendation and involving money, this is not effective at once, but must be passed by Council. There was no time to put in the decision of Council before this issue went to press, but it will be notified direct if necessary by QSL Section.

Owing to an error in filing, I regret that a few packets of envelopes containing QSL cards for members were dropped in the letter box without being stamped.

56 Mega Cycle Transmissions.

56 Mega cycle transmissions will be made at the following times this month:—

Tues. 16 April	4 p.m. to	5 p.m.	} G.M.T.
Wed. 17 April	10 a.m. to	12 noon	
Fri. 19 April	3 p.m. to	4.30 p.m.	
Sat. 20 April	10 a.m. to	12 noon	
Sun. 21 April	11 a.m. to	12 noon	
Fri. 26 April	3 p.m. to	4.30 p.m.	} Summer
	7 p.m. to	8.30 p.m.	
Sat. 27 April	10 p.m. to	12 noon	} Times

The signal will be a constantly modulated (buzzer) wave interrupted by TEST (or ABC) de G5QB (or G5WF) at intervals. Reports should be sent direct to G5WF, 88, Ilbert Street, London, W.10.

Review of Current Literature.

WIRELESS WORLD.—The special gramophone number on March 9 contained one interesting surprise: the voltage available from most of the pick-ups on the market was given for four selected frequencies, thus disposing of a few advertising claims.

EXPERIMENTAL WIRELESS.—Congratters to G2XY on the help he gave the author of the article on the Aurora Borealis.

QRA Section.

By M. W. PILPEL G6PP.

I have received a number of letters on the subject of new QRA's being published in the "Bull" each month, and as they are, without exception, favourable to the idea, the lists will become a monthly feature.

This month I am able to publish a no-doubt much-awaited list of amateur prefixes. Every one of these has been actually heard on the air, and there are no "guesses" among them. The list, for the major portion of which I am indebted to BRS152, is still some way from being complete, and I am depending upon members to fill in the blanks, so that a really full and authentic list can appear later in the year.

QRA's wanted:—RWX, VS3GG.

ELECTRADIX BARGAINS

GRAMOPHONE MOTORS. Electric A.C. or D.C. Powerful full size Panatropé model with vertical double suspension slung electric motor with silent reduction drive. 12-in. Turntable. Aluminium frame, 11½ in. long by 6½ in. wide by 8½ in. high. Total weight 8½ lbs. Identical type used by leading Gramophone Companies. Motor wound 100 volts for use on any mains voltage with series lamp or fixed resistance. Takes 20 watts only. This B.T.H. Electric Gramophone Motor is very efficient and reliable, capable of playing two hundred 12-in. records at the cost of one unit of electricity. With a lamp resistance, the motor can be operated on any supply circuit from 50/250 volts D.C., or 100/250-volts 25/60 cycle A.C. Silent in operation, and speed perfectly constant. Every precaution has been taken to minimise wear and vibration. List price, £6 6s. Sale price, 45/-, and guaranteed O.K. Vacuo Resistance and Holder, 1/6.

CHOKES. Special offer of 30 Henry large output coupling or smoothing chokes by the Marconiphone Co., Capt. Round's design. It is a really good choke for a load of 100 to 160 milliamps. The only choke at a popular price, which can be used for smoothing where series connected filaments are used. As an Output Filter Choke it can be used equally well after a super-power valve, or several power valves in parallel. Listed, 27/6. Sale price, 7/6.

CONDENSERS. New Sterling, 2 mfd., genuine Mansbridge Condensers to 440 volts, at reduced price of 2/10 only. 6 mfd TCC, 5/6.

TRANSFORMERS. B.T.H. latest design Intervolve and various special ratios, 10/- each. B.T.H. POWER Model for 220 volt, 50 Cycle A.C. mains. With centre tap L.T. for two rectifier valve supply, centre tap L.T. for Amplifier filaments and centre tap H.T. for Anode supply. List, 65/-. Sale, 25/- only.

MOVING COIL LOUD SPEAKER PARTS. Genuine B.T.H. Rice-Kellogg CONES fitted 1½ in. Moving Coil and flexible floating leather edge with flange for fixing to baffle board. Slightly soiled, only 7/6 each. A few only Marconiphone centre-suspension CONES with brass rod to fit on magnet and with 1-in. Moving Coil at apex. 10/- each.

ELECTRO-MAGNET POTS. Marconiphone 6-volt Magnet Pots. Brand new, takes ½ amp. Just the thing for your home-made M.C. speaker. Takes 1 in. Moving Coil, 20/- each.

3-VALVE POWER AMPLIFIERS. For working direct off mains supply A.C. Fitted B.T.H. Power Transformer for 2-valve Rectifier. Resistance and Transformer coupled with Choke output. Cost £30. Sale price, £4 5s. each. D.C. mains model, 65/-. 3-Valve receivers, 27/6.

WESTON MICRO GRID-BIAS METERS. One should be on every wireless set. Sensitive Moving-coil, flush Panel Model 375 with 2½ in. dial; indicates 30-millionths of an ampere per Division for use in Grid Bias circuits for adjustment to the zero G.B. current. Excellent as Millivoltmeter, Bridge Galvo, Micro-ammeter or Heterodyne Wavemeter Indicator as needle in centre zero. These fine meters are Listed 65/-, but are offered during Sale at 35/-.

The Rolls-Royce of Radio is the 50 Range



DIX-ONEMETER

The High-Grade Radio Tester

Low Price High Value
Worth £10

Instrument in Case .. 55/-
Multipliers, each .. 6/6
Complete Radio Outfit
£4 : 10 : 0

April Edition of our Surplus Bargains in Radio and Electrical Goods ready. Send stamped addressed envelope for large sale list. SAVES RADIO USERS POUNDS.

ELECTRADIX RADIOS

218, Upper Thames St., London, E.C.4.
Blackfriars Station, Underground Railway. City 0191.

New QRA's.

- G6RM.—A. E. McFARLANE, 59, Westfield Gardens, Kenton, Middlesex.
 G6US.—N. E. READ, 53, Church Street, Oswestry.
 G6YK.—G. A. EXETER, 29, Askew Crescent, London, W.12.
 G2AAG.—GAMBRELL BROS., Merton Road, London, S.W.18.
 G2ABK.—R. C. HORSNELL, "Hepani," Guernsey Gardens, Wickford, Essex.
 G2AMP.—G. W. TODD, Armstrong College, Newcastle-on-Tyne.
 G2ATI.—F. M. PARSONS, 358, Beverley Road, Hull, Yorks.
 G2ATX.—W. P. FOSTER, 10, Queen Street, Northwich, Cheshire.
 G2AUL.—A. P. WELCH, 213, Brentwood Road, Romford.
 G2AXI.—E. R. A. CARR, 65, Eden Road, London, E.17.
 G2AYD.—L. J. KAMM, 47, Broughton Avenue, London, N.3.
 G2BLX.—SIGNMN. J. W. TYRELL, No. 2 Platoon, D Coy., Training Battn., Royal Corps of Signals, Catterick Camp, Yorks.
 G2BXD.—H. J. HORSLEY, "Blinkbonny," Brassey Avenue, Broadstairs.
 BRS29.—L. L. PARRY, 99A, Victoria Parade, Moseley, Birmingham.

Calls Heard.

Calls by: CT2AA, The Western Union Radio Club, Horta, Faya. Axores, on the 7 MC band during February: 2HD, 2AO, 2GOI, 2MA, 2XY, 2YU, 5AK, 5AQ, 5BD, 5BJ, 5BR, 5BZ, 5CY, 5DR, 5LW, 5PH, 5UB, 5UQ, 5YG, 5RU, 6AP, 6CL, 6GC, 6GD, 6IZ, 6LF, 6LK, 6LN, 6MC, 6NT, 6PA, 6PP, 6QA, 6RB, 6SO, 6UN, 6UJ, 6VJ, 6WL, 6WO, 6WT, 6XB, 6XG, 6XH, 6XJ, 6YL, 6ZA, G16SJ, G15HN, EI2B, EI8B, EI7C, GSMD, GXEB.

By G6NS on a OVI receiver. (via 2BOD).

Date.	Position.	Call	Sign.	Calling.	Strength.	Wave.
Nov. 22	Off Malta	G2AO	—	Test.	R3	40
Dec. 2	Port Said	G2BM	—	—	R4	20
Jan. 3	Near Calcutta	G5BZ	—	—	R3	20
Jan. 3	do.	G2XV	—	—	R3	20

By CT2AA between December 24, 1928, and February 2, 1929 at W.U. Radio Club, Horta, Faya, Azores.

2MA, 2GF, 2SC, 2ZC, 2YN, 5JO, 5BZ, 5BY, 5CY, 5PH, 5XD, 5RU, 5LF, 6WL, 6DG, 6OO, 6RB, 6WO, 6BR, 6HP, 6QA, 6UJ, 6XN, 6KO, 6UZ, 6ZA, 6PY, 6YL, 6WY, 6XC, EI7B, EI8B, G16SJ.

Notes and News from the British Isles.

DISTRICT No. 1.

Representative: J. C. HARRISON (G5XY), Park Lane, Burnley.

I must apologise for having missed last month's report, only I was but following the example of the majority of the district's hams! However, to those who did send in reports, my sincerest apologies.

It has been suggested that the district holds a Hamfest some time in the near future. I should like to learn the feelings of the gang in this matter. Will all interested drop me a postcard by the 22nd, and then I shall know in time for the next reports? Now for those reports:—

G2AJC is swotting hard for exams so has done very little in the radio line.

G6CA is shortly to visit W and hopes to see many hams whilst over.

BRS170 is using a pair of LS5's in a Reinartz-Zenith circuit with 120 on the plate of each in his receiver, and finds results as good as the name implies. He finds the CB DX chart very useful.

G5XD has a report from Bristol on 14 M.C., but nil else in the radio line to report. He is very keen on the continuation of the Reports Section of the BULLETIN, and says that more support should be forthcoming from active hams.

G2AHV is building the Schnell receiver described by G5QF in the BULLETIN and has high hopes of it.

G2AXN has now got his QST 1929 4-valve receiver perking in fine style, though he says that conditions have not been very good. Good luck with your application for full permit, OM!

G6QA has installed a U8 valve rectifier, which he says is FB, and is helping to waken up the 1,700 K.C. band on crystal control.

G2AUH is concentrating on Group 4A of the CB. He says conditions have perked up a little lately, though no South African sigs. have been heard on 7 M.C. yet.

Now don't forget, gang, to let me know about that Hamfest, and let's have those reports in by the 22nd.

G5C1 (ex-2BOD).—Full permit now been allowed. Low power 7 M.C. fone tests will be carried out for a few weeks. Feels great after "AA."

DISTRICT No. 2.

Representative: G. Woods (G6WD), Castleberg, East Parade, Harrogate.

NOTE.—At the recent Convention held in Leeds it was decided by the members present to discontinue Area Notes from their district. Members who require a record of their activity to be recorded may, however, forward same direct to Headquarters.

The following were received before the Conventionette:—

G6OO has worked PK4AZ twice (on one occasion with only 10.5 watts input). He is now concentrating on 28 M.C. work.

FKILM has been worked on 14 M.C. ZU, ZT, Z5 and ZE have also been worked on this wave besides RWX and five W stations. The aerial used was a half wave V.F. Hertz double feeders and parallel tuning.

G5DR has worked four new countries on 7 M.C., using 4 to 5 watts input. He is very busy with Air Ministry work at Swansea.

DISTRICT No. 3.

Representative: JOSEPH NODEN (G6TW), Coppice Road, Willaston, Nantwich.

Cheshire.

I think these reports are going from bad to worse, and it appears to me that you do not want the little information that is already given, or more reports would be sent in.

When you have read these notes just ask yourself the question, "Are you playing the game as a member of the R.S.G.B.?"

Now you have my grumble, send me a card, grumble or otherwise, so that I shall have something for the "BULL."

G2SO still standing the strain of having to keep off the ether. Many query the absence of this station, and hope for a resumption of same.

BRS152.—Not much reception here this month; rebuilding receiver and adding HF-SG valve.

BRS186 states conditions have been good on the whole. He appeals for the notes to be kept going, and also asks for a Conventionette.

BRS126 reports good 14 M.C. reception. Also found five VK stations, and AR, YI, PK, but an absence of South Americans.

2AZN experimenting with transmitter, and using 100-volt dry batteries. Report good reception on the 14 M.C. band.

G6TW.—The usual 7 M.C. working done at this station. The transmitter and receiver for 28 M.C. going strong, but I do not seem to hit on the right time for this wave working; reports will be welcomed.

SHROPSHIRE, HEREFORD, MONMOUTH AND WORCESTER.

I think these Counties intend to keep dormant. No reports.

DISTRICT No. 4.

Area Representative: E. R. MARTIN, Castlemount, Worksop.

G2AYX, a new member, would like listening SKEDS, 10-160 metres.

G5BD.—A few QSO's on 14 M.C. and NX on 7 M.C.

G5CY.—Several QSO's on 14 M.C. and Canaries on 7 M.C.

G6LN continuing skip tests, measuring transmitter efficiency and using various powers with a view to an article for the BULLETIN.

DISTRICT No. 5.

Area Representative: D. P. BAKER (G2OQ), Crescent House, Newbridge Crescent, Wolverhampton.

I am pleased to note that at last G5UW has been heard on the air once more, and we can now expect some good reports from him. Conditions on the 14 M.C. band have been somewhat unusual of late: European and G stations have been stronger than I have ever heard them, whereas signals from the States have been almost inaudible.

As usual we have a marvellous report from G5ML and most of us have a long way to go to catch him up.

S'affordshire.

Representative: F. J. SINGLETON (G5UW).

G5UW has got going in real earnest at last, and recommenced his old-time schedule with PYIAW (old SBIAW) and several Yanks have been worked at odd times on 14 M.C. Chile and the Argentine have also been worked on that band.

G6SO says he has little of interest to report, and states that he finds DX very poor on both 7 M.C. and 14 M.C. Has got a CC set working on 7 M.C. band and best work of the month was done with FM, who reported QSA4, with five watts input.

G6UZ states he has finished with work on 7 M.C. band, except for occasional QRP tests. Has done some very fine fone DX on 14 M.C. and has received several fine reports from all over Europe. 6UZ also says he has eliminated all QRM to BCL's, so that he can work on 14 M.C. during BC hours, without causing interference to anybody.

G2NV has not sent in a report for some months, and we know that he has been active, both on and off the ether.

G2OQ has done a little DX during the month and has spent some time on his keying with good results.

Warwickshire.

Representative: G5UW.

G2ZW is working on 42 metres and reports that March 13 and 17 were very good days. But in general interference on this band is very bad.

G5BJ is our old friend Brown of 6YD and BRS32. He received his permit on February 27 and has lost no time. He has a M.O.P.A. going on 7 M.C. and 14 M.C. bands. Has worked Russia, Spain, North Africa and the Canary Isles.

G5FJ has been testing crystals and frequency doubling. He finds great difficulty in getting things going except with high impedance valves.

G6CC has been building sundry wavemeters. He will be on the air on 14 M.C. by the time this is in print.

G6XJ has worked two Americans, one Argentine and a big number of Europeans. He awaits cards to confirm W.A.C.

G6XQ is welcomed as a new member. He is active on 7 and 14 M.C. bands. He is using M.O.P.A. up to power of ten watts. Reported from Russia R7 T9; Canary Isles R8. A QSO with K1CM was spoiled by very bad interference. This on 14 M.C. band.

G5ML.—On the 14 M.C. conditions have been poor from most parts with exception of South America and East Indies. DX includes Brazil districts 1, 2 and 7, Chili, Argentine, Uruguay, China, Phillipine Islands, South Africa, Northern Rhodesia, Java, Singapore, Australia, India, Syria, Iraq and W6 district. On 28. M.C. VT2KT has again been worked, W stations have not been audible during the month.

BRS29 has been standing by on 10-metre band, but has found results not encouraging. His change of QRA is noted elsewhere in this issue.

DISTRICT No. 6.

Representative: G. W. THOMAS (G5YK), 169, Hills Road, Cambridge.

Now, really, you chaps, this is hardly playing the game! You mustn't ask me to make up a lot of copy about your monthly activities, because I don't get a whole lot of time on the air, and even if I did I could find other interesting things to do than to keep a permanent watch on all bands at all times of the day to find out what you were doing. So please, when you read these notes, just get a piece of paper and a pencil and send me a few lines about your station, and get other members in the district to do the same.

G2XV has been churning out many watts in the early mornings, but with what success we don't know owing to lack of official report, Rumour has it that in London his CC spacing wave is as strong as his marker on 14,000 K.C.

At very occasional week-ends G5YX has put good signals into Asia and South Africa.

G5YK has also worked a few Asiatic and South African stations and obtained a freak report of R9 from Ceylon. Much time has been spent in rebuilding the CC set here and some really good stout coils and connections on the 14,000 K.C. power amplifier put up the efficiency.

G2HJ reports he has been too ill and busy for radio. This is the second time, so hurry up and get better OB.

2AAK has made some adjustments on his receiver and now has obtained good oscillations on frequencies above 28,000 K.C. He finds that the use of anode bend rectification in place of the more usual type is a cure for the trouble he was experiencing when using an H.T. eliminator running off A.C. mains.

Essex.

Representative: R. C. HORSNELL (2ABK), "Hepani," Wickford.

BRS144 is the only station to send a report this month. He reports DX good on 7 M.C. and 14 M.C. He has been taking fading and skip tests for G2YU. He says BRS men should drop a line to C.B. re the DX chart, which is very useful and has not had much encouragement.

BRS191 has got going on 28 M.C. and several stations have been heard.

2ABK has also done some work on this frequency and report on same is under 28 M.C. activities. Essex stations have been heard on all frequencies, but no reports.

BRS77 has been listening on 28 M.C. without much success.

DISTRICT No. 7.

Representative: H. C. PAGE (G6PA), Newgardens Farm, Teynham, Kent.

There does not seem to be any improvement in the number of reports this month, so I suppose things have reached their level.

G6LK is certainly the star station this month, and we extend to him our heartiest congratulations.

I would like to call attention to the fact that we have a 1.8 M.C. band. This might be made much more use of than it is at present. Anyone can work DX on 14 and 7 M.C., but it is not so easy on the lower frequency. How about it, some of you?

I am glad to note that the Surrey men have held a miniature "Conventionette."

Surrey.

County Representative: G2VV.

A "Conventionette" was held this month at G5WP's home at Woking. A good evening was spent discussing various subjects and examining the shack, etc. The following were present: G6GS, G6NK, G6LK, G5IR, and G2VV.

G6GS is off the air at present, owing to his mains being changed to A.C. He hopes to be on 14 M.C. again by the time these notes are in print.

G5WP is active on 14 and 28 M.C. He has taken part in the "C.B." tests, and would greatly appreciate reports. Conditions were found to be very patchy, he has managed to W.A.C. at last.

G6LK has at last got going on 14 M.C. In six consecutive days he has worked: W 1, 2, 9, PY1CM, LU3DS, VK4BB, ZS4M and Y11LM, also most of Europe, thus qualifying for his W.A.C. His transmitter is a T.P.T.G., with a current-fed Hertz aerial. An LS5 is used for all transmissions. He still works fone on 7 M.C. on Sundays. (What power, O.M.—10 watts?)

G2VV using a T.P.T.G. with a DE5, and six watts, has worked several European countries on fone on 7 M.C., CT1CK reporting R6. Using 2½ watts, he has worked fone to local Europe at R5. Very little has been done in the way of DX owing to B.C.L. trouble. The best contact with six watts has been Siberia. A very poor aerial and earth system is being used at present, but he hopes to have a half-wave "Zepp" aerial shortly.

Sussex.

County Representative: G5UY.

G5AQ is in hospital, but sends a report just the same! He has been licensed for a month and has worked fifteen countries, the best DX being Baku. His power is never more than 5 watts from accumulators or 6 watts from a hand generator. He is using a "Zepp"-fed Hertz and crystal control. He has been busy with "fade-out" period tests.

G5UY has been moving. He has erected a "Zepp"-fed Hertz aerial, has worked quite a number of European stations. He uses crystal control. The best DX was about 1,300 miles. This was at the old station. He hopes to be going again from his new home very soon.

Kent.

County Representative: G6PA.

I am almost ashamed to put in any notes for Kent, just look at them!

G2AFG has not had much time for radio lately, but finds time to drop me a card. He is contemplating the construction of a heterodyne frequency meter.

G6PA has not done much in the way of DX. However, a number of "local" W stations have been worked. He has been working on 1.8 M.C. for a change. Crystal control is used and the telephone work has met with favourable reports. He wishes a few of the clever DX fellows would come and keep him company of an evening. It is very lonely down there week evenings. He is running a sked with G2BI and has also had several good chats with stations in North Wales.

DISTRICT No. 9.

Representative: G. COURTENAY PRICE (2OP), 2, St. Anne's Villas, Hewlett Road, Cheltenham.

I am unable to write anything on the general conditions as there has been QRM in the form of 'flu at Area H.Q. There has been only one reply to my suggestion re the Conventionette. I am glad to find an increase in the number of 'phone stations on the 17.50 K.C. band as this appears to help the 7 M.C. QRM question materially. The following will be pleased to help anyone on the 17.50 'phone band: G2YX, G6UG, G5BK, G2LV, G2OP.

G6RB found February good for DX on 7 M.C. and 14 M.C. Reports DX worked VK5HG, AP9FRG, FK1LM, FK5CR, VE1DA, SADT9, PY1AJ, W districts 1, 2, 3, 4, 5, 8, 9.

G2OZ has done little and is not likely to be very active yet. (Best wishes on the venture.—Area Manager.)

G6XB has now worked three continents on his 5 watts C.C. outfit on 7 M.C. Now concentrating on Aurora Borealis week and fading tests with G6LN.

2AOK, another 17.50 'phone enthusiast, will be pleased to co-operate with any transmitter requiring help.

BRS212 is combing the QRM very successfully, having now logged ZS, ZT, ZU, VS, VK, CN, VO, YI, PK, CT2, AR, FR, CP, PY, SC, NJ, FI, VQ, VB, LU, AU, AS, VT, FQ, K4, AP, NZ, SU, VE1, 2, 3, 4 and all W districts.

The remaining stations in the district—no report, no suggestions, no anything!

DISTRICT No. 10.

Representative: J. CLARRICOTS, (G6CL), "Ciel," Hartland Road, N.11.

G6UN has worked Nijni-Novgorod on 7 M.C. This is his DX at present. He hopes to try 14 M.C. shortly.

G6PP has been on 7 and 14 M.C., the latter for the first time.

WE WANT MORE TECHNICAL ARTICLES.

No DX has been obtained, but most of active Europe has been worked. He is testing on 14 without crystal control, as he is anxious to discover whether the crystal reduces the range of his transmissions.

G6SC has, after numerous "threats," become active. His first call made resulted in a QSO with Finland, using 1.2 watts to an L.S.5. on 7 M.C. He is using the new North London standard, "A.O.G." aerial.

G5UM has been testing some special by-pass fixed condensers on 1.7 M.C. Input here is 4 watts to a Cleartron CT 25 plus. Mr. Hum has contributed an interesting article on his 1.7 M.C. work. (Thanks, G6CL.)

G5QF has "topped the bill" this month, having worked Australia and Colombo on 14 M.C., using less than 10 watts to a D.F.A.6 with Pertrix batteries as the supply. He is using a loose-coupled S.F. Hertz and a balanced Colpitts oscillator.

G6CL has been active on both 7 and 14 M.C. On the former band VE1BR was the only distant station worked, but Asia and Spanish Maroc have been added to the countries worked on 14 M.C. Some 50 contacts were made, but South America and Australasia are elusive for W.A.C. Input has been 7 watts to a Cleartron 25 plus. A 28 M.C. outfit has been made, but no contacts made yet, except with G5QF—400 yards away!

G5AD has been heard regularly, as well as G6TV, G6XN, G6DP, and G2AX, but no reports are to hand.

DISTRICT No. 11.

Representative: L. H. THOMAS (G6QB), "Conway," 66, Ingram Road, Thornton Heath, Surrey.

Reports are very poor again this month. Probably, as has always happened before, I shall receive some on the 24th and 25th of the month, but please remember, OM's, that if your report is not here by the 20th it most certainly will not go in. I can't risk having all the notes left out by holding up the whole bunch in case one more arrives.

G2CX has at last worked W on 28 M.C., with a new aerial and a new valve—an LS5D. He is rebuilding his receiver to cut down noise from bus magnetos and vacuum cleaners, and finds already that a small indoor aerial gives far better results for reception than his high outside affair. He is leaving the 14 M.C. CC outfit alone till the 28 M.C. tests are over.

G5WK sends in his first report after a year's activity, practically all on 14 M.C., and reports having worked 57 countries and worked all continents 12 or 13 times.

G6QB has hardly been off 14 M.C. this month, and most of the DX QSO's have been South Americans and South Africans. Best report R7-8 from K1CM and QSA5 from AI5VX (Ceylon). Has anyone else in the area worked SC7AA? He seemed very surprised to QSO with England!

G6WY has rebuilt aerial and transmitter and worked all continents in about six days.

G6HP has not reported, but seems to have been working everything he hears and has also worked W2AYR on 28 M.C.

G6QC sends in his first report. He has been working mostly on 1,750 K.C. and best QSO is R5 at 178 miles with 4 watts. Usual European work on 7 M.C., but reports that he cannot get out at all on 14 M.C. He wants to see more work on 1,750 K.C.

BRS25 has had a fairly active month, and is interested chiefly in 28 M.C., where he has logged 34 W's and VE2AC. He believes he is the first G station to log Canada on this frequency. He reports G6QB's 28 M.C. CC very F.B., but unfortunately G6QB was on 7 M.C. CC at the time. Hi! Some strong harmonics round Thornton Heath, OM!

BRS240 sends his first report; he has been observing causes of fading and reports receiving FVM2 on 14 M.C. He has a QSL from 3LO with the autographs of the English team on the back. He wants someone to co-operate with him in observing fading on 7 M.C. band.

It occurred to me that something in the way of an area competition might have the effect of stirring things up in District No. 11. I suggest, if the District as a whole approves of the idea, that some small sort of memento (provided by me!) be awarded this month to the station who works the greatest number of different countries or protectorates in the British Empire during the month from April 18 to May 18. Area Representative's decision to be final! Next month we will think of something that gives the low-powered men a chance. Please let's have opinions on this scheme. Perhaps someone will volunteer to provide a small prize next month.

And, finally, please report by the 20th.

DISTRICT No. 12.

Representative: L. J. FULLER (G6LB), 13, Seagry Road, E.11.

G6UT reports further QSO's with VK, but cannot raise W. He has worked the Dutch ship, XPAOJA while off Dakar (Africa). All work on 14 M.C.

G2ZN is still using super QRP— $\frac{1}{2}$ watt—and is trying out an end-on Hertz. He reports little difference in the results obtained using any aerial as they all give R3-4 at 400 miles.

G6LL has the honour of making the first two-way contact with Canada on 28 M.C., having worked VE2AC. Apart from this and a good deal of DX on 14 M.C., he reports nothing doing.

G5AR reports that trouble with his gas engine has caused him to be inactive for some time, but hopes to be on soon.

G6FY is going on 28 M.C., but has not QSO'd anyone. A test on this frequency with G6LB produced no results. He is still doing 3,500 K.C. CB tests.

G2NU reports great activity of W stations on 1,750 K.C. from 03.00 G.M.T., and says that they are easily worked on 40 watts.

G6LB has been busy receiving on 28 M.C., but has only heard W2JN and several London stations. He is working a listening schedule with G6FY.

DISTRICT No. 13.

Representative: H. V. WILKINS (G6WN), 81, Studland Road, W.7.

The month of March seems to have brought better conditions, at least as far as 14 M.C. is concerned. Judging by the few reports received, it seems to have been possible to work the world on this band in less than twenty-four hours.

G6VP finds 14 M.C. good, but not up to last year's standard. He also has found that the DX has been in quite different directions to last year. He has been QSO ZS and PY or ZS and CX practically every night. In all he appears to have worked one Mexican, two Argentine, four Brazil, YILLM six times, AI5VX (Ceylon) twice, several Z's, a few VK's and others too numerous to mention. In fact he was QSO all continents in 36 hours. (FB, OM!) He is using a 25-ft. vertical indoor aerial and says he will never use another. He uses a full-wave voltage-fed old-type Hertz with feeder length control and finds it gets out better than a Zepp. Has also managed to knock some of the chirp out of his note, but is still troubled with high filter no-load voltage.

G6WN has managed to raise most of Europe on CC using 14 M.C., and raise Syria once. Most of the month has been spent on 28 M.C., but so far no luck with a QSO and no reports. The CC circuit has been changed from the G5YK method of frequency doubling to the more conventional one, and results seem to be much better.

G2ARV is busy with CC in anticipation of the full permit. He finds half-wave valve rectification much easier to smooth to produce a good DC note. T.H. has been a trouble lately, but ceased on changing the valves. He has been using old BE tubes in the rectifier, but finds it expensive putting in new ones each week. Hi! He thinks it would be a pity to lose the Area Notes.

BRS 15 found 7 M.C. bad, 14 M.C. good, and carried out several tests on this wave. He has heard 16 stations on 28 M.C., one using five watts only over a distance of 4,000 miles. Conditions, he says, are improving on this latter wave.

Station visits: G6JY and G6CO to G6WN, and G2NU to G6VP. Drop me a line and come along, OM's Area Representative.

DISTRICT No. 14.

Representative: J. WYLLIE (G5YG), 31, Lubnag Road, Newlands, Glasgow.

February has proved quite an eventful month for No. 14. On February 27 there was a record gathering of Scottish stations at 5YG, when the following were present: 2MA, 2MG, 2FV, 2IA, 2WL, 5XQ, 5GK, 5NW, 6KO, 6NX, 6WL and 6WZ. This represents the first occasion on which Scottish transmitters have been able to get together in any large number, and a most enjoyable—if somewhat crowded—evening was spent. I was particularly pleased to welcome 5GK, 5NW, 6KO and 2MG, the three former coming down from the North in very foul weather, which argues heavily for their enthusiasm. 2MG was also specially welcome, as his visit coincided with a recrudescence of his transmitting activities after some years of silence.

Our London representative, Dr. Morrison (5ST), on receiving an appointment in Glasgow, indicates the necessity for his retirement from his committee post. While we are sorry to lose him in this capacity, we shall be very glad to welcome one of the "old hands" amongst us once again, and look forward to having the merry "tweet tweet" from Kilbarchan shortly after Easter. Concurrent with Dr. Morrison's resignation from the Southern post comes 2WL's resignation as District Officer of "A" District. Mr. Wilson has received a business appointment in London and leaves for that village on March 22. We are all very sorry to lose him, and I particularly shall miss him, as his services have been invaluable to me in many ways. However, "It's an ill wind, etc., etc." for Mr. Wilson has agreed to take over from Dr. Morrison, and will in future, act for us in London in the capacity of Committee Representative. I am sure we wish him every luck in his new sphere of activity.

That will have to do at present or Mr. Editor will "climb on my roof." In passing, however, may I say that 5YG is now W.A.C.

"A" DISTRICT.

Representative: A. T. WILSON (G2WL), 206, Newlands Road, Cathcart.

2MA has been pretty active all month. He experimented with a Zepp. aerial, but found 6YW's V.F. $\frac{1}{2}$ -wave Hertz much better. He was QSO W, FM and Azores during the month while on 7 M.C. The 14 M.C. band will be used in March.

2MG got started up with his TX, but found the grid and filament of his 0/40 rather too affectionate, thereby causing a dirty, shaky note. The "bottle" has gone for repair.

2FV is known to be rebuilding for crystal control.

2IA has not found time to start up yet.

2WL has built a new TX, and screened grid S/W superhet, and is busy getting his gear together for the trek south.

5XQ is presently engaged in the construction of a new split Hartley TX.

5YG has now got going with D.C. filament supply, and is getting T8 and T9 reports from all over. NX1XL and Asia have been worked several times during the month. The station will be on 14 K.C. till July.

6NX has been on 14 M.C. all month, but does not find the band any too good yet. He comments on the curious fact that every test call he sends out "raises a Russian." Hi!

6WL was privileged to visit 6LL during the month, and would desire to express his thanks to that gentleman for a most interesting time. He is rather badly smitten with the 28 M.C. fever, and is putting in a lot of time with the RX on this band.

6WZ is at last getting his TX gear together and expected to be on the air before March is out.

"B" DISTRICT.

Representative: E. G. INGRAM (G6IZ), 20, Cairnfield Place, Aberdeen.

2AP is known to be on the air but has not reported.

6VO continues his sunrise tests and proposes to give up DX in favour of concentrated work.

5JK is not comfortable regarding his source of H.T., finding his band generator much too heavy. He is investigating other sources of H.T. and will be on the air shortly.

6IZ has built a new S/W RX, which produces 5SW and 2XAF on the loud speaker with 6-v-1. He is presently using a harmonically crystal-controlled TX, and is getting satisfactory reports. Tests are at present being made with a new aerial.

"C" DISTRICT.

Representative: J. B. STURROCK (G6KO), Kirkbuddo, Forfarshire.

2SR reports work on 28 M.C., but, like not a few others, has not effected a QSO as yet.

5GK rebuilding for CC.

5NW is thought to be working, but has not reported.

6KO is getting considerable satisfaction from his new CC TX, his best DX with it to date being Palestine. Will be working on the 14 M.C. band during April, May and June.

BRS158 reports work on 28 M.C. band, but has not managed to log much so far.

DISTRICT No. 15.

Representative: H. ANDREWS (G5AS), Wireless Depot, Ystradgynlais.

No reports to hand for this month and I wonder if the weather has sent them all holidaying.

G5AS is off the air for a time due to change of QRA, but hopes to be on again by the time these notes are in print.

Now, OM's, what about a pow-wow. We are arranging a gathering of District 15 hams for Whitsun and I shall be pleased to hear from all as to where it shall take place—either Cardiff or Swansea—and when.

DISTRICT No. 16.

Representative: C. MORTON (GI5MO), "Simla," Glastonbury Avenue, Belfast.

Conditions for DX appear to have been fairly good in Northern Ireland during the month, and 14,000 K.C. is improving greatly as the days get longer. A few more GI's are now working in the 14,000 K.C. band and find it a relief from crowded 7,000 K.C. band.

GI6WG has not had much time and only worked Europeans on 14,000 K.C.

GI5WD has been entirely rebuilt, this having occupied most of the month. A few W contacts were made on 14,000 K.C.

GI6YW is still working on 14,000 K.C. and managed to QSO Canada again.

GI6QD has got going again, and has been QSO Finland, Roumania and NX1XL, and has a schedule with Hong Kong. He hopes to be on fone on the 1,770 K.C. band soon.

GI6HI has worked AU7AS (Tiflis) in 7,000 K.C. He has got his receiver going now on 28,000 K.C., and hopes to have the transmitter going soon on that band.

GI5HN has started on 14,000 K.C.

GI2CN is only on at week-ends on 7,000 K.C. and has not done much. He has his receiver going now on 28,000 K.C.

GI5MO has been working on 28,000 K.C., but so far without result in the way of contacts. The aerial is being changed from horizontal to vertical at present.

Channel Islands.

Representative: A. M. HOUSTON FERGUS (G2ZC), La Cotte, St. Brelades, Jersey, C.I.

The past month has again been very full of blanket effects, in the mornings, though, as in previous years, as the end of the month approached, these gave way to either normal or ordinary fading conditions.

The other stations are still inactive, but by following out the advice of G5MU and G6PP, I (G2ZC) have found that I am getting more efficiency with harmonic C.C. on a smaller input than ever I got without the crystal, as all schedule stations worked give better and louder reports, and on only two times has an attempt been made after dark to work further away, and in each case the

station called at once replied and gave good reports, one being Hungary (a new country) and the other Leningrad.

We think the "New QRA" list is well worth publishing, and hope it will be kept as a regular feature.

Africa.

By G. G. LIVESEY (3SRB).

There is not much to report for these past two months. I am very sorry to hear that A4Z—our well-known friend Streeter—has resigned from the League, but I am sure there is some very good reason for this.

The League loses the best amateur in its ranks.

A7Q has done good work lately, having got his W.A.C. He has had R4 and six reports from S.B. and S.A. on his fone. Transmitter is a "Baby Burgess," 440 volts D.C. to a B.T.H. 12.

A5L is doing DX on 20 metres—G, F, and W, also AH-3AB. He is using a DET/1 valve, with 36 watts input.

A3F was QSO F-8JF on 40 metres, using only 20 watts. It is not easy to work with Europe on the 40-metre band unless 100 watts or over is used.

A9Z and A8N are inter-working successfully on 10 metres.

A7D's 10-metre transmission has been heard in U.S.A., and he is awaiting more particulars from W2JN.

B7D has been getting good results on 20 with an LS5. FK5MS, FK-1LM, and AI-5VX. On 30 metres OA5CM and W. He reports that on December 29 at 16.00 G.M.T. he was QSO A9L at R8; ten minutes later A9L reported that B3D's signals had faded right out. At 16.30 G.M.T. A3T called CQ, B3D replied, but A3T said that he was too QSS to copy.

(An example of the erratic conditions here, 3SRB.)

A8L has built a new receiver for S/W—a 1-V pentode. 5SW comfortably on L.S.

He has inserted flashlamp bulbs as fuses in both H.T. grid leads. (Why in the grid leads, 3SRB?) and finds that when working on the broadcast band with plenty of static about, the pentode L.F. valve blows the fuses at every heavy static discharge. Who has had similar experience, or can explain this?

B3K sends in following report of stations heard on ultra high frequencies:—

AGA, Nauen, 13 metres; AGK, Nauen, 13 metres fone; G5HS, 8 metres; WLL, 9 metres; W2XS, 10.5 metres; SPU, 11 metres; W2BJD, 10.25 metres; W2JN, 9.9 metres; W2AYR, 8 metres;

G6LL and G2KF heard calling Test on 10 metres. KDKA on 14 metres heard occasionally.

BRITISH EAST AFRICA.

By L. J. HUGHES (FK1MS).

Little news here; no intermediate or prefix has yet been assigned by the Authorities, and all queries addressed to them about the 1929 licences are at present being treated with discreet silence.

RHODESIA.

Division 7. By 3SRB.

Nothing has been vouchsafed as yet concerning new prefixes, and no mention at all concerning 1929 regulations, such as wave-lengths, types of wavemeter, etc.

However, considering what very obliging P.O. authorities we have here, they can rest assured that no one is the least likely to break new regulations. Favours should have favours returned. And quite apart from any necessary regulations, we could not have a more benevolent P.M.G.

The P.M.G. is apparently considering the erection of a broadcast station in S. Rhodesia.

I, and presumably other licensed stations, received a letter from the P.M.G., asking for information on broadcast received from J.B. and also 5SW England, how good it was, etc. Also to what extent one was troubled with fading static and other things. A number of other technical questions, *re* apparatus in use, antennae, etc., were asked.

Probably, if our various reports are considered satisfactory, the erection of a station may go forward soon.

I advised erection in Gwelo (the centre of the country) and a power of not less than 5 kilowatts, to combat fading.

Irish Free State.

Representative: COL. DENNIS (EI2B).

It is remarkable that whilst conditions on all bands are universally reported as very poor, over here many G stations seem to be getting excellent DX reports on inputs of 15 watts or so, although EI stations, with inputs up to 10 watts, do not appear to be getting out well. Our DX reception has also been markedly inferior to that in England, many stations which are strongly received in England being barely readable here. At the writer's station D and E stations still come in well all night, whilst for nights on end not a single American station is heard. Judging from previous results obtained, I do not think that this can be attributed to inferior apparatus.

I am glad to say that EI2B, EI8B, and EI7C have been granted temporary permission to use the 28 M.C. band during the present

tests. In the writer's case, however, the permission arrived too late to enable full use to be made of it.

Many stations appear to be only very occasionally active, but reports have been received from EI8B, EI7C, and EI4D. Of these EI8B has worked U.S.A. several times on 28 M.C., getting reports up to R7 (old code) with 8 watts input; also FK5CR on 14 M.C. and NX1XL on 7 M.C., whilst EI7C has worked W2JN twice and raised W2AYR on 28 M.C., though in the last case fading prevented a QSO. Input 9 to 10 watts. On 14 M.C. his best were AQILM, RWX, a ship at Port Sudan, and VT2KT, the last on an input of only 5.5 watts. EI2B's best were Crimea and Azores.

Notes and News from Europe.

Belgium.

By PAUL DE NECK.

On the 7,000 K.C. band work is, as expected, hampered by heavy QRM, and a DX contact is a difficult task. ON4EA on this band made the first contact between Belgium and the Isle of the Réunion, East of Madagascar.

The 14,000 K.C. band is the real long distance wave and gives very good results. ON4AR4RO, ON4AR, 4RO, 3EW, 4DI, and others have worked Java, China, and South America. ON4EW made the first contact between Europe and the Ascension Island.

The contacts with the training sailing ship XEB4WK have been a real success. QSO's were obtained daily, with the exception of four days, when the ship was in the Antillians seas, just before arriving at Tampa.

We hope in our next report to be able to give some results of the work accomplished by us on the 28,000 K.C. band.

Czecho-Slovakia.

By L. VYDRA (OK2YD).

No interesting results were obtained on 7 M.C. DX was not heard as regularly as during March, 1928, whilst W stations were almost inaudible on most evenings. Increasing interference is occurring up to the time of fade-out and good QSO's are rare. The Russians are the prime cause of our local interference, and we shall be glad when they convert to D.C. notes. DHE is a bad commercial offender in our band.

The 14 M.C. band was very active and all continents have been heard during daylight. North America was the weakest spot and then South America. Contacts with G stations were excellent from 05.30 until 18.00 G.M.T. For an hour after this all G's disappeared, but about 19.00 G.M.T. several were heard, but weaker than during the daytime.

Much confusion exists due to the various British Possessions not officially deciding on their new call signs. We note that VU, VQ, VT and AI are all being used in India. With South Africa we have ZS, ZU and ZT, which is correct?

On 28 M.C. very little has been achieved. During the CB tests conditions were dead, for four days after this period W stations were logged but no Britishers.

Denmark.

By HELMER PETERSEN (OZ7S).

Conditions generally were the same as noticed during the corresponding period last year. There appeared to be no consistency from one day to the other.

On 7 M.C. conditions were generally poor, during daylight only a few local stations could be heard and at night time conditions were very little better. Southern Europe, Western Asia, North Africa and Ireland were the most regularly heard. These countries seemed to be well received in England and Germany also.

The 14 M.C. band is easily the best at present and almost every distant country can be heard at good strength, excepting the North Americans, who were, on the whole, rather weak.

On 28 M.C. very little progress has been made, the only Danish station to be heard in England was OZ7T by BRS152. We would mention that the North American stations have not yet been heard, but we hope that before our next report several good contacts will have been established.

Germany.

By E. REIFFEN.

DX conditions deteriorated on 7 M.C. towards the end of February, and the best time for trans-Atlantic work is now in the early hours of morning. Little is to be heard on 14 M.C., but ZS stations come through well at about 17.00 G.M.T. Unfortunately no 28 M.C. work was reported during February.

On 7 M.C. various QRP stations had a large number of DX QSO's. On 14 M.C. DX stations have been heard almost exclusively on Sundays.

Since the 10 M.C. band has been closed to amateurs few ZL's have been heard, but a few are working on 7 M.C., and recently D4DKF connected with ZL1FW at 18.30 G.M.T.

More D stations have lately gone over to CC, notably, D4AU, D4BY, D4ABR, D4CS. We are pleased to be able to report that the number of stations using T1-4 is steadily on the decrease. (The German section has forbidden its members to use T1-2.) The tendency among D stations is to use greater power.

France.

Is it the result of the frost, or of QRM, that French stations have hardly done any DX during January, 1929?

On 32 metres there is evidently nobody left, but on the contrary there are far too many on the 40-metre band, and every night there is a horrible salad! Only the American stations stand out prominently, but soon QRM will render their reception difficult if not impossible. In the mornings a few New Zealanders and Australians may be heard, but not the good DX of heretofore. The reception of AUTRK (Turkestan) by 8MST and 8KV should be mentioned, as also reports of FPCAI (Kerguelen Islands) though no QSO with the latter has been effected, in spite of the many attempts and promises of prizes.

On the 20-metre band the situation is better as the QRM is less. The activities of the REF stations are tending towards 10 metres; F8AAP, 8CT, 8JT, and a few others transmit regularly, and 8BU (late ROIO), 8JN, 8KV, 8WC will shortly be starting. The chief of the Oceania section of the REF (OOBAM in Tahiti) is also getting ready. At the moment there is hardly anything to report except a few QSO's between 8CT and the U.S.A., and numerous reception reports. 8RRM, who listens regularly, hears chiefly Europeans and harmonics of W1K, and 8JN receives at good strength harmonics of W1K, W2JN, 1CPB, 2ALW, 8GG.

Fine weather will soon return, and with them, we hope, activity will be resumed by French stations on all bands. Many are taking advantage of the pause to modernise themselves so as to do better work in the future.

Holland.

By J. H. KOEN, M.Sc.

The month of February brought no good conditions for real DX work. Only on some afternoons 14 M.C. gave a chance to work some distant stations.

The 7 M.C. band still suffers from too many bad notes, and we wonder how it is possible that many stations are able to radiate some noise produced by modulating something like raw A.C. with speech, and that people insist on calling the "fone." Of course, there are some real fone stations left, but they are very seldom heard. We think that for serious DX work on the 7 M.C. band it will be a good thing to cut that band into two halves, the upper half, say, for Europe; the other half part, say for the rest of the world, for it is a hard job to cross the pond on evenings when Yanks are heard jamming each other with QSA4 strength over here. We wonder what kind of radio "heaven" U.S.A. is with their big collection of transmitters. Experiments on 28 M.C. gave poor results. Only PAODU seems to have a fine week-end QRA for reception on that frequency, and often has a log of eight to ten Americans and Canadians on one Sunday afternoon.

Roumania.

By C. BRATESCU (CV5AF).

Roumania is a backward country as far as short-wave activities are concerned, because of the laws governing radio-electric stations. Thus at the present time only three or four transmitting stations are working. In 1927 and 1928 there were many stations working that have now closed down.

Firstly, ER5AA (the first Roumanian amateur) who had communications with the five continents. He declared that after working the world he had no more interest in continuing to experiment!

Then ER5AB, who made the first attempts at telephony in this country. He was the director of the principal review, "Radio-Roumain" which, since then, its weekly appearance has become "weaker" until it now appears only once a year. He has also worked under the calls ER5RR, ER5SS, and RQ2AA.

None of the above stations are active at the present time. Lastly, there is CV5AF, who, on the other hand, can be heard almost every day, and whose transmissions are well known all over Europe. CV5AF, using two receiving valves in the transmitter, has been given R4 by W4AAQ in Montgomery, Alabama.

CV5AS at Craiova, makes a few experiments on key and 'phone. At the moment there is no society in Roumania, either for transmitters or receiving stations, but a little weekly paper called "Radio" is starting a Radio Club of Roumania (R.C.R.) I have written to the Editor, proposing, among other things, an ultra-short-wave section, so as to start a network of receiving stations and eventually of transmitters. I am trying my utmost to further the progress of short waves in our country. I will report progress every month. My efforts are limited by the laws at present in force.

During my QSO's with British stations I have had very good QRK, but I must complain of the non-receipt of cards from some of the stations. In view of the distance between us, I much prefer to QSO a G station, so why not let me have your card? As your correspondent for QSL cards, I pass them along immediately and safely to all the other Roumanian stations.

Our local broadcasting station at Bucarest has been received by an amateur at Liverpool. So our country listeners are advised to emigrate to Liverpool, as they cannot hear our tiny broadcasting station at a short distance from the town. In a couple of months our large station at Baneasa (just outside Bucarest) is expected to commence testing.

We hear enormous numbers of EU and AU at all hours, mostly using A.C., between 45 and 41 metres.

Correspondence

GRAMOPHONE PICK-UPS

To the Editor.

DEAR SIR,—In reply to the letter by Mr. N. B. Bligh dealing with my article, owing to the cost of producing diagrams in the BULLETIN, one of mine was not printed, viz., a circuit and ratio couplings. The Editor, being a wise man, did not imagine (nor did I) that it was interesting to readers. I will explain the technical part of a pick-up or any gramophone recording sound-box.

(1) When a needle is traversing a record, the so-called scratch or rustle is produced by the needle touching the walls; this gives us a horizontal vibration to the needle.

(2) The sound waves on the record, what the trade call hills and dales, will give a perpendicular vibration to the needle.

(3) We now have two distinct motions, the first at an even frequency, the second motion at uneven frequency.

(4) The "scratch" is a very light vibration and may be damped right out easily by making the needle holder and the "reed" across the magnets practically rigid.

(5) We now have left, the perpendicular (sound) motions remaining, but damped down (40 to 50 per cent.).

(6) By playing around with transformers or R.C. coupling, we amplify to what pitch we require.

I might state this is a mechanical fact which may be found with a fixed pick-up or sound-box on any gramophone, using a galvo and a battery.

I made such a sound-box, producing no scratch, some sixteen years ago, but the volume was only about 50 per cent.

The secret lies entirely in your producer and not your valve or coupling. If Mr. Bligh will listen around on the 150 band he will hear several amateurs putting out the real thing, but very rarely from 5HP, as we are always trying to improve and become perfect.

I am, dear Sir,

Yours respectfully,

HAROLD S. PACE.

12a, Kirkdale, S.E.26.

P.S.—If the needle point is very slightly filed so that it rests only on the walls, and not in the bottom of the valley of a record that has no sound impressions, the scratch is still at the same pitch.

VARNISHING GLASS RODS

To the Editor.

DEAR SIR,—I have read with interest your remarks on the above subject in the March BULLETIN, and I note that you have found in one dictionary a definition of the word "hygroscopic" which supports your view. I have four modern dictionaries, one being a technical dictionary, all of which define this word as "capable of absorbing," or "capable of absorbing and retaining," "moisture from the atmosphere" (the italics are mine), and I really do not think that the case of glass referred to in Webster is the generally accepted meaning of the word, as it would be very difficult to draw a distinction between this phenomenon and that of condensation due to difference of temperature from that of the atmosphere.

After I had written my letter I realised that you might seize on the fact that the glass used in my experiment was only coated on one side, but, candidly, I do not think that this is worth consideration.

The solubility of soda glass in rain water (which contains an appreciable quantity of CO₂) is, I think, quite negligible as any observable solubility would necessitate very prolonged exposure to the action of the water; at all events it is, I think, neglected in even the most critical quantitative chemical work where glass vessels are used. Nor do I think that there is any very great difference between actual immersion in a shallow vessel of water and being continuously covered with raindrops on a wet day, my point being that after such treatment the glass will lose its moisture far more quickly than the shellac. As you say, the only satisfactory way of determining the effect on conductivity would be to carry out careful insulation resistance tests, and I regret that I have not the facilities for critical tests of this nature.

It should not be lost sight of that shellac is affected by many alkaline solutions, being, for instance, completely soluble in borax, also that the method of preparing shellac from the crude stick lac consists in treating the latter with a solution of sodium carbonate in which certain constituents of the crude lac are soluble. If, therefore, the whole of this soluble matter is not completely removed in the process there is a greatly increased probability of the shellac being affected by rain water containing CO₂, and, in industrial districts, many other impurities in solution.

If you care to try the experiment, as I have done, of treating even the best orange shellac with a solution of sodium carbonate, I think that you will find that the solution becomes coloured red, showing that the soluble constituents have not been completely removed. Also, if a piece of coated glass is immersed in the solution the film of varnish expands considerably and leaves the glass. I only mention this as showing that whatever effect rain water may have on glass it is likely to have an infinitely greater effect on the shellac coating.

I did not suggest, far from it, that uncoated glass would not collect dirt in a town atmosphere; indeed, having lived for over 18 years in one of the "smokiest" parts of London, I know the contrary to be the case; but what I *did* suggest is that the comparatively rough surface of the varnish will collect and retain more dirt than the glass under the same conditions.

I hope that someone will find it worth while to carry out comparative leakage tests under weather conditions, not during a spell of summer weather, real summer I mean, and will publish the results. In any event I should not anticipate that the leakage, whether the glass is varnished or not, would be found at all serious under the conditions obtaining in the ordinary amateur's transmitting aerial using spacing rods, even although these are all in parallel, provided that the rods are of reasonable length, say, 10 to 12 inches.

Yours faithfully,

M. J. C. DENNIS (EI2B).

To the Editor of THE T. & R. BULLETIN.

DEAR SIR,—I trust that you will do everything in your power to persuade amateurs from mutilating the recently revised international "Q" signs.

I see that objection is already being raised against QSA, and modifications or new interpretations are being suggested by amateurs in this country.

Surely it must be realised by the amateur fraternity that these signs received the very careful consideration of the radio telegraph interests of the entire world before ratification.

The main point seems to be that it is absolutely immaterial whether the signal be R1 or R10, the only considerable factor is its readability. The old "R" code was so hopelessly ambiguous and denied the only really valuable information, namely the commercial readability of the signal.

To be told that my signal is R2 or R9 I can fairly say does not interest me in the slightest degree, but if I am told that I am 100 per cent readable, then I know exactly in what circumstances the receiving station is copying me.

With regard to the complaints one hears as to the interference on the 7,000 K.C. band, I do submit that a very large percentage of jamming is caused by amateurs themselves in bad operating, and it seems to be fatuous for them to complain when they are enjoying conditions superior, in many instances, to their neighbours in the cyclage. I can see no justification whatsoever for repeating words twice unless one has been specially asked to by the receiving operator, and one has only to listen to the average QSO among amateurs to satisfy oneself that a tremendous amount of the matter transmitted is irrelevant surplus. Calls are too long, the very objectionable OB and OM should be dropped entirely, but one could go on indefinitely, the 73's, the CUL's, etc., etc. Amateurs should appreciate that they have earned the right to consider themselves above this type of contact, and if they have nothing worth while to say to one another, then for goodness sake let them keep off the air altogether and give a chance to those who have profitable matter to handle.

I would suggest that those who grumble at jamming should spend a few, both enjoyable and instructive, hours listening on 600 metres; they will not only hear QRM, but they will also hear how, by intelligent operating, it can be nullified.

I do honestly make a clarion call to amateurs to come down to earth, to try and realise our lowly station in the radio telegraphic world and endeavour, by every means in our power, to improve it.

Yours faithfully,

KENYON SECRETAN.

105, Castelnau,
Barnes.

TELEPHONY ON 7 M.C.

To the Editor of THE T. & R. BULLETIN.

DEAR SIR,—I have always been strongly in favour of telephony being forbidden on the 7 MC band on Sundays, and it might even be extended, so as to forbid it at all on every day of the week during certain hours with advantage. If an hour or two hours were put aside daily, so that QRP stations would have the air free of any fone stations, that still leaves plenty of time for those who want

to use it. If this were adopted, there would be no reason for those who must use it to be barred from all Sunday. From my own personal point of view I would bar it altogether; but then I am somewhat unique as, knowing I can work all the week and any time of it, I make a point of not transmitting at all now over the weekends, so as to leave the air to those less fortunate and who can only transmit during the evenings and Saturday and Sunday, and who ought to get as much freedom as can be given them. Summing up, if an hour was put aside in the morning and evening, during which no one used telephony, I think that would fit the case and please everyone.

Yours faithfully,
A. M. HOUSTON FERGUS.

La Cotte, La Moye,
Jersey, C.I.

Re AREA NOTES.

To the Editor of the T. & R. BULLETIN.

DEAR SIR,—I was much interested in Col. Dennis's letter in the March issue.

I quite agree with his remarks, and although the perpetrator of a "sprained ankle" report, I really think that such items should not appear.

It is very difficult, however, for the average amateur to maintain regular reports of solely scientific interest. He wants to support his area manager, and feels that, if he has nothing of an exceptional character to report, an explanation of his temporary inactivity is more acceptable than that silence, which, if every chap kept, would result in the early demise of our area managers, and a widespread lack of interest in the "BULL."

The fact seems to be lost sight of, generally, that radio is the hobby and not the business of most of us. Only a small part of his time and money can be allotted to experimental work by the average "ham." His investigations, whatever they may be, must be spread over many months, and, if as frequently happens, he is overtaken in those investigations by more fortunate brother "hams" who have a more generous share of mundane gifts, either technical or monetary, he is apt to become very disheartened, and his reports either cease or he takes refuge in descriptions of his lesser activities.

Very often this disheartening process produces a type of amateur whose main object in maintaining a transmitter, is that of collecting QSL cards; he loses sight of the fact that it is much cheaper to commence a picture postcard album. Yet, if an article appears in the "BULL" describing some effect produced, say, by a couple of 6-in. nails, a jam jar, and a few hairpins (yes, they are still made, Mr. Editor!) his interest is re-aroused and he is saved from radio ennui and recommences work with a new heart.

Consequently, I fear that Col. Dennis's plea for more scientific reports would ultimately limit interest in the "BULL" to a minority. I am convinced that the C.B. Notes have, by the wide appeal of their contents, created a renewed interest in our magazine, which was previously tending to become just a tiny bit too technical for the majority. It must be very clearly understood, however, that I am not depreciating technical articles; they have their rightful place in the pages of the "BULL" and are of inestimable value to the serious experiments. But a surfeit has the undesirable effect of scaring the lesser lights, who would otherwise contribute articles on a technical level, from which none of us would fail to acquire information, more or less.

It would be a mistake, I think, to endeavour to obtain a "cut and dried" effect in the Area Notes, and it would be suicidal to discontinue them. In my humble opinion, the "happy medium" could be obtained by reports on the following plan, based upon Col. Dennis's excellent suggestions:—

Column one would contain all station calls in the district or sub-district, "No report" being advised in column 4 in that instance (Cols. 1, 2 and 3 permanent information).

With apologies for spreading myself over your excellent pages!
I am, Sir,
Yours faithfully,
W. A. HAYES (GI2WK).

To the Editor.

DEAR SIR,—At a meeting of the Radio Transmitters' Union of Northern Ireland (the members of which are necessarily subscribing members of the R.S.G.B.), held in Belfast on 25th ult., it was resolved unanimously that the members of the Union abstain from the use of 'phone on the 7,000 K.C. band on Sundays from 00.01 to 24.00 G.M.T. Also that it be a respectful recommendation to their fellow-members in the R.S.G.B. that a similar voluntary prohibition should be undertaken in Great Britain.

The reasons on which this step is based are:—

- (1) That probably 99 per cent. of the matters for serious experiment in telephony can be carried out adequately on A.A. and monitored by the experimenter himself if necessary.
- (2) That in the small percentage of cases where such tests are inadequate, there are sufficient opportunities in the early mornings and at nights on 6 days in the week, as anyone undertaking such experiments must necessarily work to schedule with another observer or observers. Apart from this, the 1,750 K.C. band is at least as serviceable for the purpose, if not more so.
- (3) That it is desirable that DX experiments, for which the 7,000 K.C. band is largely necessary and which can best be undertaken on C.W., should have a clear day from zero to zero, unobstructed so far as is possible by broadly-tuned interference.
- (4) That Sundays have been tacitly recognised for this purpose throughout the world.
- (5) That operating conditions on the narrow 7,000 K.C. band now allotted render abstention from 'phone a necessity if (3) is to be complied with.

I should be glad if you will place the matter before your Council for their consideration.

With fraternal greetings,
Yours faithfully,
JOHN A. SANG,
Hon. Secretary, R.T.U. (N.I.),
22, Stranmillis Gardens, Belfast.

To the Editor of T. & R. BULLETIN.

DEAR SIR,—I would like to know if the following upsets any theories with regard to polarisation of radiated short waves?

One evening during last August, using a small (2½-in.) horizontal cage aerial 68ft. in length (F.W. 23 metre V.F. Hertz), the aerial coil coupled à la 6JV's method, i.e., inner end of aerial coupling coil connected to H.T./L.T. minus and outer end to down lead single feeder, contact was established with FK4MS, our old friend Cox, of Mombasa. He reported reception at R4. Without altering transmitter adjustment, a half-wave vertical copper pipe aerial was connected to coupling coil by a low horizontal feeder. The report came back, "No difference in reception strength R4 as before."

Yours faithfully,
F. L. STOLLERY (G5QV).

1 Station.	2 Normal freq. in kilocycles	3 Power watts.	4 Current experimental work.	5 Current periods of working.	6 Record of Station.
*NY2 † §	1745 28100 7253	100	Range of 28 MC. C.W. cloud effect. Frequency modulation of phone on 1745	Every day 0300-0500 1800-2300	W.A.C. O.W.L.S.
‡NY3	28120	10	Reflector for W. Stations. Skip	Sat.-Sun. all day	W. 28 MC 4 watts
*NY4 †	7050	50	Propagation of waves over water	Every evening 1700-2400	W.A.C.
NY5 †	7251 14291	10	Harmonic C.C on 14 MC. Direction of X5	Saturdays only 1800-2400	—
NY6	7256	10	No report	—	—
NY7	28140	100	Temporary QRX. (Business on health, etc.)	—	—
NY8	7052	10	New Station. Constructing only	—	—

*Member of CB.
†Requires reports from BR5 (or W or C, etc.)

§Wants schedules with F.M. for special test.
‡Requires reports from 50 mile radius.

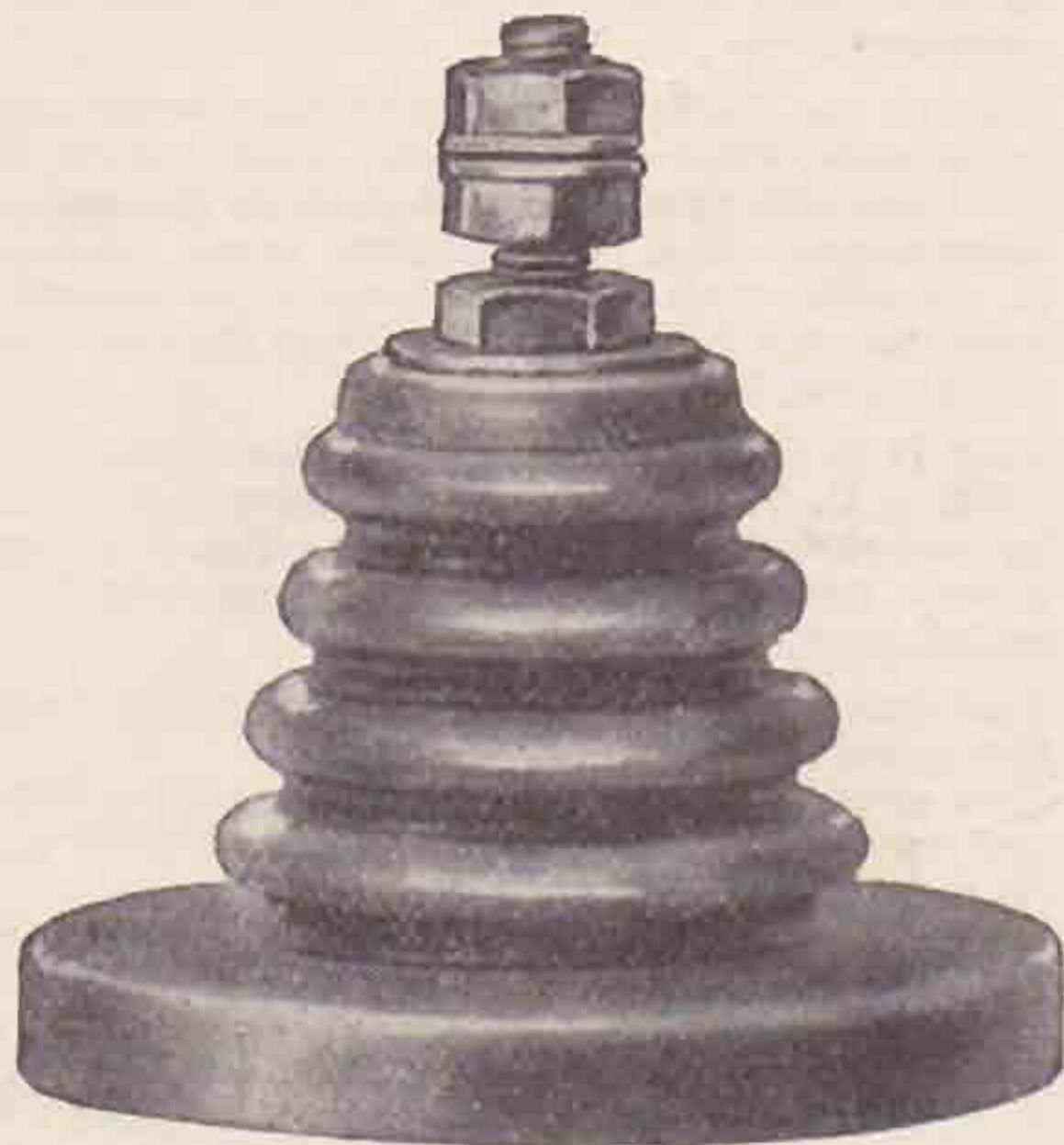
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We have now had an opportunity to test thoroughly two of these excellent resistances.

On the test bench they proved to be everything claimed for them.

When subjected to a D.C. voltage of 400 and adjusted to dissipate 40 watts, the value of resistance was quite steady after about 30 seconds, although, as stated in the catalogue, they got remarkably hot, but appeared to be able to deal with this loading satisfactorily.

The adjustment of resistance is beautifully smooth and, when tried in an eliminator, quite noiseless.



We have also inspected and tested the "stand-off" insulator illustrated. It is well made and of high quality, and should prove most useful to those members working on the higher frequencies.

Both the above components can be obtained from Claude Lyons, Ltd., Liverpool.

Trade Notice.

From Messrs. Lectro Linx, Ltd., we have received a copy of the latest CLIX Catalogue. We are very interested in the CLIX Accumulator Knobs for fixing to accumulator contact terminals, which are a well-known source of trouble due to acid corrosion. They are manufactured to fit standard threads on all well-known accumulators and sell at 5d. each. The CLIX Multi-Plug and Socket should be very useful as a means of dispensing with the old-fashioned long terminal strip which usually takes many minutes to disconnect; this CLIX substitute takes up to a 5-cord fitment, and is foolproof. There is also the CLIX Power Plug, together with Power Socket and Safety Bush designed for use with apparatus where electric current from the mains is employed; the device is, of course, immune from shorts and shocks due to the usual CLIX method of finishing off the wires in the socket. CLIX Wood-screw Sockets are useful as a means of fitting extension and junction points. A perusal through the catalogue may help everybody to overcome the doubtful plug and socket contact on the set, as there appears to be a CLIX for every purpose.

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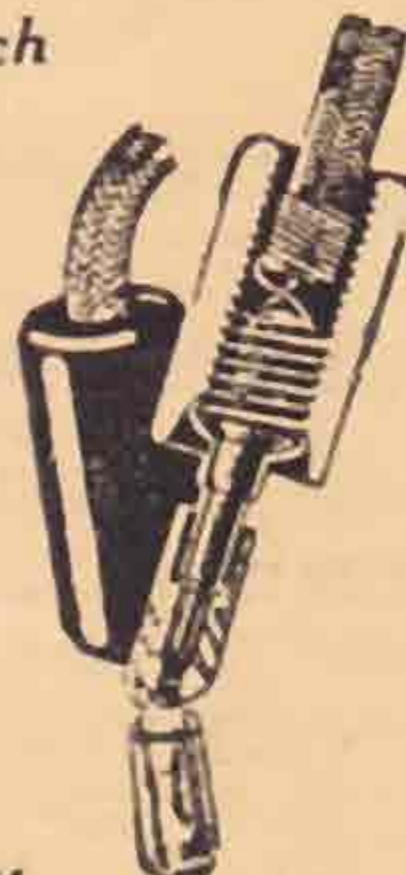
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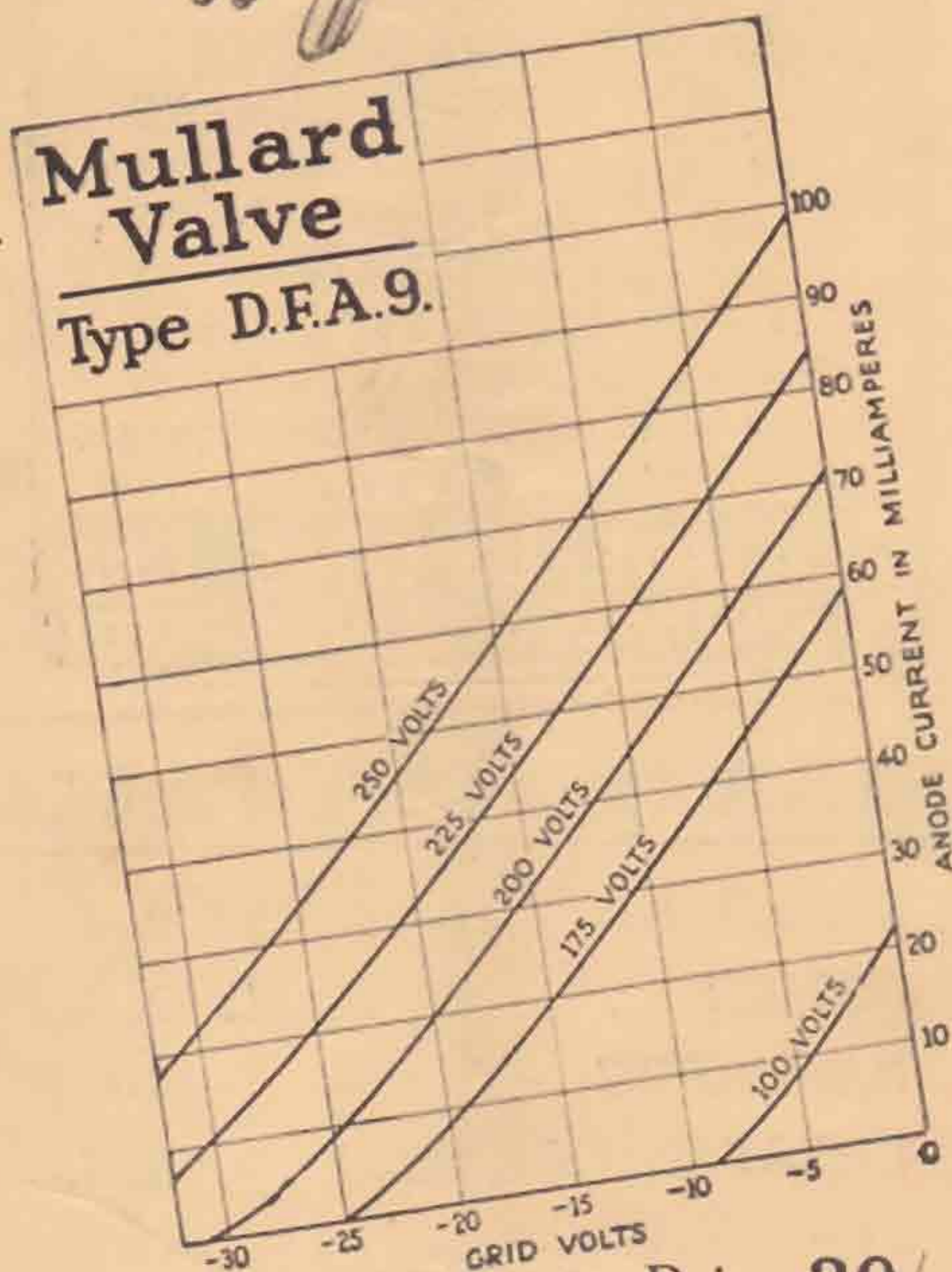
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