

T. & R. Bulletin

THE JOURNAL OF

The Inc. Radio Society of Great Britain

AND THE

British Empire Radio Union



Vol. 6. No. 8.

FEBRUARY, 1931 (Copyright)

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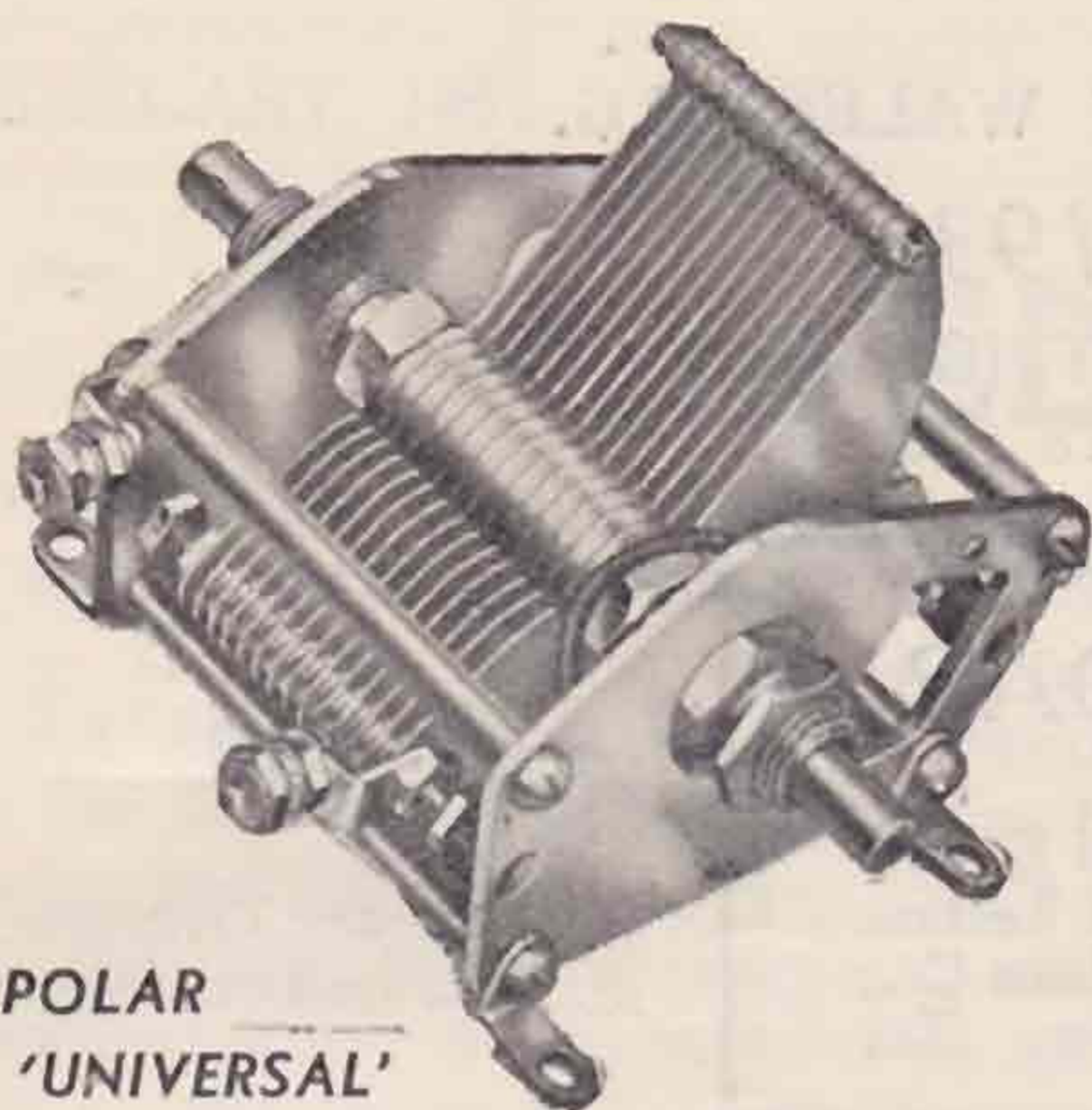
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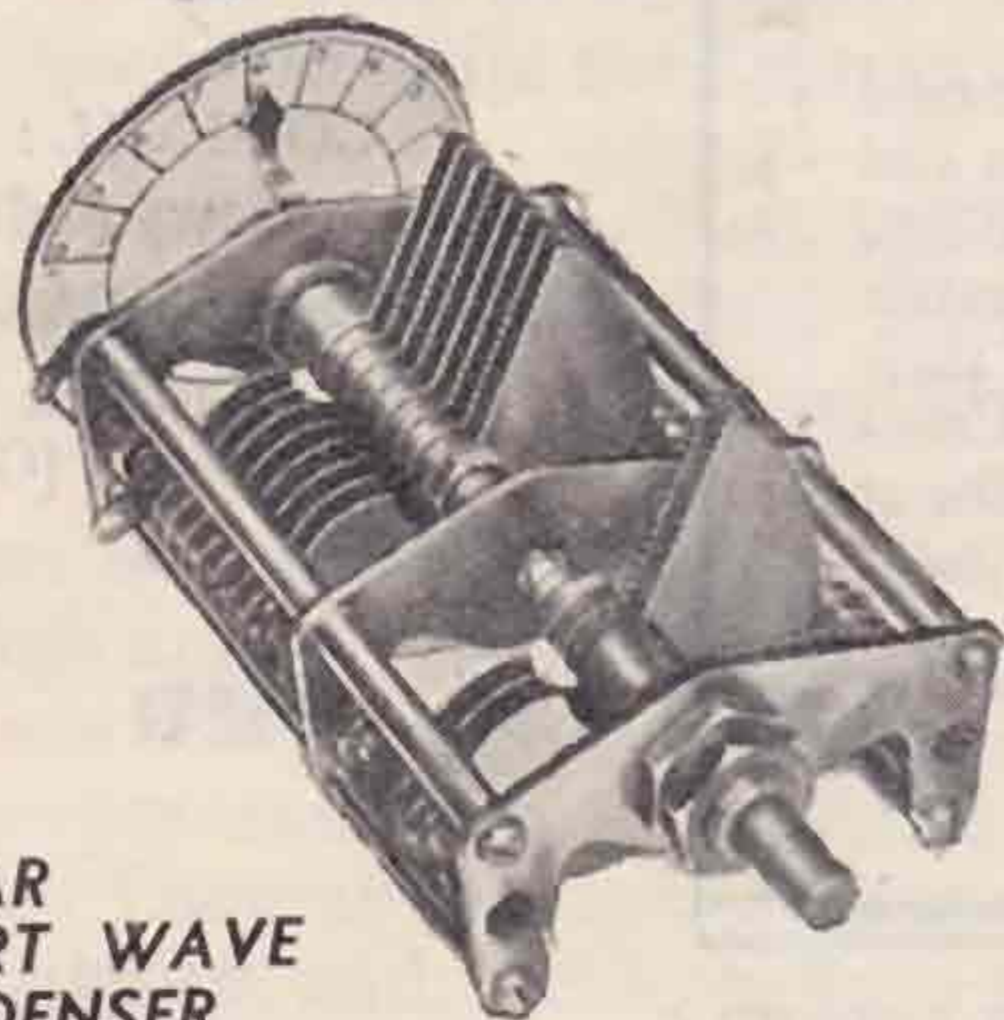


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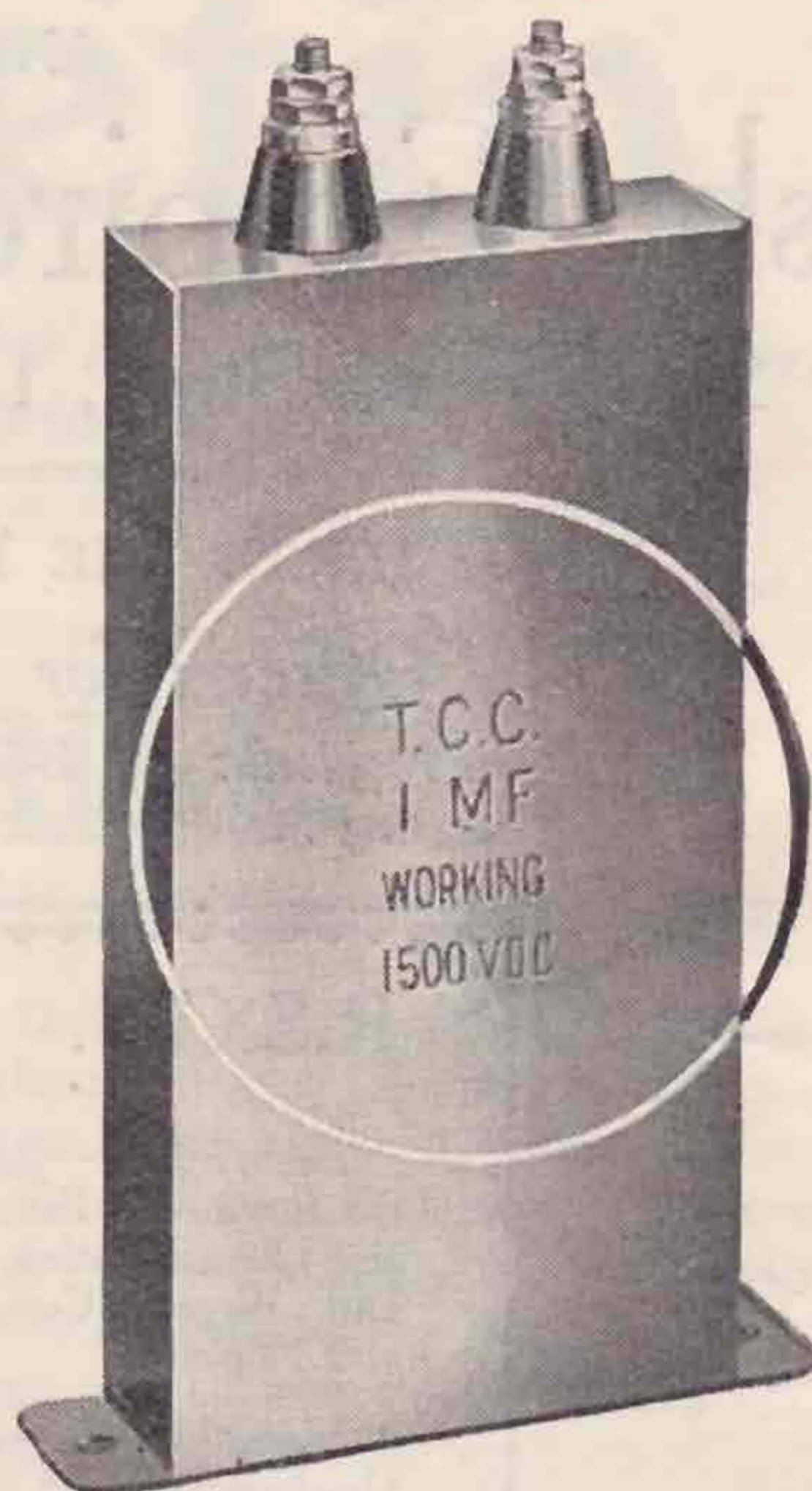
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R.S.G.B. CALENDAR.

February 27.—At the Institution of Electrical Engineers, Savoy Place, W.C.2: Lecture and Demonstration by the Gramophone Co., Ltd., Hayes. Commence at 6.15 p.m. Tea at 5.30 p.m.

March 13.—At the Lensbury Radio Society's Headquarters, 16, Finsbury Circus, E.C.2. Informal Discussion at 6.30 p.m.

March 17.—Hamfest at Pinoli's Restaurant, Wardour Street, W.1.; 6.30 for 7 p.m. Tickets 5/-.

March 25.—At the Institution of Electrical Engineers, Savoy Place, W.C.2; Lecture and Demonstration by Mr. E. C. S. Megaw, B.Sc., D.I.C. (by permission of the General Electric Co., Ltd.), on "Electron Oscillations and their Application to Ultra-High Frequency Communication." Commence at 6.15 p.m., tea at 5.30 p.m.

The following dates are also booked for meetings:—R.S.G.B., April 29; jointly with the L.R.S., April 10.

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T&R Bulletin

*The only Wireless Journal Published by Amateur Radio Experimenters
in Great Britain*

FEBRUARY, 1931.

Vol. 6. No. 8.

EDITORIAL.

THERE are a number of points concerning licences that we wish to bring more clearly to the notice of members, and these points refer to extra facilities.

It will be remembered that ten months ago the 3.5 M.C. band was opened for amateur use (for limited hours) in this country, and the then existing Trans-Oceanic licence-holders were the first to be given this extra band. All those Trans-Oceanic permits were high-power permits, and the next step was to obtain low-power Trans-Oceanic permits for members so that all might have an equal chance to make use of the 3.5 M.C. band. Finally, the band has been opened for daily work, instead of only at week-ends as hitherto. *But*, every member must abide by the terms of his own licence, and if he has one of the Trans-Oceanic licences issued last April he is probably only allowed to use the 3.5 M.C. band at week-ends.

Applications for *any and all* privileges on 3.5 M.C. must pass through the Society, and every member is entitled to apply for permission to make full use of this band. There is no additional licensing fee for low-power Trans-Oceanic permits.

All requests for either High or Low Power Trans-Oceanic permits should be made to the Society *via the District Representative*, and not to the Post Office. In the case of high-power Trans-Oceanic permits the District Representative is required to comment upon, but *not* reject, them.

All requests for 28 and 56 M.C. permits should be sent direct to the Post Office.

It is hoped if members will read, and carefully follow, the above points, that Headquarters will be saved much unnecessary work.

* * * *

There is another little point which we should like to add. Our Honorary Secretary has a very large amount of correspondence to cope with in his official position, and we feel that some of this work might very well be avoided if members would bear in mind that we are working in close co-operation with the District Representatives, who are well informed of the affairs of the Society. They are always pleased to answer any small queries that you may have to the best of their ability, and, incidentally, a better liaison might thus be established between the members and their Representatives.

* * * *

We expect that many of you have noticed that the frontispiece of the BULLETIN no longer contains two separate lists of Committee and Council members and may, perhaps, have wondered at the change. The explanation of this step is not difficult, but before going into it we should consider for a moment the old order of things and how it has worked—or failed.

Put briefly, the Government of R.S.G.B. was as follows:—There was a Council and a Committee corresponding very much to the Upper and Lower Houses in the British Parliament.

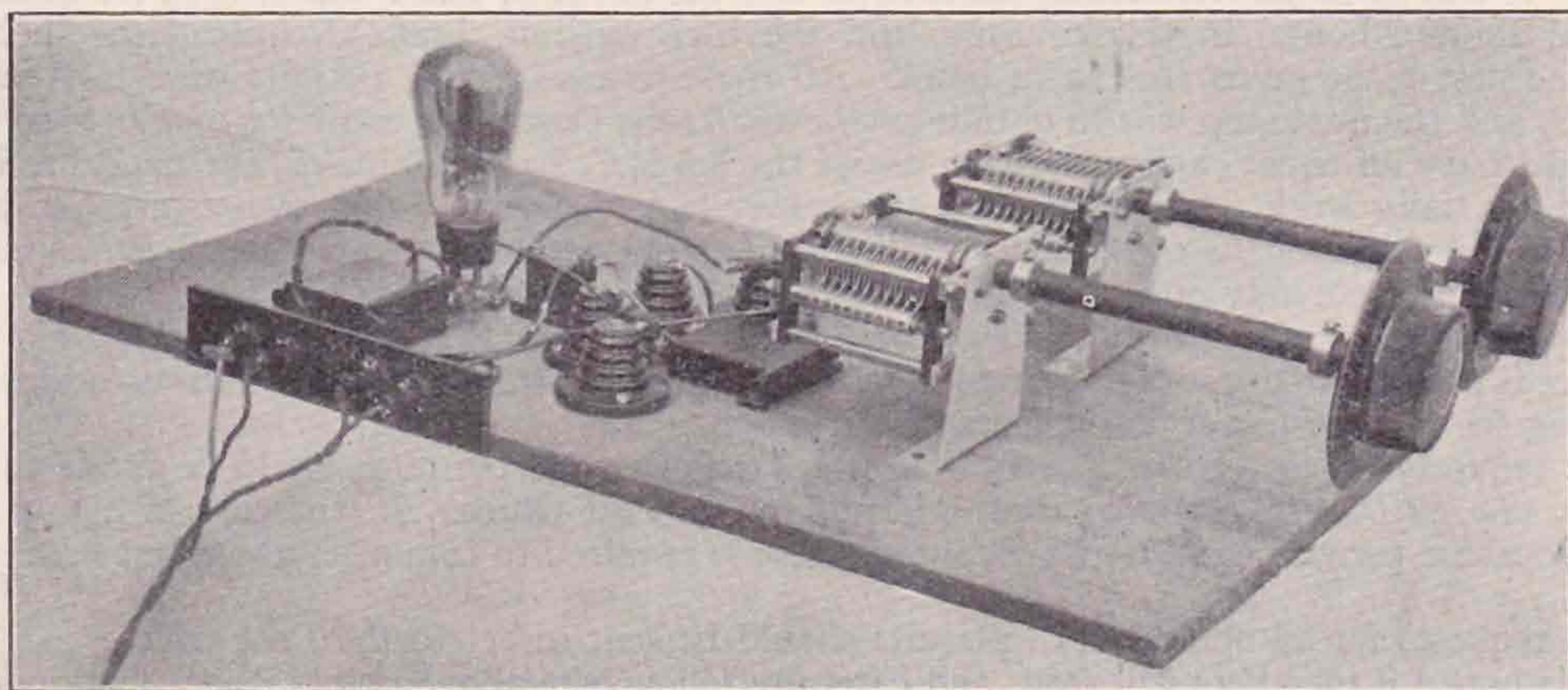
(Continued on page 217.)

A Split-Hartley Transmitter.

IN the December issue a simple tuned-plate tuned-grid transmitter was described suitable for the beginner. In the accompanying article a transmitter is described built in the form of the Split-Hartley circuit. This circuit possesses the advantages of simplicity and single-tuning control (neglecting for the moment the aerial tuning), though it requires six connections to the coil L_1L_2 and calls for a condenser of good construction at C_2 .

The Hartley circuit is probably familiar to most readers, and possesses but a single oscillator coil; it requires an H.F. choke, however, in either the plate or grid feed, and such chokes appear to be an eternal source of trouble to some transmitters, especially when the set is to be used on a number of wavebands. By splitting the oscillator coil and inserting a condenser the need for an H.F. choke immediately disappears.

standard *Clix* valve-holder, and has been used in conjunction with an *Osram* LS5 valve. This immediately labels it as a 10-watt set (or thereabouts), but only slight modifications need be made if higher power is required. Four stand-off insulators can be seen fitted with *Clix* valve sockets which carry the coil L_1L_2 . Condenser C_2 is wired with as short leads as possible between the centre sockets and condenser C_1 is connected to the outer pair of sockets. As the circuit comprised by part of the coil and condensers C_1 and C_2 forms the main oscillator circuit and carries a fairly heavy H.F. current, it is inadvisable to make use of clips for the connections to C_1 unless there is no doubt that the contacts made will be of the best. The connections to the coil from the grid and plate of the valve are, however, made by clips, as little current is carried by these leads. It was mentioned earlier that a



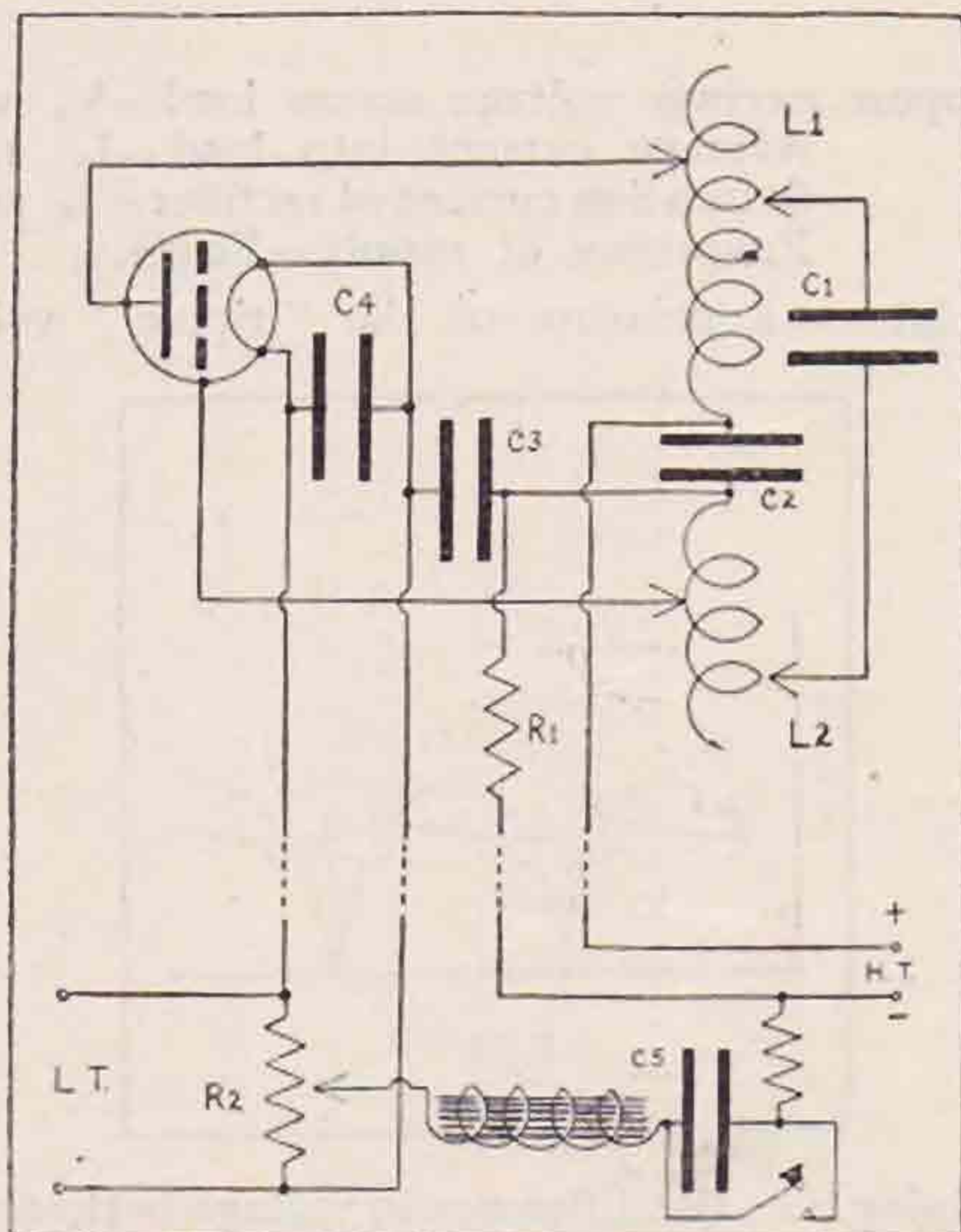
The main oscillator circuit consists of the coil L_1L_2 and the condensers C_1 and C_2 . It is usually regarded as a single coil circuit, as, if the coil is wound on a skeleton former, it would be wound as one coil and then cut at a suitable point. It is important that the two halves should be coupled as tightly as possible. The variable condenser C_1 is shunted across *equal* portions of the coil either side of the condenser C_2 . This variable condenser has, of course, the full H.T. supply across it, and as both electrodes are at H.F. potential it is fitted with an extension arm. In the photograph this condenser is the nearer one. Condenser C_3 maintains the centre of the coil at zero or filament (earth) potential, and C_4 is connected directly across the filament terminals. The apparatus connected with keying will be dealt with later.

CHOICE OF APPARATUS.

The set shown in the photograph is fitted with a

good condenser is required for C_2 , as this has to pass a considerable H.F. current as well as having to withstand the full H.T. voltage. A *T.C.C.* mica condenser designed for small transmitters (type 1039) would be very suitable, though for lower power one of the types reviewed on page 196 of the January issue would be excellent. A value of $\cdot 01$ mfd. is suitable here. Condenser C_3 may be a *T.C.C.* mica condenser of $\cdot 005$ mfd. or $\cdot 01$ mfd., and is not required to carry so large a current. C_4 is 2 mfd. The variable condenser C_1 is a *Cyldon* $\cdot 0002$ mfd. transmitting condenser fitted with mounting bracket and extension handle. As this mounting bracket is of metal and screwed to the frame of the condenser, the baseboard, on to which it is fixed, should be of American white wood or mahogany. The former is regarded as the better, and, providing it is dry, no trouble from losses should be experienced.

The grid leak, R_1 , may be given a fairly high resistance, say 50,000 ohms; a high value here increases the efficiency of the set and assists in obtaining a good note when filtered R.A.C. supply is used for H.T. As only a few milliamps will be



In the above diagram the fixed contact of the key should be connected to the upper end of the resistance (i.e., H.T.) and not to the lower end. Condenser C_1 should, of course, be variable.

flowing in the grid-leak a *Burne-Jones* Spaghetti resistance can be recommended, while for use with higher power *Varley* 10-watt power resistances will be found suitable.

COILS AND ADJUSTMENTS.

No coils are shown in the photograph on account of the apparatus they obscure. The coils may be wound with copper tube (when they are self-supporting) or wound on skeleton or ribbed formers with, say, 12 or 14 S.W.G. wire: for medium or high power tube coils are, of course, to be preferred. For the 3.5 M.C. band a coil of 24 turns will be required, such that L_1 consists of 14 turns and L_2 of 10 turns. The whole of L_2 and 10 turns of L_1 will thus be tuned so that, as stated before, condenser C_1 tunes across equal portions either side of C_2 . The remaining four turns of L_1 form "anode tap," that is, the portion of this coil between the tuning condenser and the anode connection.

For the 7 M.C. band a 13-turn coil is required, L_1 consisting of eight turns (three for anode tap) and L_2 of five turns. The diameter of both the 3.5 M.C. and 7 M.C. coils may be 3.5 ins. A 14 M.C. coil requires eight turns, 3 ins. or slightly less in diameter, of which L_1 contains five turns (two for anode tap) and L_2 three turns.

In adjusting this oscillator for maximum efficiency the full anode tap may safely be used, though if the type of valve is altered (or the grid leak to any appreciable extent) it may be found that a better value of anode tap can be found. The position of the grid tap controls the self-excitation,

the nearer it is to the tuning condenser connection the greater is the feed back. As an instance, three turns between C_2 and the grid tap was found to be correct for 7 M.C. with an LS5 valve. With an LS5b, however, only two turns of grid excitation was required, a 20,000-ohm leak being used. This data should be sufficient to enable anyone to adjust for maximum efficiency.

The aerial is, of course, coupled to the anode end of the oscillator coil and a further .0002 mfd. tuning condenser is shown in the photograph for aerial tuning purposes.

FINAL REMARKS.

The terminal strip shown in the photograph carries four *Chix* all-in terminals, from which are connected the wires represented by the dotted lines in the circuit diagram. These are taken to the power supply and keying apparatus. The resistance R_2 is a centre-tapped one of about 100 ohms to obtain an artificial centre tap on the filament of the valve when heated from A.C. supply. The key-thump filter, between R_2 and H.T., consists of a 30 henry choke (of low D.C. resistance), a condenser of .01 mfd. or higher, and a resistance of about 25 to 50 ohms. The condenser and resistance in series are put across the key contacts, and the value of the former is best found by trial and error: sometimes a value of 1 mfd. can be used, though too large a condenser, while cutting out all trouble from key thump, produces a bad tail to the note. The small resistance in series with this condenser serves to reduce excessive arcing at the key contacts on "make" and to prevent damage to the contacts. Too big a resistance will reintroduce key thump.

It is hoped that this short article will be of some little use to members, and may possibly bring to their notice a very excellent circuit that is not seen as often as it might be nowadays.

Editorial.

(Continued from page 215).

The Council (Lords) had supreme power in all questions of policy and finance, and all decisions of Committee (Commons) had to be submitted to it for approval before action could be taken. In the old days, when R.S.G.B. and T. & R. were separate bodies, the Committee was known as the T. & R. Committee and was composed entirely of T. & R. section members, whose duty it was to manage the affairs of the T. & R. Section, and keep the views of the transmitting fraternity before the Council of the B.C.L. parent body, R.S.G.B. With the coming of the fusion of the two groups, however, the separate ruling bodies were rendered unnecessary, although it was decided that before any alterations were made the old system would be given a further trial.

Owing to the fact that most of the Committee members were also sitting on Council, it has been found that much time has been wasted by Council ratifying their own decisions made a week before as Committee members. This new arrangement must, we feel, mean a considerable speeding up of the working at Headquarters and will, in addition, lift some of the burden of clerical work from the shoulders of all at H.Q.

Smoothing Circuit Design.

By G6OT.

THE circuit which generally follows a rectifier with a view to "smoothing" the unidirectional pulses of rectified current in a steady supply is one which presents no little difficulty from the design point of view. So let it be stated from the outset that no attempt will be made in this article to follow the subject from rigidly theoretical principles. An excellent treatise for those who want to delve into the subject more completely will be found in the Journal of the Institution of Electrical Engineers for December, 1930, by Prof. Wheatley.

In general, if we feed a resistive load from a source of alternating current in series with some rectifying device such as a thermionic valve or metal oxide rectifier a series of "impulses" will flow of the shape shown in Fig. 1. This state of affairs can very simply be considerably modified by connecting either a condenser across the load or an inductance in series with it.

In Fig. 2 is shown the voltage waveform across a load supplied by a full wave rectifier, while the line a, b, c, d, e indicates approximately the waveform when a condenser of suitable size is connected across the rectifier output. During the periods a to b, and c to d, the rectifier voltage exceeds the condenser voltage and the condenser is being charged, its voltage thus rising. During the periods b, c and d, e, however, the condenser supplies the load with current, its p.d. falling as shown. The p.d. maintained across the load is thus much more nearly constant. A very similar result could be arrived at by inserting an inductance in series with the load in place of the condenser in parallel with it. An alternative method of regarding the matter would be to say that the upper harmonics present in the original wave are either shunted off by the condenser or choked back by the inductance.

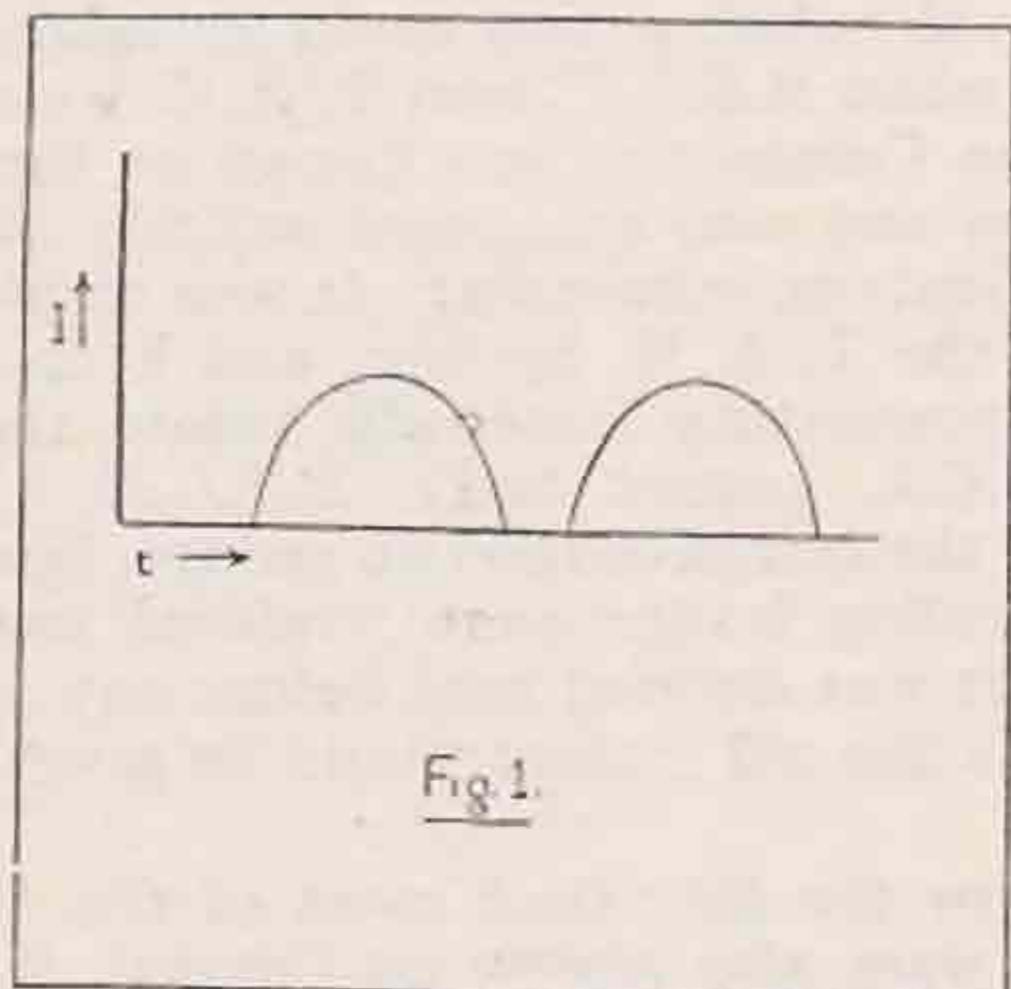


Fig. 1.

Now the exact value of this condenser has caused a great deal of discussion. J. H. Morecroft has developed an approximate formula for calculating its size which applies when using rectifier valves which can be saturated.

Suppose average voltage across load = V_o volts.
 Average current into load = I_o amps.
 Saturation current of rectifier = I_e amps.
 Frequency of supply = F c.p.s.

Also let a = a measure of the "ripple" voltage

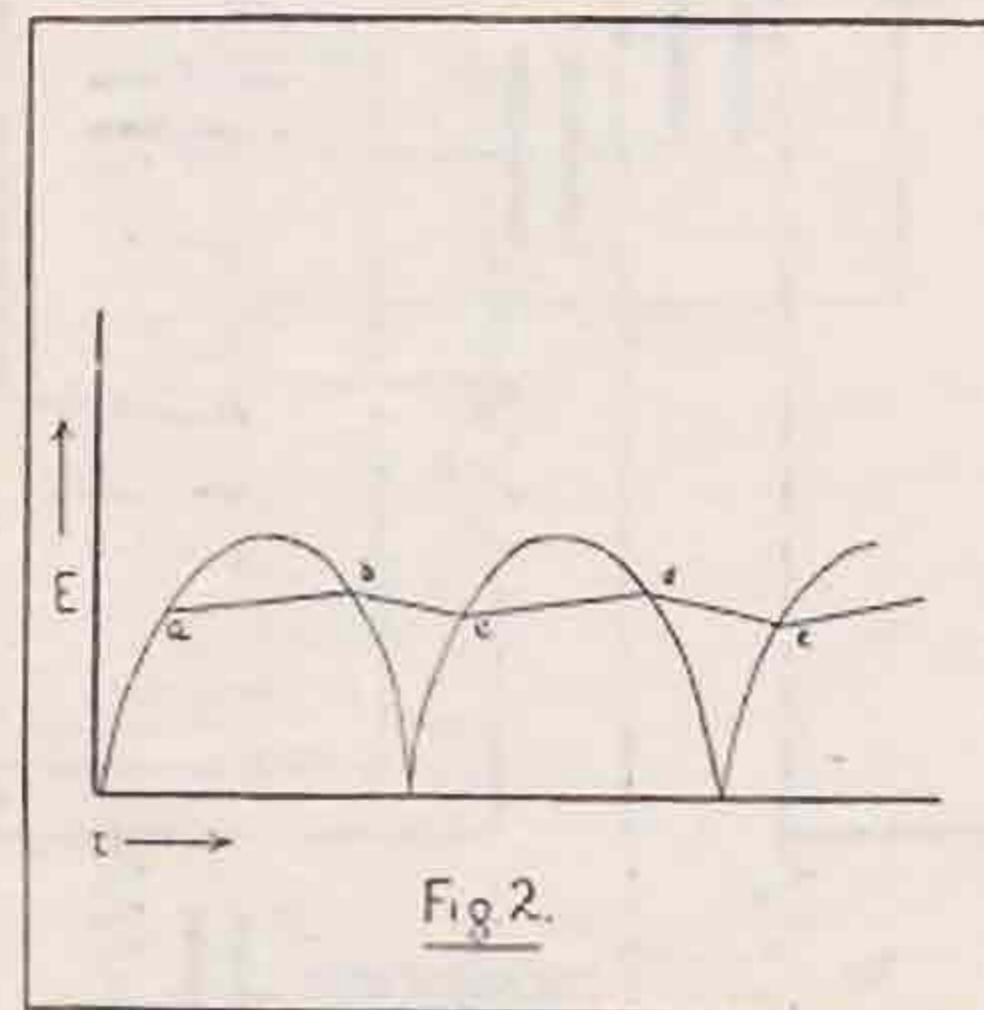


Fig. 2.

remaining, *i.e.*, the difference in voltage between two points such as b and c in Fig. 2 such that $a = \frac{V_b - V_c}{2V_o}$

Then $C = \frac{I_o}{4aV_o} f \left(1 - \frac{I_o}{I_e} \right)$ will give the value of condenser necessary to keep the voltage fluctuations f within the specified amount.

As an example, let us consider the case of the Mullard U.L.3 rectifier valve.

Let us assume we require a current of 100 Ma. at 2,500 volts. Suppose also that we stipulated $a = 5$ per cent. = .05 and the supply frequency = 50 c.p.s. From the characteristic we find that the saturation current 600 Ma. = .6 amp.

$$\begin{aligned} \text{Then } C &= \frac{.1}{4 \times .05 \times 2500 \times 50} \times \left(1 - \frac{.1}{.6} \right) \\ &= 3.3 \text{ microfarads.} \end{aligned}$$

This theory can be regarded as very approximate only, since the voltage drop in the valve itself is neglected, it being considered that the condenser is charged at the saturation current of the valve.

In the case of modern rectifiers, particularly low power types using thoriated filaments, the saturation current cannot be obtained, and the limitation of the charging current must be by means of the internal resistance of the valve.

The problem is, however, generally solved by the manufacturers themselves who usually specify a suitable condenser. The reason why too large a condenser must not be used in this position is now clear. The current which charges the condenser during the period $a b$ in Fig. 2 was limited by saturation in the case of a tungsten filament, but with the thoriated type a current large enough to impair the emission permanently could easily be drawn through too large a condenser.

Having now reduced our voltage fluctuations to a reasonable value it remains to smooth out these as far as possible without losing more of our D.C. voltage than is necessary. To do this it is usual to insert in one or both leads an impedance of high value to the harmonics and fundamental ripples, but of low D.C. resistance. Finally, another condenser is bridged across the load to shunt the remaining ripple currents. We thus arrive at the usual power filter circuit shown in Fig. 3.

Now this is actually one section of a form of low-pass filter. For satisfactory operation, we must

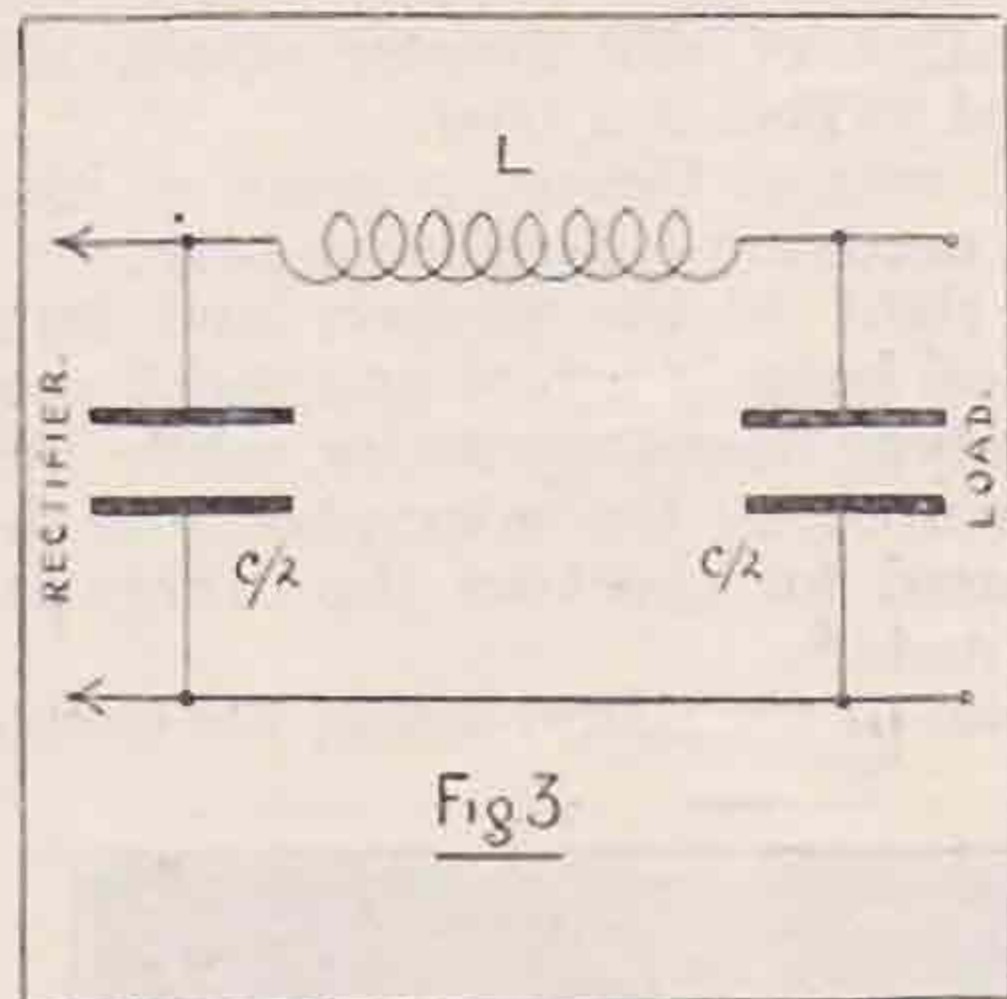


Fig. 3

design this with a cut-off frequency below the lowest frequency appearing in our rectified current.

Unfortunately, the filter cannot be designed along the lines of a proper low-pass filter for insertion in a speech circuit owing to the stipulations caused by the operation of the valve, etc.

The value of the rectifier condenser having been more or less fixed, we can, however, ensure that our inductance is of a suitable value to make the cut-off frequency correct.

For a section of filter as shown in Fig. 3

$$\text{Cut-off frequency} = \frac{1}{\pi \sqrt{LC}}$$

Now the value of C (or rather $\frac{1}{2} \times C$ as drawn and used in the above formula) has been fixed, and hence we can find the value of the inductance required. It should be remembered that the fundamental frequency which it is required to remove is twice the original supply frequency if full wave rectification is employed.

Thus, suppose we are rectifying (full wave) 50-cycle A.C. and are using a 4 mfd. first smoothing condenser, what will be the very minimum inductance we can use for L?

We will assume that we shall get reasonable smoothing by putting the cut-off frequency at 70 c.p.s., bearing in mind the fact that 100 cycles is the lowest frequency present in the circuit.

Thus $C/2 = 4$ mfd.

$\therefore C = 8 \times 10^{-6}$

$$f_c = \frac{1}{\pi \sqrt{LC}}$$

or $L = \frac{1}{\pi^2 f_c^2 C}$

$$= \frac{1}{9.89 \times 4900 \times 8 \times 10^{-6}} \text{Henries}$$

$$= 2.58 \text{ henries.}$$

Of course a larger inductance will make the cut-off frequency lower and the attenuation of 100 cycles greater still, but the above value, say, 3.0 henries, represents a minimum practicable figure.

It now remains to find a suitable choke. It is essential to remember that the choke must have its true inductance value when carrying the maximum direct load current through its windings.

A suitable choke may be available, in which case the task of finding a suitable filter is complete. Should the choke be of an unobtainable value, then it will be necessary to design one.

The design of iron-cored chokes when carrying D.C. will therefore be the subject of the next article

Book Reviews.

"PATENTS, TRADE MARKS AND DESIGNS."—By H. T. P. GEE. 47 pages. Price 5s. GEE & Co. (H. T. P. GEE), 51 & 52, Chancery Lane, London, W.C.2.

The author of this well-printed and neatly bound little guide presents a brief outline of the procedure to be followed in patenting inventions and registering trade marks and designs.

A short historical introduction precedes a wider consideration of the steps necessary to obtain a patent. The case of the employee's invention, the grounds upon which opposition to a patent may be based, the "working" of a patent, the granting of licences, and many other important issues, are dealt with in a concise and illuminating manner. At the end of this section is a list of countries abroad in which inventions may be patented or registered.

"Trade Marks and their Registration," with a single page devoted to "Designs," complete the

book. Under the former heading, a most interesting survey of the essentials of a trade mark is given, and many examples are shown of well-known trade marks and the category into which each falls. Not only is the legal situation summarised in this section, but advice is given on how to make up a trade mark.

Although the booklet is exceptionally interesting and authoritative, coming as it does from the pen of an expert, it is probably priced a little too highly at more than one penny per page. T. P. A.

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BY "THE ROVER."

IF you take an hour's journey by car along the Canterbury road leading from London, you will come to Teynham, a small village situated a few miles past Sittingbourne, amidst typical Kentish surroundings.

Leaving the main road on the left and passing through an avenue flanked by fruit orchards and hop-fields, you will come to a small yellow cottage, the home of G6PA. The layout of the station can be easily followed from the photograph.

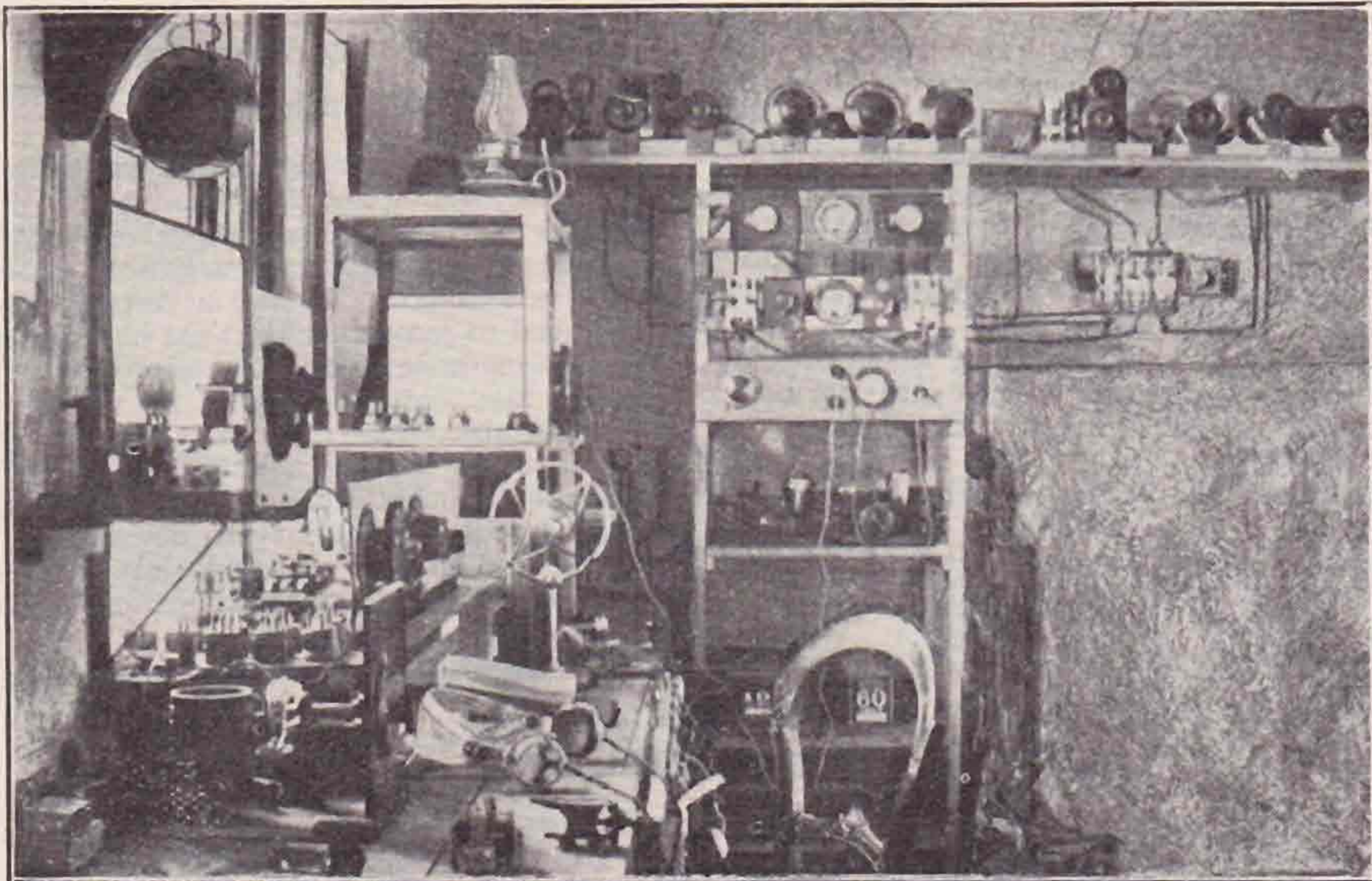
In the left foreground can be seen the monitor standing on a shelf above the bench, while immediately below, and to the left of the receiver, is a heterodyne frequency meter. This meter was described in the BULLETIN over 18 months ago, and being constructed in the same manner as the rest of "Pip Ack's" apparatus, is still in excellent order and working with a high degree of efficiency.

labour spent, and those who adopt a similar scheme will find it well worth while if much work is carried out on the lower frequencies, for it is here that its advantages are most apparent. The extra amplification obtained with the S.G. valve as a detector is very considerable, and although its use necessitates the incorporation of a potentiometer, those amateurs in search of still greater sensitivity will be well advised to give it a trial.

The L.F. side of the set is more or less conventional and needs no enlargement here.

On the right of the receiver and immediately below the oil lamp is a new and much more elaborate heterodyne frequency meter, while below this, almost obscured by the microphone, is the crystal oscillator used for checking the calibration of the frequency meters.

At the end of the room, facing the camera, is the



In the author's opinion, the receiver, which can be easily identified, is the *pièce de résistance* of the whole station, and those who know the operator will readily appreciate the many unique features incorporated therein.

It consists of a S.G. H.F. stage, a S.G. detector and two L.F. amplifiers, each of the three stages being built in the form of a separate unit. The H.F. side is wired for both aperiodic and tuned coupling, either system being brought into use by means of a switch, which, although extremely simple in appearance, has many contact points, and many hours were spent wiring and re-wiring before efficient operation was obtained.

The results, however, have amply repaid for the

transmitting equipment, and here the ingenuity of the station owner is again apparent.

On the bottom shelf of all can be seen the high tension supply, consisting of dry cells, and giving three hundred volts.

On the next shelf above this is a three-valve speech amplifier, while above this is a collection of switches, which, together with the three situated on the wall, connect the key, batteries, and speech amplifier, to whichever transmitter it is desired to use.

Of these there are four, each self-contained, and they can be seen on the long shelf above the meters and switches.

On the left is a T.P.T.G. tuned to 14 M.C., next to
(Continued on opposite page.)

A Field Day in N.S.W.

By J. B. CORBIN.

HAVE you ever attended a radio field day? To "hams" who have taken part in a search for a hidden transmitter, there is no need to urge them to attend a second one, while those who have never done so, their amateur radio is incomplete. For with a D.F. loop, a receiver, and a car, at least a good morning's fun is assured. What if directions do lead to picnic grounds (Y.L.-less) or main thoroughfares, or the lines plotted after two bearings run parallel—isn't it a bright, sunny morning, and one can easily take a few more bearings, and even if they are all wrong, well, we can assemble at the rendezvous at 1.30 and get visible D.F. per the official car, thence to lunch and the fun afterwards.

Australia, with its clear sunny weather, is particularly fitted for all outdoor sports, and field days constitute the amateur radio method of taking advantage of them. Though not the proud possessor of a "ticket," it was nevertheless my privilege to attend the second field day of the N.S.W. Division of the Wireless Institute of Australia—last year on August 31.

The weather, though threatening early Saturday, relented and sent along a wonderfully clear sunny spring day for the Division's second search for the hidden VK2WI.

The transmitter at H.Q. consisted of a crystal-controlled outfit, C.O. and frequency doubler, using the double tank method, Heissing modulation supplied from 320 of dry B. batteries and feeding a half-wave "Zepp" on the 40-metre band. The transmitter itself was kindly supplied by VK2DY.

The parties to start had all been arranged in a rough semicircle round the hidden transmitter. All parties were to be as near to these allotted points as possible by 10.30 a.m., when the first

call in CW from the C.C. portable transmitter operating under the call of VK2WI was to be made.

The writer's party consisted of VK2BC (Mr. Norman Hurl, who owned the D.F. gear and, most important, the car), VK2DY (Mr. Don Lindsay, of C.C. fame, to-day famed for a mysteriously obtained FB prismatic compass and binoculars), VK2HG (Mr. Jack Mackel, owner of spare receiver), and the odd part—myself. To keep up my status I nearly sat on the loop immediately but afterwards behaved fairly well.

The first moral brought home to us was, do not build too big a loop, as we found a 3-ft. loop quite an aggravating thing in the back of a closed sedan. We had "eats" enough for an army, plenty of gear, and these, together with ourselves, took some minor adjusting, but was managed, and after a twenty-mile run, on good concrete roads, from Chatswood, through Parramatta, we arrived at our allotted starting point near Kamarra railway station.

A look around revealed an ideal spot (?)—it was not certainly in the middle of a main road, but as it had hilly country all around it, and by no means lacked electric train wires, telegraph, and high-tension power lines, we thought there may be better spots to take a D.F. bearing. Once more Mahomet was emulated and off we went to the nearby hill, on top of which, there being no trees, we decided to take our first bearing:

The call was tuned in on a ISG-V-1 receiver, with the loop set in any direction. The loop was then rotated till the signal strength minimum was found. In this position the loop should be at right angles to the transmitter. By means of the compass, a direction was taken at right angles to the

(Continued on next page.)

which is another, operating in the 7 M.C. band, and using the crystal oscillator adaptor described in the BULLETIN some time ago by G2NH.

On the right of the 7 M.C. transmitter is the 1750 K.C. outfit, employing the R.F.B. circuit, while on the extreme right of all is a T.P.T.G. unit used on both 1750 and 3500 K.C.'s.

On the former band the efficiency does not compare favourably with the efficiency on 3500 K.C., so it is used mostly on the latter band, and on this frequency the crystal oscillator from the 7 M.C. set can be introduced into the grid circuit.

Separate single wire inverted L type aerials are used for both transmission and reception, the former being 67 feet long from the free end to the transmitter.

Loose coupling is employed on 14 and 3.5 megacycles, while on 7000 and 1750 K.C. the antenna is tapped directly on to the anode coil.

This type of radiating system has been found extremely efficient on the higher frequencies, and used in conjunction with a counterpoise, equally effective on the lower frequencies of 3500 and 1750 K.C.

The switches are so arranged that once the

required transmitter has been furnished with its power supply, all further control can be carried out without the operator leaving his seat, while the separate receiving aerial enables break-in to be used when desirable.

A good deal of DX has been worked, and in addition to holding a W.B.E. certificate, the station was the first G to QSO OK3SK on 1750 K.C.

G6PA is a keen R.S.G.B. member, and since leaving London he has done much to further the cause of amateur radio in his district, the steady increase in members around Teynham being ample proof of his interest in the Society.

By the time these notes appear in print, G6PA will have moved to Ospringe, a small village a few miles further south, and the hoped-for installation of an M.L. generator will solve the ever-present H.T. problem.

In conclusion, the author thanks "Pip Ack" most sincerely for a very pleasant day spent at the station, the memory of which will remain for a long time, and feels sure that he will be voicing the sentiments of all the London gang in wishing him very 73 at the new QRA.

loop, through centre stay, to find the bearing. A district map was spread on the ground, trued for North, and from our position on this a line of any length was plotted, by means of set square and protractor. Our first photo was taken and gear re-loaded, the whole operation taking just over ten minutes.

Our second bearing was to be taken at a suitable point a fair distance away, and at right angles to first bearing. Luckily another nice hill was visible in the right direction, about two miles away, so off we set, and after some deviations and cross-country driving we arrived, and once more approached our loop to see if it was agreeable to coming out of the car. This time it was not so keen, and a screen wire was parted before it was out, and as soon as we set it up it showed its unwillingness to participate by at once falling over and breaking another screen. However, these were adjusted, and we looked for VK2WI. Not a sound. We tried all over the band—still dead silence. The time was 10.50 a.m.; 2WI should be on; either it wasn't or our receiver had gone on strike. Here the second receiver proved its worth, and space in the car, for on hooking a few feet of wire to it to act as an aerial we brought in a couple of locals, but no 2WI, and so as it was 11.15 before we heard them again; quite a lot of worry, supposition, and manhandling of a perfectly good receiver was saved.

Signal strength here was much weaker than at our first position, proving that we had come away from the transmitter, but you can imagine our delight when, on plotting our second bearing, the lines intersected near our first position where signals had been strong.

As much time had been lost in the delay at VK2WI (we found later that they had been hooking up the modulator, to go on 'phone), we had to hurry lest somebody else had managed two bearings before 2WI had closed down. Firm treatment of the loop put it in in one attempt, and we didn't dawdle on our way back again to a spot near our first bearing. This time we broke records on assembling our gear, and good R8 signals rewarded us and, best of all, our plotted bearing almost passed the same point—an error could only be expected, as our true position on the map was only known approximately.

Then alas! the human element entered, with the usual results, for a "Ham" (I won't spoil his international reputation), and myself decided to look per visible D.F. (binoculars) where they might be, and after a cross-country steeplechase of a couple of miles, at a speed accelerated by a view of our most dangerous rivals, we were kindly rescued, rather weary, by VK2BC, and gently given the information that we had sighted the hidden transmitter early in our exercise gallop, and that the rest of our party found it soon after we had left. We had noticed feminine company, and at once given that particular party a miss. Moral: Follow your loop directions all the time; not your idea of where a nice spot "would or should be."

But all the same our party was the first in, and "we" had won—even if two of us were a mile or so away, at the time of the finding. We found the hidden transmitter in the good time of just over one hour. At noon the winners of the previous

test, VK2RC and VK2IJ, arrived—victims of loss of confidence in a perfectly irreproachable loop. At 12.30 p.m. a third party, VK2DW and VK2LH, after two hours' searching and passing the right spot at least ten times, arrived. VK2HR, VK2JX, and VK2LZ arrived at 1 o'clock, after a late start, and delayed by a couple of wrong bearings.

At 1.10 p.m. three rockets were fired, the position of the transmitter was given over the air, and a car left for the rendezvous.

After lunch other ham stations were worked, with 'phone and CW, but one lad's attempt from behind a bush, per his receiver, was discovered in time. A description of the finding of the transmitter was given over the air by the leader of each party. Later, a test between VK2WI and VK2HL, in a tri-engined Avro, was attempted, and proved to be very successful.

At 4.30 p.m. the field day was declared closed and several car loads of somewhat tired and decidedly wiser "hams," plus one semi-BCL, sundry receivers and gear, started off for home.

One of our Dutch members, PA0FLX, has asked us to state that he is anxious to get into touch with G stations on either 7, 14 or 28 M.C. He will also be pleased to receive reports on his transmissions.

Stray.

It is often thought that QSL cards cannot be fixed to the wall without damage to the wallpaper, though why the damage should matter is hard to understand if the cards are over it. At any rate, hams interested should buy a packet of what are known as Art Corners from the local Woolworths, who supply so much to amateur radio—towel bars and so on. These art corners are small circles of stiff gummed paper slotted like a photo album to take the corners of postcards. If the QSLs are mounted with these on a large sheet of brown paper no damage to wallpaper occurs, as the brown paper can be attached to the wall with but four drawing pins, and can be removed at any time for spring-cleaning and other pagan rites. The sum of 3d. buys 100 of these useful items.

N.P.L. Calibration Service.

In order that amateurs may have an official calibration service the Post Office have arranged with the National Physical Laboratory to transmit calibration signals from G5HW on 1,785 kcs., on the first Tuesday in March, June, September and December of each year at 9 p.m., the first taking place on Tuesday, March 3.

The form of the transmission will be "CQ de G5HW" repeated several times, then "Standard wave frequency transmission on 1,785 kilocycles," followed by a continuous dash, the whole transmission lasting about 10 minutes; this procedure will be repeated six times in the hour, i.e., at 0, 10, 20, 30, 40 and 50 minutes past the hour.

We feel we are much indebted to the Post Office for this action, which will assist us to adhere closely to the terms of our licences.

Apparatus Worth Buying.

Heavy Duty Resistances

WE have recently had the opportunity of examining some heavy duty resistances made by the British Electrical Resistance Co., Ltd., of Ohmic Works, Queensway, Ponders End, Middlesex. These resistances are of an entirely new design, and are a great advance on anything we have seen so far. The wire is wound on a hexagonal steel tube, which is heavily vitreous enamelled, and this shape gives a very large bearing surface for the slider. The old type of laminated spring contact, which causes so much wear on the wire, is discarded and its place taken by a metallic carbon compound brush. This brush, of generous dimensions, forms the sliding contact and is housed in a bakelite finger grip control of a novel design, which moves on a plated hexagonal rod. The brush is kept at constant pressure on the wire by a strong spring, and, as the carbon compound reduces the friction, wear and consequent loss of carrying capacity is reduced to a minimum. Three terminals are provided, one at either end of the resistance and one for the slider. A Type "O" resistance of 7.5 ohms to carry 5 amps. was tested on 4.4 amps, and after two hours' continuous use did not heat up in the least. This model was also tried for voltage regulation on 2 amps. and it was found that the adjustment was so smooth that the voltage could be controlled to a fraction of a volt with ease. The price of these resistances is comparatively low and varies with the type required. As a guide the price of Type "O," in various ratings from 810 ohms carrying 0.3 amps. to 7.5 ohms carrying 5 amps., is £1.

The same firm also makes a vitreous enamelled resistance unit, which is wholly covered with enamel, in various values, dissipating from 10 to 150 watts. In these the contact wires, which are brought outside for connections, are spot-welded to the resistance wire, making a good, sound job. The result is a dirt-proof, airtight resistance or potentiometer.

The price list, which is obtainable from the makers, gives some interesting curves which show the temperature to which the resistances rise under various loads. These should be useful to people who habitually overload such things as resistances.

A New Mullard Release.

The PM2A is a newcomer to the market and in this valve we have an excellent power valve of the 2-volt variety. Its performance is greatly in excess of its predecessors, and it is really very good value at 10s. 6d.

The filament is rated at 0.2 amps., and 150 is the maximum H.T. volts. Under test it was found to consume as small a current as 4 milliamps., using 120 volts H.T. and 6 volts G.B. Its mutual conductance is 3.5, the amplification factor 12.5 and the anode impedance 3,600 ohms.

We can safely recommend the PM2A as an extremely satisfactory and efficient valve for loud-speaker work with low H.T. voltages, and in view of its low current consumption it should be excellent in the last stage of a portable receiver.

Clix Anode Connector.

For the benefit of users of screened grid valves in now popular metal screening boxes, Lectro Linx, Ltd., now manufacture a suitable vertical type anode connector, this being in addition to their horizontal type. It will be found that ample clearance has been provided to enable the insulated resilient socket to penetrate the hole in the top of the valve screen and make good contact with the vertical pin tag fixed to the S.G. terminal. There is no possibility of a "short" when connecting or removing. Price 3d. each, retail, engraved.

Curing Trouble from Eliminators.

PATENT 328117.

With reference to a letter under the above heading in last month's BULLETIN, we have received a letter from Messrs. Ferranti, Ltd., drawing attention to the fact that the use of two condensers in the manner indicated for the removal of "tunable" hum is covered by Ferranti Patent No. 328117, and its use is explained in their booklet W.522, dealing with the construction of supply units, a copy of which will be sent by them on request.

We are also informed that Messrs. Ferranti, Ltd., have available a double 0.1 mfd. condenser (type C3c), listed at 4s. 6d., which has been specially designed for this purpose, and that the use of the condenser in question automatically gives permission for use of the patent.

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Contact Bureau Notes.

By H. C. PAGE (G6PA).

IT has fallen to my lot to take on the work of Contact Bureau Manager. Now to carry on the work so ably done by G5VL is no easy task, and I must crave your indulgence if my efforts do not come up to his. You may rest assured that I shall do my best to uphold the fine traditions of CB.

Contact Bureau has grown by leaps and bounds, and has become a task far too large for the spare-time services of any one man, be he ever so willing. Therefore it has been deemed necessary to make certain alterations in the organisation of the section. In future the conduct of each section of the Bureau's work will be in the charge of one man, who will be known as a Group Manager. It will be his duty to take sole charge of his section, and supervise the work of the different groups studying the same branch of research work. For instance, one man will be responsible for all the 28 M.C. groups, and another for all QRP groups, and so on.

It must be quite obvious to all of you that one man cannot possibly be *au fait* with all branches of the work, and it is felt that to put a keen man who knows more about his own particular section in charge of that section will make for better working all round. Moreover, it will leave the CB manager more time to deal with other matters affecting CB. To this end, certain men have been asked to take charge of the different sections, and next month I hope to publish a list of such sections, and their managers.

For the benefit of those who have not my new address, here it is: H. C. PAGE (G6PA), Plumford Farm, Ospringe, Faversham, Kent. Please make a note of this.

Now let us turn to CB work proper. In the first place, I must apologise if these notes are rather disjointed this month. I have had to take over at short notice, and there has been a lot to be done, and very little time in which to do it.

No doubt the most interesting sphere of activity this month is the 28 M.C. Tests. From the reports I have seen so far, I fear there has been but little success for anybody, but, of course, there may be some that have not come to hand yet, and there is still time for a change. The good conditions that we used to experience on this band seem to have gone from us. I have a theory that the characteristics of the different bands change as time goes on, and possibly, if this is the case, we only started to find out about 28 M.C. as it began to wane in usefulness. Let us hope that it will soon begin to wax again.

Everyone will agree that 14 M.C. is nothing like as good as it was a year or two ago, even allowing for the improvement in our apparatus, while 3.5 M.C. and even 2 M.C. seem to be increasing in usefulness.

I have some interesting particulars from G6AQ with regard to VK2LZ, Mr. W. E. C. Bischoff, of Crows Nest, N.S.W. VK2LZ is very keen on 28 M.C. work, and spends a lot of time on that

band. He transmits nearly every Sunday, but although he has had several reports from New Zealand, has only effected local QSO's so far. His transmitter on 28 and 14 M.C. is a M.O.P.A., the P.A. acting as a frequency doubler on both these frequencies, and on 7 M.C. as a neutralised M.O.P.A. His frequency is 7025, 14050, and 28100 Kc. The aerial is a ten metre Zepp. It has a ten metre top, and feeders of 7.5 metres in length. The height is about ten metres above the ground, giving low angle radiation. A reflector is also used occasionally.

The transmitter itself uses two TBO4-10 valves in parallel for the P.A., with power varying from ten to sixty watts. The oscillator consists of two B409s and power from three to twelve watts, according to the power used on the P.A.

The receiver is a five-valve affair, and has one SG RF stage, a detector, and three stages of RC amplification. The RF stage gives wonderful gain down to about 15 metres, but is not used on 28 M.C., the aerial being taken via the grid of the second valve for this band. During the summer months, a four-foot aerial is connected straight to the grid of the SG valve, and this gives a great decrease in QRN, while no decrease in signal strength is noticed.

G6NF told me the other day that he does not know which group he is in, if any, and as I was new to the job I could not help him much, so I am putting his notes in among the odds and ends. I don't suppose he will mind.

He has reconstructed both transmitter and receiver for this month's tests. The transmitter consists of a T.P.T.G. crystal controlled, utilising a Mullard VO-50 with an input of sixty watts. The reconstructed receiver is of two valves, PM2DX as detector, and HL210 as LF stage. This latter valve is coupled by means of a Ferranti A.F.6, which gives much greater signal strength than was hitherto obtained. He has reverted to the end-fed type of antenna, but as DX is lacking, results are not yet forthcoming. The absence of feeder tuning condensers, and, therefore, simplified adjustment is greatly appreciated. The length of the antenna is 69 feet. His results on 28 M.C. to date are as follows:—

Dec. 28.—Harmonic CN8MC. Very chirpy.

D.C. R2. Calling G5BZ.

Jan. 3.—Nil. Jan. 10. Nil.

Jan. 17.—FM8Z Calling CQ ten R8 R.A.C. Note faded right out. 14.20 G.M.T.

G6UN has also started up on 28 M.C. He has not yet heard anybody outside London. He reports that he has cured threshold howl in his receiver by using a DE5B as LF valve in place of a PM6. He is using a O-V-1.

ZL3CP writes to say that he is starting up again, after quite a long absence. He says he is keen on 56 M.C. work (I hope our 56 M.C. men will note this.—D.A.) He is building a CC transmitter to work on 3.5, 7, 14, and 28 M.C. His output valve is to be a Phillips screen grid 75 watter. He hopes to

arrange a schedule to work G stations, and wants to be able to handle B.E.R.U. traffic.

That, I think, concludes the various reports that have come to hand with regard to 28 and 56 M.C. Now for a few lines from an old friend, OK3SK, who, by the way, is now OK3AK. 2 M.C. is his special subject, and he has worked quite a number of stations in different parts of Europe on this band. He has had no less than 60 QSO's with G stations. He remarks that for medium distances 1.7 M.C. gives greater signal strength than 3.5

M.C. He has confirmed this by a 24-hour test with OK2RM. He favours a low power Hartley outfit, and has made his W.A.C., but not on 1.7 M.C., of course. Please note his new address, OK3AK Neu-Ebersdorf, Czechoslovakia.

G5VL asks me to say that he made an error in attributing the two 56 M.C. transmitters described in last month's notes to G6DH. Really they were due to G6XN. VL regrets this error, and trusts G6DH has not been caused any trouble thereby.

Group Reports.

28 M.C. Work.

Group 1B.—G.C. G5SY is beginning to lose hair in patches through scratching his head trying to think of something to keep the interest of the group up, during the most depressing conditions now being experienced on this frequency band. He feels that he has been lucky to get any results at all, conditions have been so very bad. A few harmonics have been heard, but that is all. He reports having heard the following: WSC R7, WCC R3, WAJ R5, WPE R6, and WQP R3 on December 27, and again on January 3, just above the 28 M.C. band. He heard a very unsteady DC note in the band at R2 on December 6, but could not read it. None of the other members of the group have anything of interest to report.

Group 1C. G.C. G6VP has rebuilt and changed over to a Standard Goyder lock, and although the mechanical difficulties of tuning have greatly increased, and the last two FDs had to be rebuilt with a view to greater efficiency, the output bears no comparison; the Goyder lock to a T.P.T.G. being 50 per cent. more efficient.

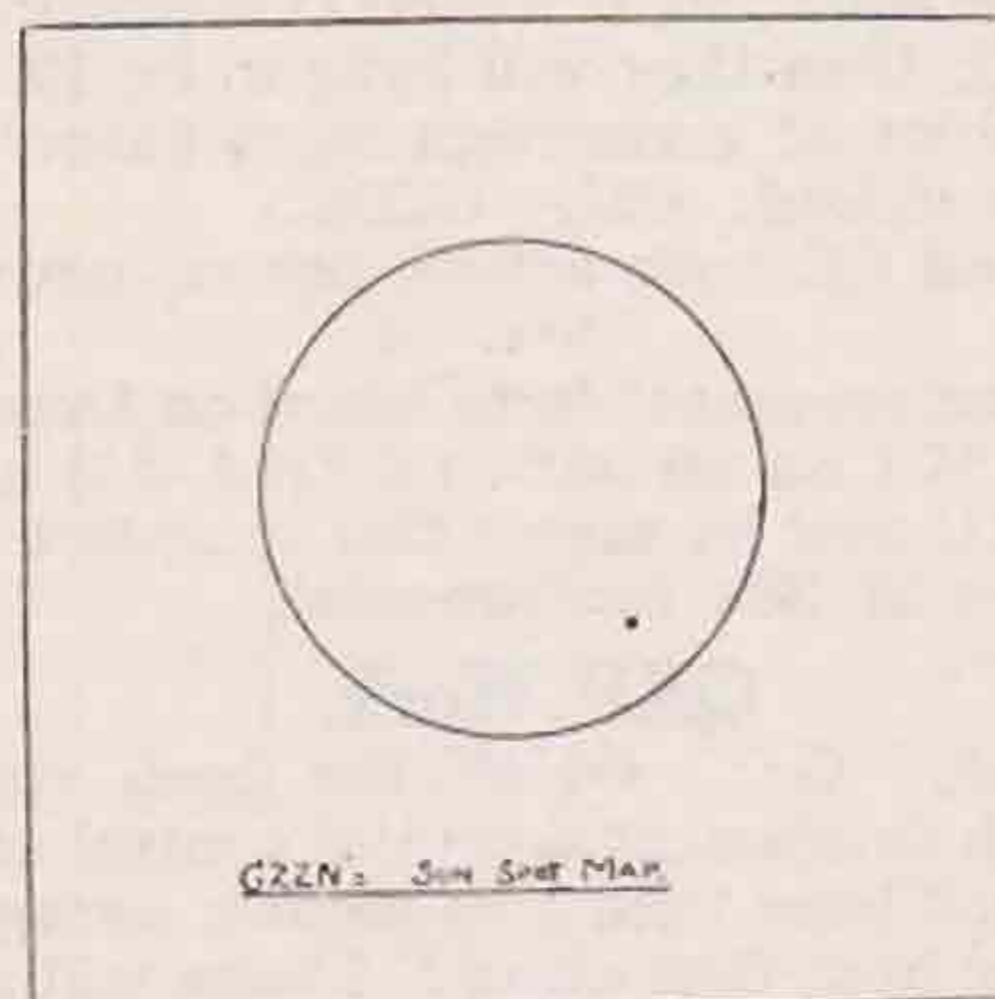
He finds that there is only one good way of assuring that the lock is maintained, and that is by observation of the plate feed at the plate of the last FD, which drops right back when the lock has been properly made. At the request of CB he has tried another aerial, which points NW at the free end, and has $6/2\lambda$. Its length is 67 feet on the top, with 33 feet down lead. The free end is 53 feet high, and the home end 36 feet. Locally it appears to be very directional. On 14 M.C. it is really very good, as a considerable amount of DX has been worked. G5YK has been off the air as a result of alterations to his power supply. He will be working again in time for the tests. He has only heard G6HP on the last two Sundays. G6WN has practically rebuilt and changed to a $4/2\lambda$ end on aerial. He is being received all round London at up to R9 and should do well when the DX comes on. G6DH complains of the paucity of 28 M.C. enthusiasts in other countries. He says that there are very few Americans working now, and as SU8RS is no longer working DX is very limited, which, coupled with the fact that he has no local stations, makes things worse. His log is as follows: November 2, LSD. November 3, HJO, LSD, WGP, WKD, and SUZ. November 9, Transatlantic Fone R4. CQ ten de CN8MOP called him and made contact, but faded out very soon afterwards. November 23, commercial harmonics, and nothing else until December 21, when he heard Transatlantic Fone again. G2XH, ex 2BIV, has got his full ticket now,

and is to be congratulated. He has been running a schedule with G6YC and is now getting set for the tests.

Group 1 F. G.C. BRS25. G2CX is the only member to report this month, but I know full well that the others are active. Their silence is attributable to the bad conditions for DX work which still continue on 28 M.C. BRS25 heard about a dozen local stations, but no DX. December, which hitherto has been a very good month for DX on this band, appears to have been a complete blank this year, at least in this part of the globe.

Fading, Blanketing and Blindspotting.

Group 2A. G.C. G6NK is disappointed that his remarks on the direction of radiation have met with no response. He says all reports are scanty this month, but hopes for better work next month. BRS426 mentions a clinking sound due to atmospheric disturbance, but no one else seems to have heard it. He has also made some interesting observations during foggy weather. He states that during fog no Gs were audible, but came in as usual when the fog disappeared. 2AYX sends an interesting article by G5PX on the effect of the moon on short wave signals. G6SU has been very busy, and had little to report. A discussion on lightning discharge has brought in some remarkable statements. (You might let us have those, OM. DA.)



Group 2B. G.C. G2ZC. As a group we have very little to report this month, owing to the fact that we are trying to sum up amongst ourselves the various points we have been discussing for the past five months, on the subject of the Heaviside Layer. This has been a more formidable task than we at first thought it would be, but when we do get it out we shall submit it to the other members of C.B.

There is very little doubt now that our sun spot theory has been fully proved, and as G2ZN has kindly offered to give a sun spot report each month, it should not be difficult for R.S.G.B. members to forecast as to which band it will be the best for working on, if they follow our theory.

We have opened up a new subject for discussion on the various types of fading experienced. In passing, it might be added that the summing up of the Heaviside Layer by the group, even in telegraphic form, made up a budget of 18 pages of close typed paper! Members of the group are: G6YL, G6PP, G2IM, G2ZN, CTIBK, G2ZC (G.C.), and ex CTIBL as honorary member. G2ZN's sun spot map is given on page 225. He states that it has been a very quiet month in the sun spot business, and has been responsible for some of his best DX.

56 M.C. Work.

Group 7A. G.C. G2DT writes: W9AUH reports that he will be using G6TW-G2DT transmitter for the first half of February, but from February 15 to 28 inclusive he will be using Split Colpitts with 600 plate volts PDC to a type 10 with grid and plate tuners each of $50\mu\mu\text{F}$; inductances $1\frac{1}{2}$ turns $2\frac{1}{2}$ in. diameter to a single wire VF with vertical $\frac{1}{2}\lambda$ radiator. A single $\frac{1}{4}\lambda$ reflector will be used, and orientation will be on London (Best of luck 7B.—G2DT.) Transmission will be continuous 24 hours per diem consisting of V V V de W9AUH, and whenever possible the operator will listen in to attempt a QSO. This is an exceptionally fine effort on the part of this OM and may he succeed in getting his signals picked up.

G6TW has been studying feed lines to radiators, and propounds the following: "If a 7 M.C. wave is compared with a 56 M.C. wave, the losses in the latter will be eight times those in the former, with leakage from feeder to feeder, hence we are not putting the power into the radiator. To do so one must start to spread out the feeders in ratio to the assumed leakage. Assuming feeders are 10 metres long, then there are really two fundamentals thereon, which means that the spread must be eight times more for the first 5 metres, and eight times more for the second, that is, 16 times greater than the distance at the start; so, if feeders commence by being 8 ins. apart, then they will have to be 10 ft. 8 ins. apart at point of connection to radiator." (Very interesting indeed, OM.—G2DT.)

G6LK and GC both active, but no news in particular.

G6LK just reports that he heard on December 11 at 21.30 G.M.T. on 56 M.C. CC QSA-2/3 a station signing ORU and he places this reception of ORU as harmonic of 38λ fundamental.

QRP Work.

Group 8A. G.C. G5RV has been very busy, mainly with fundamental crystal control on 7 M.C. QRP has not been tried this month, owing to this, and moving from digs again! Please will all members note that his new address is now 44, Marconi Road, Chelmsford, but that G5RV will operate from its original address at 27, The Avenue, Sunbury-on-Thames. He has had a month of misfortunes, as nearly everything possible has gone wrong. However, work continues on the new station. Results so far have yielded only local QSO's, the best being with OH6DK, who gave R7 in daylight. Work with 7 M.C. quartz crystals, and

their application to 7 and 14 M.C. still continues. G2WP complains that conditions are still too bad for DX, but has got SP3LP and EAR185 on 3 watts. On 5 watts he has added three new countries to his list, LA, ES and CT. On 3.5 M.C. band, all England has been covered with 4 watts. He wonders why, in the present dud conditions, CT, EAR, FM, CN and a few Southern French stations can still be heard after dark, but nothing else at about the same distance.

2ABS finds that, on 1.7 M.C., DX is best with a full moon, and other WX conditions have little effect. On 7 and 14 M.C. DX is good when the barometer is steady and high, and not good even if it is high, and going up; it must be steady. 3.5 M.C. is more or less like 1.7 M.C., but less marked. G6MB reports continued bad conditions on 7 and 14 M.C., where he has been trying to help 8A in the matter of the Blank Trophy. Most of the month he has been off the air, owing to various causes, mostly the festive season. He considers 14 M.C. to be the only band for QRP DX these days . . . when it behaves itself. G6LF, a very staunch supporter of 8A, fails for the first time. This, in connection with the dark rumours concerning a permanent ten watter at this station, is causing the G.C. some anxiety.

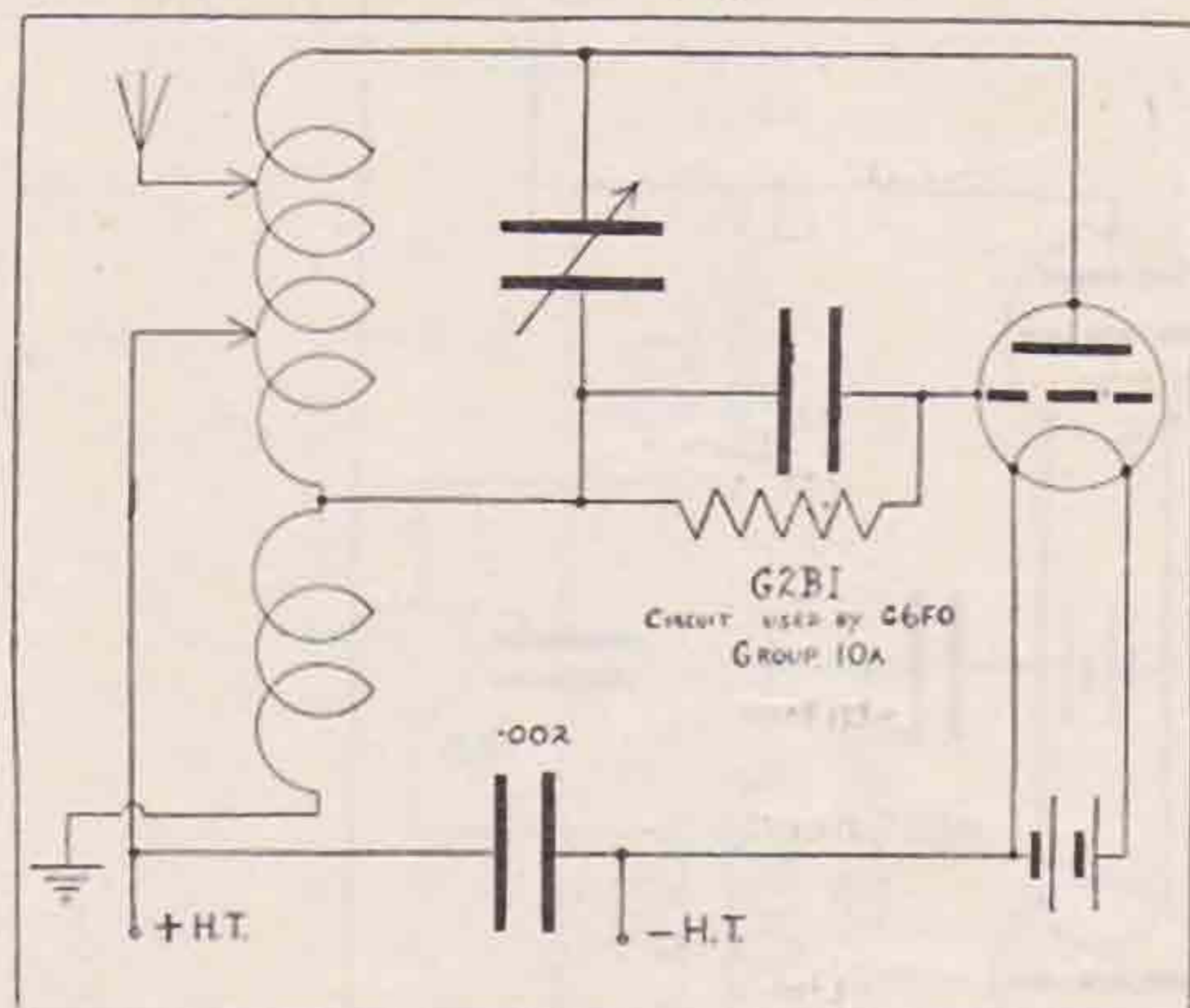
Group 8A still needs another member. Will any volunteers please write to the G.C.

Group 8C. G.C. G5PH has now got a new den built, and is on the air again at his new QRA. He has done well at the time of writing, having worked SP and EU. He has heard some Yanks, but cannot QSO W yet. With the help of G6QA, he has been testing out some aerials. He has put up a half-wave Zepp Hertz, and with 4 watts input gets .4 of an ampere in the feeders. A DE5 is used as oscillator, and a LS5 as modulator, with a SP55 as speech amplifier. G2AT has been too busy to report, but he has been heard, and is still on very low power, about 1.5 to 2 watts. G2AV has rebuilt his transmitter, and is glad he has done so. He is using air-spaced coils on glass rod mountings, and can change from 7 to 14 M.C. in one minute. He is using CC on 7 M.C. He finds very little doing in the way of DX. G6PS has not much time for radio, and has had to drop out. The G.C. wants another man to take his place. G5AQ is doing well with a C.O.P.A. input of 5 watts. G5QA is still alive, but has not reported this month.

2 M.C. Work.

Group 10A. G.C. G5UM.—All members of Group 10A are particularly active at present, and turn in 100 per cent. reports for January. G6ZH does not let business QRL interfere with transmitting, and continues to do good work on the band. He keeps a regular sked with G6FO on Sundays at 09.00 G.M.T., and has conducted some unusual tests with him when receiving his 2 M.C. harmonic at R6 on 3.5 M.C. Slight trouble is being experienced with chirp, and the use of a three-wire counterpoise seems to do the greatest good. G6ZH comments on the excellent results obtained from an S.G. detector, pentode receiver, which is ideal for fone reception, and eliminates blind spots and swaying aerial effects. BRS164 continues his consistent DX reception, but has nothing outstanding to report this month. Rather considerable QRM is experienced from commercial C.W. stations either working within

the 2 M.C. band, or emitting violent harmonics. (Several South London hams have great trouble from harmonics of Kidbrooke.—G5UM.) 2AZQ is thinking about the question of qualifying for his open-aerial ticket, and requests details of suitable transmitting circuits. He does not want anything elaborate, but intends to use a single valve rig mainly for local work on 2 M.C. On the receiving side DX stations are still at a premium. G5RX, who has been on 2 M.C. for very many years, finds conditions better than ever. His crystal control note has penetrated to many parts of the country



during the past month, and he has worked several London stations, and G6OO, G.C. of Group 10B, in daylight. He expresses the hope that more Continentals will follow OK3SK's example and use 2 M.C. more—a wish that is echoed by the other members of 10A. G5RX thinks there is room for more research into skip effects on the band, adding that he regularly finds that stations some fifty miles away are not so loud after dark as those 200 or more miles distant. Naturally, local contacts are not affected, being within the range of the ground wave. A few comments from other CB members on this question would be appreciated. G5RX's

sked with G6FO is being kept at 23.15 on Fridays, and though results have not been up to expectation, RX has altered his aerial and hopes for better luck. G6FO also keeps a sked with BRS164, who has noted some extraordinary variations in QRK. As FO's input and radiation are always constant, he thinks that something quite apart from WX is the cause. What is believed to be an original modification of the Hartley circuit has been tried out. It is given herewith, and is, says G6FO, due to G2BI. The H.T. is connected to the nodal point of the oscillator coil, thus eliminating all H.F. chokes. In order to keep the H.T. off the grid, a rather high value of grid leak must be used. G6FO recommends the Ediswan receiving compression type available in values from 10,000-500,000 ohms, according to the valve used. If desired, the grid leak could be taken to L.T. through an H.F. choke. To give an example of the efficiency of this circuit, G6FO says that on 28 M.C. it gives 70 per cent. against 20 per cent. for an ordinary Hartley! G5UM has been carrying out a few bench tests on various lines. The Mazda AC/HL, after a period of considerable testing, has proved itself to be eminently suitable as a crystal oscillator, but the heater must be left running all the time, as it delays changing over if switched on each time. An excellent QSO was made on December 20 with G6FO, while G5RX was worked a little earlier. All members of Group 10A report conditions remaining good, though on some evenings DX is harder to work than on others, although plenty of it can be heard, as on January 18, for example.

Group 10B. G.C. G6OO and G6UJ keep up a regular schedule on 2 M.C. They have been very busy with microphone and speech amplifier work. They are able to keep up an unbroken sked at any time of the day or night, while G6MN, G6DR, and G2KO all work regularly. Fone is the order of the day between all, save G6MN, whom no one seems to be able to work, except on CW. G6PS, of Hull, wishes to drop out, and give some more active ham a chance. The C.G. hopes G5YM will join in with them.

* * * * *

Review of Foreign Magazines.

(ABSTRACTED BY G6FY).

A MOST interesting transmitting circuit, which allows of crystal control at any desired frequency by means of a single crystal, is described by Mr. M. Cosyns in the January Q.S.O. Two independent oscillators of frequencies, f_1 , f_2 , are arranged to drive simultaneously a pair of valves arranged as a push-pull amplifier, the drives being in phase on the grid of one valve of the amplifier, and in opposite phase on the other grid. The plate current of the amplifier contains oscillatory components at frequencies f_1+f_2 and f_1-f_2 , and if the plate tank be tuned to one of these frequencies, the output will be almost entirely at that frequency.

In a numerical example given, f_1 equals 6,700 Kc/s., and f_2 is variable between 300 and 600 Kc/s. The output, tuned to f_1+f_2 , is, therefore, variable from 7,000 to 7,300 Kc/s.; i.e., over the 7 M.C. band.

The stability of the output frequency is deter-

mined by that of the two drives. The constant high frequency drive can be stabilised by a crystal, and the variable drive is at such a low frequency that no difficulty is experienced in constructing an oscillator of high frequency stability. Thus the output can be made very stable; it is actually

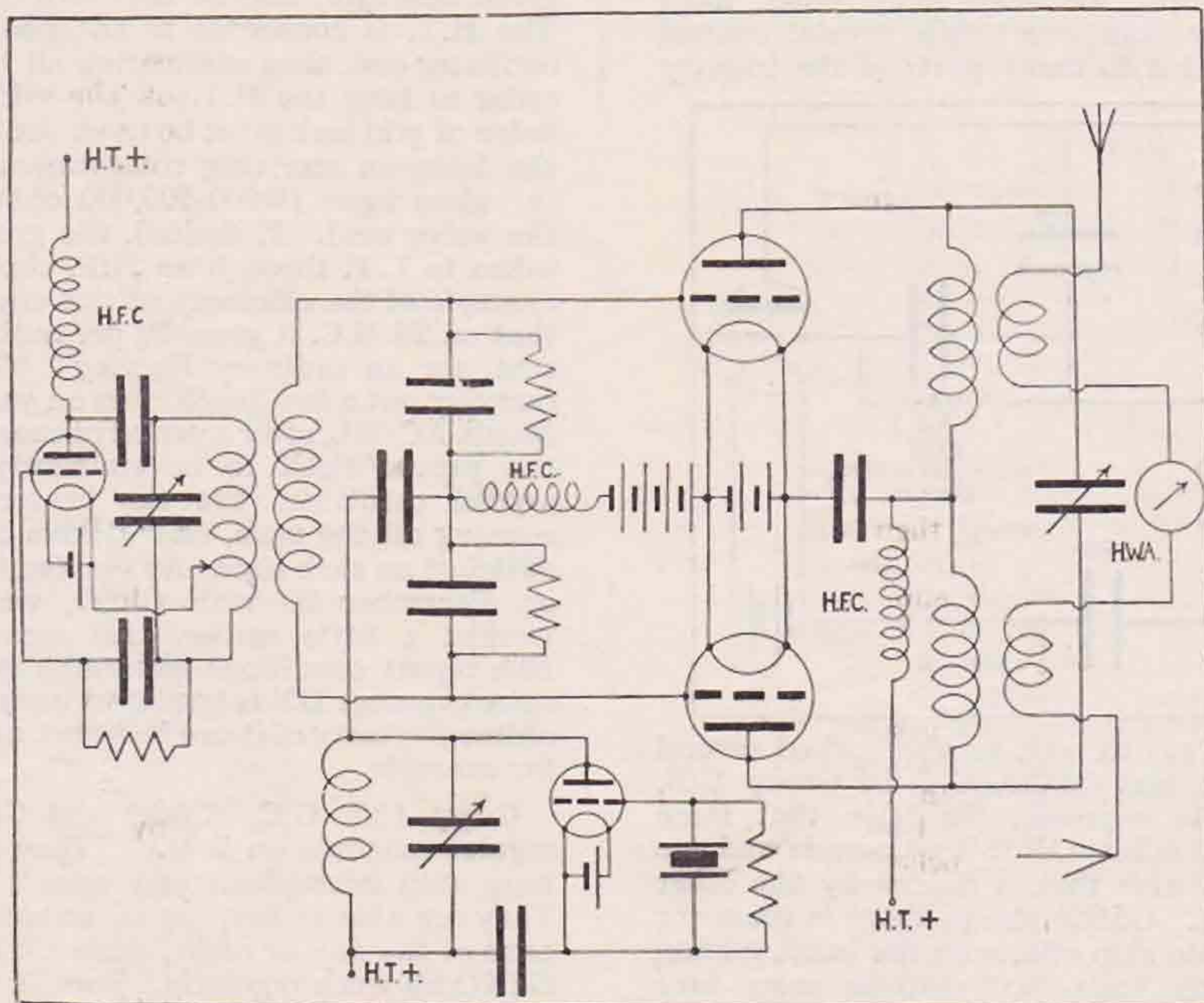
stated to be $\frac{f_1}{f_2}$ more stable than in the case of

a properly adjusted MOPA, and quite comparable with a fully crystal controlled set. In this way, C.C. results are obtainable, in the numerical case given, over the whole 7 M.C. band, and with a 6,700 K.C. crystal.

A practical circuit is given in the diagram. Adjustment is very simple and is effected as follows: Having biased the amplifier down to draw very little current, the crystal oscillator is switched on, and its coupling to the amplifier adjusted until the latter draws normal working current. The crystal

oscillator is then switched off and the low frequency oscillator switched on, its coupling then being adjusted until the amplifier draws the same plate current as when previously driven by the crystal. With both drives operating, the plate circuit of the amplifier is then tuned to the desired output frequency. It is most important that the output circuit be carefully balanced and tuned, or undesired frequencies will be passed to the aerial. In order

shown that in general there is a definite connection between the yearly average number of sunspots and yearly average signal strength. Agreement over shorter periods is not always so close, but there is a connection between terrestrial magnetic activity and signal strength considered over monthly periods, the relation being a direct one in the case of E-W transmission, and an inverse one for S-N transmission.



to change frequency, it is only necessary to retune the low frequency oscillator, and the amplifier output.

The relations between "Solar and Magnetic Activity and Radio Transmission" are discussed by L. W. Austin, E. B. Judson, and L. J. Wymore-Schiel, of the Bureau of Standards, in the December *Proc. I.R.E.* Observations on long wave stations over a number of years are presented, and it is

A novel form of bug key, in which operation is controlled by an oscillating valve instead of by mechanical means, is described by DE712 in the December *CQ.* On one key contact the valve is caused to oscillate at very low frequency to give the dots, and on the other it is put out of oscillation, giving a dash. Actual keying is effected by a relay in a plate circuit of the valve.

* * * * *

28 M.C. Tests.

STOP PRESS REPORT.

At the moment of writing, little is known of the fortunes of the various experimenters on 28 M.C., but it seems certain from the few reports that have already come to hand that conditions on this frequency were consistently bad throughout the tests.

It has been apparent that world-wide interest has been aroused by the tests, and any lack of contacts cannot be set down to apathy or poor organisation. It is to be hoped that the next few days will bring in better news of the last days of the tests, but any such information must wait until next month's BULLETIN.

Certain reports have come through from across

the Atlantic with regard to the first Sunday, January 4. On this day VE2AC heard G6WT'S harmonic; QSA5 on 14 M.C., and QSA2-3 on 28 M.C. On January 11 VE2AC heard CT1AA, but thinks it was also a harmonic. Other than some American signals, VE2AC heard no other identified signals. Information comes along from ARRL: W2ACN heard or worked nine W stations, but heard no G signals. W2ALW heard or worked three W stations. Other information will hold over.

Reports from the East and from VK and ZL say ND for the first days, but it is hoped that more cheerful reports are on their way.

(Continued at foot of next page, col. 2.)

One Watt Week.

WE are all, I am sure, very sorry that G5VL has found it necessary to resign from Contact Bureau. The splendid and efficient way in which he carried out the tremendous amount of work involved in running the section deserves the thanks not only of members of the Society, but also of every amateur who has been helped in his experiments by the very useful information and hints which have been published by C.B. in every issue of the BULLETIN. It is a great pity that G5VL was unable to carry on with the good work. Just before resigning, he asked me to take over the organisation of the low-power tests which were proposed in the December "BULL." and although I was rather dubious of the success of this venture, I agreed, and will do my utmost to carry the tests to a successful conclusion.

The object of these experiments is to determine the maximum distance over which communication can be established with consistency when using inputs of not more than 1 watt. The low-power groups of C.B. have promised their whole-hearted co-operation, but it is to be hoped that many other members of the Society will enter for the tests, and help to prove that QRO is not nearly as necessary for successful contacts as some people would have us believe.

Will all stations who intend participating please send me a card (a QSL card will do), signifying their intention. The tests are open to all R.S.G.B. members residing in the British Isles, and the rules of the contest are set down below.

Reports should give details of every contact made, and should be made out as follows:—

Date. G.M.T. QRH. QSO. QSA. QRK. QSB. QRN. QRM.

Under the last five headings particulars should be given of your signals as reported by the station you worked.

G5VL has very generously offered a prize of £2 2s. worth of radio goods to be awarded to the station compiling most points. I am hoping to take part in the tests myself, but will be ineligible for the prize.

Now, then, some of you QRO merchants, dust up that old half-run-down receiving battery and let us see what you can do on QRP.

Rules.

- (1) The tests commence at 21.00 G.M.T. on Saturday, April 11, and finish at 08.00 G.M.T., on Saturday, April 18, 1931. All reports must reach M. W. Pilpel, 54, Purley Avenue, London, N.W.2, not later than Saturday, May 2, 1931.
- (2) Only QSO's made between the hours of 21.00 G.M.T. and 08.00 G.M.T. will count.
- (3) The input to the main oscillator must not exceed 1 watt of pure D.C. supplied by accumulators or dry batteries.
- (4) No schedules may be arranged, and more than one contact with the same station within one period will only count as one contact. A period is reckoned at 21.00 to 08.00.
- (5) Contacts may be established on any licensed amateur frequency band, according to individual licences.

(6) Communication must not be established on high power and then reduced to 1 watt. Less than 1 watt may be used, but will not count for extra points.

(7) Inter-English* QSO's do not count for points, but in the event of two or more stations tying on points, the one with most inter-English contacts will be considered the winner; therefore, they should be included in the reports.

Points for other countries count as follows:—

- (a) One point each Wales, Scotland, Ireland (N. and S.), Channel Isles, France, Belgium, Holland and Germany.
- (b) Two points each Norway, Denmark, Sweden, Spain, Italy, Austria, Luxemburg, Switzerland, Czechoslovakia and Faroe Islands.
- (c) Three points each Portugal, Finland, Jugoslavia, Latvia, Esthonia, Hungary, Rumania, Danzig, Poland and Lithuania.
- (d) Four points each Algeria, Morocco, Azores, Madeira and Russia in Europe.
- (e) Five points each Egypt, Iraq, Palestine, Syria, Canary and Cape Verde Islands, Trans-Jordania and Russia in Asia.

QSO's with ships will be awarded points for the groups into which they would naturally fall, e.g., up to 500 miles=a, 750 miles=b, 1,250 miles=c, etc., etc.

For every contact above 5 with each country in group (a), multiply by 2.

For every contact above 4 with each country in group (b), multiply by 3.

For every contact above 3 with each country in groups (c) and (d), multiply by 4.

For every contact above 2 with each country in group (e), multiply by 5.

In the event of anybody working a station situated outside the limits of the countries mentioned, they will be awarded points accordingly.

* In the cases of Welsh, Irish, Scotch or Channel Islands stations, the words "Inter-English" should be taken to mean inter-Welsh, inter-Scotch, etc.

M. W. P.

28 M.C. Tests—(Continued from previous page.)

One thing is certain, and that is that 28 M.C. has never before had such attention all over the world, and with a little more luck as regards conditions, there would have been a different story to tell.

Detailed information and a survey of the tests will be in next month's BULLETIN, and I hope to acknowledge every report therein.

GI6YW.

Strays.

G6BU, 64, Arthur Street, Ryde, I. of W., would be pleased to hear from anyone using a 7 M.C. crystal in a low-power transmitter.

* * *

ON4COP requests reports on his QRP transmissions (commenced last November).

Empire



News.

AUSTRALIA.

By H. R. CARTER (VK2HC) AND A. S. MATHER (VK2JZ).

Report for December.

THE improvement on all frequencies is most gratifying. The 28 M.C. band is responsible for a good deal of wasted R.F., but local QSO's are reported in Victoria and N.S.W., the only DX is between VK3 and VK4. Everyone is waiting with great excitement for the R.S.G.B. tests on 28 M.C., and we hope to establish a G-VK QSO during them. The best time for 28 M.C. work seems to be between 20.00 G.M.T. and 02.00 G.M.T.

On 14 M.C. the conditions are quite good, and the usual number of G's are coming through with varying strength. The best time for 14 M.C. contacts is between 12.00 and 15.00 G.M.T.

On the 7 M.C. band mostly local work is being done, but QRN has been very bad lately. Every week-end there is an increasing number of stations working on CC and very seldom is a bad signal

EGYPT.

By SU8RS, Egypt Signals, Polygon, Cairo. (Via G6VP.)

There is not much news this month on account of the few stations at present active in Egypt, i.e., SU1AA and SU1AQ.

Conditions on 14 M.C. have been good on the whole and many VK's are coming through quite well.

Only one DX station has been heard so far on 28 M.C. during the tests, this being YI6HT.

Mr. Runeckles, the ex-owner and operator of SU8RS, will be in London on or about February 20, and is looking forward to meeting his many friends in London before proceeding home.

IRAQ.

By YI6KR.

Iraq reports good conditions on 7 M.C. and on 14 M.C. variable, but improving with good intervals. Bad fading usually sets in about 14.00 G.M.T. 28 M.C. has proved a wash-out.

BRITISH EMPIRE RADIO WEEK.

February 22, 00.00 G.M.T. to 28, 24.00 G.M.T.

Open to all members of B.E.R.U. and R.S.G.B. (for full particulars see Dec. "Bulletin")

heard. Alas for them if they are logged by a Vigilance station.

[We have also received an interesting report from Mr. Sones, of the W.I.A., but as the above is more recent it has been published in preference.—ED.]

CEYLON AND S. INDIA.

By VS7GJ, Frocester, Govinna, Ceylon.

During the early part of December cool mornings and evenings were experienced, and DX conditions as far as the low-country is concerned were favourable during this period, especially for stations east of Ceylon, when ZL and VK stations came through well about 4.30 p.m.-6.30 p.m. I.S.T. Later in the evening Africans were heard. During the second half, Ceylon experienced a change in weather, it being generally very muggy, cloudy and atmospheric powerful, and all signals were subject to heavy fading. A few G stations as well as a few others to the west have been heard calling. Mr. Shepherd Nicholson, of South India, states that the screening curtain lifted on December 2, which synchronises with the proper arrival of the North-East. In a tropical country, where atmospheric are invariably in evidence, reading signals other than D.C. note is not too easy. R.A.C. stations, please note. A watch has been kept for signals on the 10 metres band,; so far nothing recorded.

IRISH FREE STATE.

By EI2B, Fortgranite, Baltinglass, Co. Wicklow.

Conditions on 7 M.C. have been, on the whole, fairly normal during the day but very variable at nights, many of which are completely dead so far as DX is concerned. 14 M.C. is still very bad during daylight and absolutely dead after dark. So far as I know, nothing has been heard on the 28 M.C. band, on which EI7C recently reported that he had not heard even a harmonic. The same applies to the writer's station.

We are starting a Letter Budget this month which it is hoped will be well supported in spite of the fact that EI seems just now to be in a rather lethargic state. EI7C has kindly undertaken to look after it in the Dublin area. An application to the Post Office to allow of the use of the 3.5 M.C. band on the same conditions as in England is being considered by the authorities, so we hope that this band may soon be opened to us.

KENYA, UGANDA AND TANGANYIKA.

By VQ4MSB, Radio Station, Mombasa.

There are no outstanding items of interest to report for December, as only two stations—VQ3-MSN and VQ5NTA—send in reports. The 14 M.C. band is good just before 15.30 G.M.T., then fades away until 20.00 G.M.T. Skeds are being kept on

7 M.C. between VQ4CRF and VQ5NTA. VQ4MSB is having H.T. battery trouble, and no contacts with G stations during month have taken place. All members have been circulated regarding 28 M.C. and Empire Week tests. VQ4CRF will be crystal controlled shortly. VQ5NTA is seriously thinking of migrating to 28 M.C. band. For local working wipeout still continues on 14 M.C.

NEW ZEALAND.

By ZL3CP, 61, Hackthorne Road, Cashmere Hills, Christchurch. (Via ZL3AR and G2VQ.)

Crystal control is becoming very popular in New Zealand, and 28 M.C. is obtaining many new converts. Many 1st District hams—ZL2AC, ZL3AJ, and ZL3AR—are active there and ZL3CP will be on that band soon.

The Christmas convention was poorly attended, but those who did turn up had a very enjoyable time. After business was over the meeting adjourned to the S/W telephony station ZLF, and later in the evening a fine hamfest was held at which Western Electric talkie films dealing with radio matters were exhibited. The next day a picnic was held and races run off for valuable prizes. ZL2GK won a UX852 and ZL2GP a couple of WE205 D tubes.

It is hoped that when other ZL's hear what they have missed, they will turn up in force next time.

NIGERIA.

By FN2C, 1st Battn. Nigerian Regt., Kaduna.

FN2C seems to be the only active station and working at this station has been confined to 14 M.C. Conditions have not been good but European stations are heard between 13.00 and 18.00 G.M.T. On 7 M.C. QRN makes it impossible to read any signals although stations are heard all over the band.

FN2C is out in the bush at present with only 9 watts input but has managed to QSO 14 countries in the last three weeks. Power at the fixed station will be 45 watts and skeds with G stations will be welcome.

SOUTHERN RHODESIA.

By VP9SR, Salcombe, Plumtree. (Via G5PJ and ST2D.)

December notes must be scrappy, as so far no reports from other parts of VP, although asked for in League Gazette. At this station conditions during December were bad on 14 M.C., and DX receiving non-existent. Weather was stormy and QRN about R7. Received signals average R2 to R3.

NOTES & NEWS FROM THE BRITISH ISLES.

DISTRICT No. 1.

Representative: J. BROWNE, "Kenilworth," Beaufort Road, Ashton-under-Lyne.

It is hoped to hold a Conventionette in March, and details will be announced next month. The following stations have reported active:—G2WP, G6RH, G2OI, G5CI, G2DH, G5ZN, BRS244 2AWV, and G6BJ inactive. That leaves 40 odd stations who have not reported.

No. 4 DISTRICT.

Representative: J. LEES (G2IO), 17, Trevoze Gardens, Sherwood, Nottingham.

Ten members attended the January meeting in Nottingham, the main topics discussed being receiving equipment and work on the 28 M.C. band.

All bands, except 56 M.C., are being used by members in this area. On 28 M.C., seven members are active, two transmitting and five receiving, and all report ND on the first two Sundays of the tests on this frequency. Please let me have your reports for the Letter Budget before the 25th of each month.

DISTRICT No. 5.

Representative: F. W. MILES, (G5ML), Rydal, Beechwood Avenue, Coventry.

Will all members in this district kindly note that definite arrangements have been made to hold a Conventionette in Birmingham on Saturday, March 28. Further details will be given in the district notes of the March issue of the BULLETIN and circularised by G5VM to all members at a later date. A hearty invitation is extended to other R.S.G.B. members outside the district.

Please do your utmost to come, to make this a success.

DISTRICT No. 8.

Representative: R. C. NEALE, Farnborough Road, Farnborough, Hants.

The response for Letter Budget is still poor. I

wish the fellows who haven't written would try to help the scheme go ahead.

For any who haven't the idea—each man, be he transmitter or BRS, sends along a letter monthly, writing of anything to interest others—not necessarily technical. These letters are circulated in Budget form to all contributors.

Please write regularly, as Budget is far too small at present. Drop me a line if all not clear. This district claims an R7 QSO with OK3SK on 1.7 M.C. This looks as if this band, also 3.5 M.C., will be making amends for the ever-declining conditions reported on 7 and 14 M.C.

BRS368, of Jersey, C.I., is now G2AHD. We also have to welcome G6BU, of Ryde, I.O.W., on the air.

As a preliminary test for a regular Budget Broadcast, two test transmissions were sent out from G6GZ on 1.7 M.C. during January. Two more will be transmitted at 2 p.m. on Sundays, February 22 and March 1. All in No. 8 District: Please report direct to me. No notes appeared last month as owing to an oversight they were sent too late.

The following report active:—G2BI, G2GG, G6NZ, G6GZ, BRS157, BRS343, G6BU, G2AHD.

DISTRICT No. 11.

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

Nothing of note has been happening in the district during the past three months. If any points are worth mentioning, they are the unusual amount of activity on 3.5 M.C. and 1.75 M.C. On the former band most of the high-powered stations in the district may now be heard, with a corresponding decrease in QRM on the other bands.

It is proposed to circulate a Letter Budget a few days after the appearance of these notes. To avoid "hold-ups" by members that are not interested, I

propose to send this only to those who drop me a card intimating they would like to see it. Please do this at once and I will draw up the circulation list and start the ball rolling.

Another suggestion is that if any member is guilty of holding up the "Budget" without a reasonable excuse, he will be missed until a definite note is received to the effect that he wishes to resume.

All detailed news of any interest to the district will be sent round in this way each month, but in view of the large number of active stations it will be necessary to limit the Budget to three days at each station.

Please let me have those cards at once and if you have any suggestions to make, put them on the cards.

DISTRICT No. 12.

Representative: T. A. ST. JOHNSTON (G6UT), 28, Douglas Road, Chingford, E.4. Telephone: Silverthorn 1557.

The usual monthly meetings are being well attended. Members of neighbouring districts will be welcome at these meetings, which take place on the fourth Tuesday of each month, the next date being February 24. A new member has been enrolled—G5NC—and is known to be an active station. Members of this district are very active just now on the 1.75 and 3.5 M.C. bands.

DISTRICT No. 13.

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

The January meeting proved a huge success in spite of BULLETIN being late, and therefore no previous announcement other than the letter Budget. A total of 13 were present and an enjoyable evening spent.

It was decided to run an area "hamfest" early in April and I should be glad to hear from those who will be able to attend. The charge will be a moderate one and will depend on the number who show their willingness to make it a success. A Saturday night has been fixed as the most suitable, and the date and place will be announced next month. We shall be glad to see any other members of the London gang outside this area and again would be glad if they will inform me of their intention of coming along.

March 1 is fixed for the next monthly meeting and will be held at G6WN. Please do your utmost to turn up so we can further discuss the "social" evening.

The following members have reported:—G6VP, G2OL, G5VB, G2BY, G6XN, BRS414, BRS273, and BRS405, and the only item of importance is the reception of VU2FX on 28 M.C. by BRS273, on the first Sunday of the test.

Six members of the area have been known to be taking part in the tests.

DISTRICT No. 14.

Representative: H. HARDING (G2HH),

This month there are two meetings of the Monmouthshire Transmitters' Society to report—the first on December 11, at G6FO, where a large company listened to a chat on aerials, given by BRS355, and the second at 2AHK, when B.E.R.U. matters were discussed, and it was decided that the M.T.S. would work together throughout the tests and send

in their reports through G2HH, who has issued special reporting forms for this purpose.

The following stations are active in the area:—G6FO, G2PA, G5FJ, G2QI, G2HH, and G6GW, and a Letter Budget is going strong in the district.

SCOTLAND.

Representative: JOHN WYLLIE (G5YG), 31, Lubnaig Road, Newlands, Glasgow.

I cannot start these notes this month without reference to a former member, possibly one of the earliest R.S.G.B. members in Scotland. I have in mind Mr. W. R. Clark (ex-G2VX). Over three years ago Mrs. Clark became afflicted with a grave illness. The end was inevitable, and for three years she has suffered untold pain. She went to her rest on January 13, and I am sure I do not err in offering Mr. Clark our sincerest sympathy. To enable him to devote all his time to Mrs. Clark, he gave up his membership and all radio interests, and I can assure him that if, when time has softened the blow, he has any wish to resume his radio work, he will be more than welcome among us again.

I have to intimate G6RG's appointment by Council as Empire Link Station for the British West Indies, in succession to G6XB, who found it necessary to drop out. The duties are shared with G5YG, so that Scotland now becomes responsible for the entire British West Indian Link. Schedules and relays are being arranged, and before long I hope the link will be functioning smoothly.

To those of you who intend working on the 2 M.C. band, might I draw attention to the possibility of overtones causing interference to broadcast. It is hard to say exactly how to cure this, but it certainly will help matters if the aerial coupling is kept very loose.

It has been suggested to me several times from H.Q. that we adopt the "Letter Budget." I raised this matter with you once before, and such opinion as did reach me was decidedly against it. Now, however, that the "personal work" element has disappeared from those notes, it is possible that the "Letter Budget" might prove a suitable substitute. The *modus operandi* is for each member to send in an article; a regular report of his work, along with any observations or suggestions relative to it; criticisms of articles in earlier Budgets, etc., etc. These would be collated at Scottish H.Q. and circulated ONLY AMONG THOSE CONTRIBUTING material towards the composition of the Budget. Kindly let me have your views at your earliest, and if the consensus of opinion is favourable to the adoption of such a scheme, details will be gone into.

My notes last month relative to the Edinburgh men has called down a storm on my more or less devoted head. Believe me, gentlemen, I am not in the least offended. On the contrary, I am delighted, as it is a very long time since any remark of mine produced any evidence of interest from "D" District, and I am more pleased than I can tell you at the evidence of new life in your city. The letters referred to were most helpful and introduced one or two new viewpoints which certainly will be acted upon in the near future. Don't be afraid to speak your minds, OM'S, and where Society interests are concerned, you will never find "YG" take offence or be slow to act on good advice.

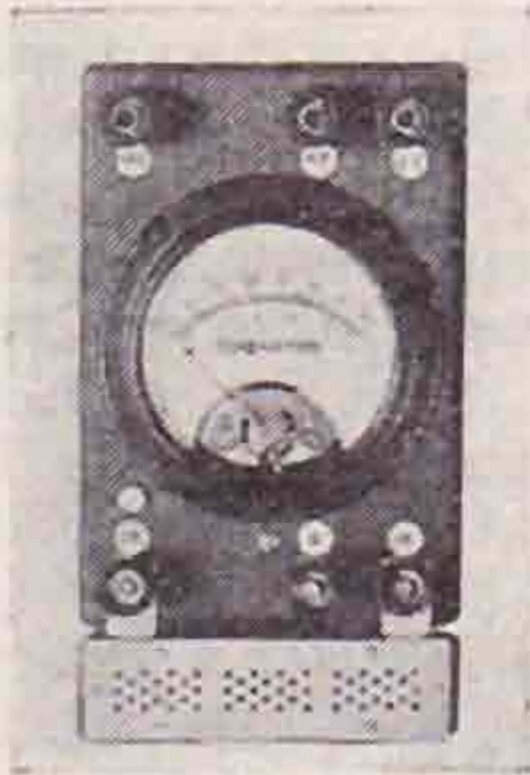
Once again ONLY TWO stations report.

(Continued on page 234, col. 1.)

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It lacked the 50 Multiplier Ranges, the Precision Duplex Scales, Knife-edge Needle, Accurate Bearings, and High Figure of Merit. Remember that the DIX-ONEMETER is nearly electro-static in its tiny load and can be used at 2,500 ohms per volt. On 100 volts the high value of 250,000 ohms can be used.



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MEGGERS. 100v., 200v., 500v. and 1,000v. at half price. Ohm-meters, direct reading, £9 10s. Megger Ducter, £18. Megger Faradmeter, £20. Grassot Magnet Fluxmeter, £12. Capacity Bridges to 10 mfd., £10.

TEN-RANGE SUB-STANDARDS by Nalder, Crompton, Evershed, etc., Moving Coil Sets covering all ranges in volts and amps. to 600. Cost £25. Sub-divided Standard ohms to .05, 45/-.

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CHESTER BROS.,

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Wavemeter Calibration.

By A. D. GAY (G6NF.)

THE writer has calibrated the R.S.G.B. wavemeter against five sub-standard crystals and three N.P.L. calibrated crystals and thirteen commercial stations whose frequencies are definitely known. This has given twenty-one calibration points. It will be kept standardised against the five sub-standard crystals.

The wavemeter calibration service is open for members' wavemeters covering the 3.5 M.C. band. This service can also be given to check crystals on any frequency within any of the bands. The calibration of wavemeters must, however, be restricted to the 3.5 M.C. band only.

The frequency of crystals will be given to within one part in a thousand. The range of a wavemeter will be given to within that wavemeter's standard of accuracy, and providing that it is an instrument capable of retaining a calibration, and having an open scale, the frequency range will be given within one part in a thousand also.

It is desirable that, whenever possible, the member should bring the wavemeter by hand and make the necessary observations. This will minimise the risk of damage in transit, and also be of assistance in determining the condition under which an instrument should be used in order to maintain a reasonable degree of accuracy. All London members desiring calibration should meet with this request.

It is important to see that instruments are

soundly constructed with stout wiring. Condensers should be of the "Cyldon" type with good solid bearings, and not too high a capacity. It will be of little use sending a 0.001 "Muckite" condenser with a 10-turn "Wobblem" coil. This type of apparatus will be returned as unsuitable for calibration. The right of refusal of calibration being reserved by the writer.

The calibration of stations whilst on the air will be given free, if they will give G6NF a call, or drop a card. It will be necessary to QRX for two minutes whilst the wavemeter warms up, then on receiving the GA signal to QRV for one minute whilst the frequency is checked. QRX then for a further two minutes, for reading off and checking. Then the frequency will be given within one part in a thousand.

The writer's frequency also is always indicated within that accuracy which will give stations another calibration point on any waveband.

Council has decided that a fee of 5s. for wavemeters and 2s. 6d. for crystals should be charged for calibration service.

Instruments sent by post should be carefully packed to avoid damage in transit, and all inquiries should be addressed to Mr. A. D. Gay, 49, Thornlaw Road, West Norwood, S.E.27; Telephone No.: Streatham 2154, and if sent by post, enclosing approximate frequency range, condenser capacity, fee and remittance to cover return postage.

(Continued from page 232.)

The 28 M.C. tests at the moment of writing have yielded nothing but a report from India of a test transmission of G6RG, who has also just completed his W.A.C.

G5ST has inquired as to the possibilities of the 2 M.C. band, and G6SR is in touch with him relative to tests.

Mr. J. W. Brown (VS6AB), President of the H.A.R.T.S., is at present in residence at 11, Eyre Crescent, Edinburgh, and will be there until the beginning of July. He is anxious to meet as many Scottish amateurs as possible, and has promised to be present at the "A" District monthly "rag-chew" on February 25. He has forwarded me a few copies of the H.A.R.T.S.'s excellent paper, "DX," and I shall be pleased to forward a copy to anyone interested to the extent of joining the Hongkong Amateur Radio Transmitting Society. Entry money is \$5 and the annual subscription the same sum. Ten dollars Hongkong currency is equivalent to about 10s. sterling.

I regret to intimate that G5YQ has found it necessary to drop out owing to ill-health.

Lastly, don't forget to show up at G5YG on Wednesday evening, February 25.

European Notes.

KEEN interest has been taken by the amateurs of Czechoslovakia in the R.S.G.B. 28 M.C. tests during January. So far as we know,

however, no British stations were heard on this band in that country. Conditions on most bands are still reported poor from Czechoslovakia, and many amateurs in this country are doing considerable work on the 3.5 M.C. band. This band appears to contain considerable possibilities and foreign amateurs look forward to the time when more British stations will be active on this frequency.

We hear from Switzerland that the U.S.K.A. and the Swiss Alpine Club are joining forces to study the possibilities of radio communication between the mountains and the plains. The importance of such a radio link in times of emergency can easily be imagined.

The U.S.K.A. is also conducting some interesting relays on the 3.5 M.C. band, which frequency, by the way, seems to be very popular in Switzerland.

2 M.C. Tests.

Attention is drawn to the fact that all entries for the 2 M.C. tests to be held next month should be sent to G5UM (17, Eastwood Road, London, N.10) not later than February 21. Four sets of letter codes will be allotted to all participating transmitters. Receiving stations must also give notice of their intention to enter the tests. See last month's BULLETIN for complete rules.

Only a few days are left—don't leave it too late before deciding to enter!

J. H. H.

HIC et UBIQUE.

British Empire Radio Week.

ALL members are reminded of B.E.R.W., commencing February 22. Please note that the Azores come under Group (1) (British Isles).

* * *

First Contacts.

GREAT BRITAIN AND TRANS-JORDANIA.—G5BD and 2CIS, October 28, 1930, 23.59 G.M.T., 7 M.C.

GREAT BRITAIN AND UNFEDERATED MALAY STATES.—G6QB and VS3AB, April 7, 1929, 14 M.C. (This supersedes G5XD's claim).

GREAT BRITAIN AND LUXEMBURG.—G6QB and L0AA, March 1, 1924, 1.75 M.C. (This supersedes G5FS's claim).

* * *

W. B. E. Certificates have been issued to S. H. Walters, ZUID, and D. W. Buchanan, ZL3AR.

Welsh Membership.

We have been asked by Mr. Phillips, the D.R. for Wales, to draw attention to the seeming apathy shown by certain of the Welsh members. He complains that no answers are given to his letters, and in view of his desire to commence a Letter Budget and arrange a Conventionette, we hope that this note may cause some of the persons concerned to rally round and give him support.

There are nine members in this District, including four B.R.S. members.

QSL Section.

Members will be glad to hear that additional help has been engaged at H.Q., and that therefore it will be possible for much more time to be given to the QSL Section with a consequent speeding up of the work, and it is hoped that there may be a general increase of efficiency and service in the Section. Miss Gadsden has managed very creditably up to the present, but with so many other important things to do in the office, it was inevitable that she could not give all the time that she would have liked to the Section.

The last few weeks have seen a burst of activity, and the Section is now receiving cards as fast as it can deal with them—due, no doubt, to an improvement in conditions on the 7 and 14 M.C. bands. The return of good conditions with the U.S.A. is reflected in a huge weekly pile of cards for the A.R.R.L., and the pigeon-holes that a few weeks ago contained hardly more than half a dozen cards are now jammed to overflowing.

J. D. C.

WANTED.—T. & R. BULLETINS, November, 1925, February, 1926, July, 1926, and December, 1926. Any reasonable price paid.—Box 050, R.S.G.B.

Social Notes.

There are two dates of special interest to members in and about London; they are Saturday, March 7, and Tuesday, March 17.

On Saturday afternoon, March 7, there is a visit to the City of London Electric Lighting Co.'s power works at Bankside, S.E.1; and I would ask those who would like to come along to notify us *at once*, as the number is strictly limited to 20, and so, therefore, it must be a case of "first come, first served."

I think this should be a very interesting event, as this station is one of the most up-to-date in the country, and, moreover, is one of the selected stations under the grid scheme of distribution.

Also, to quote G6UN, it's a good idea to see where the ripple comes from!

On Tuesday evening, March 17, there will be a Hamfest at Pinoli's Restaurant, Wardour Street, W.1. The President will be in the chair, and it is also hoped that we shall be able to welcome Mr. Runeckles (SU8RS), who is expected to be home by then, so it is hoped that everyone will roll along and help to make it an FB evening.

The price will be, as usual, 5s., and the time 6.30 for 7. Finally, the Social Committee for 1931 is as follows: C. Brookes (G2CB), F. Dowsett, and R. L. Royle (G2WJ), and these gentlemen have very kindly consented to come in and help me.

C. S. B.

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Our thanks to "Gerry."

54, Purley Avenue,
London, N.W.2.

January 21, 1931.

The Hon. Editor, T. & R. BULLETIN.

DEAR SIR,—The splendid work done by Gerald Marcuse for the good of Amateur Radio in general, and the British amateur in particular, is well known by everybody.

This seems to be a suitable opportunity of showing our past President how deeply we appreciate his work, and I should like to suggest that a token of our respect be presented to him at the Convention, 1931.

It may seem rather early to talk about the Convention at this time of the year, but I feel certain that amateurs in all parts of the world would be loth to miss this chance of subscribing towards the presentation, and the news must necessarily take some time to circulate.

Therefore, I appeal to the world's amateurs to send a donation, no matter whether large or small, so that we can make this gift to "Gerry" something worth while.

Postal and money orders should be made payable to me, and should be crossed.

Don't wait until the last minute before the Convention, but send your subscription now.

The list will be closed on Saturday, September 5, 1931, and the full list of subscribers will be published in the October, 1931, BULLETIN.

In the hope that the response to this appeal will be as great as it deserves, and that G2NM will see that we really do appreciate the work he has done,

I remain,

Yours sincerely,

M. W. PILPEL.
G6PP,

QRA Manager R.S.G.B.

Calls Heard.

By BRS273 on 14 M.C. and 7 M.C.:—au7kal, lu2ca, py9an, stlsc, sulal, sulaq, velabg, ve2bb, ve2bd, vk2dx, vk5bn, wlafu, lan, w2ma, wlaxf, lasf, w2qf, wlaye, w2ud, wlayx, w2zg, wlbsg, w3aqi, wlcaa, w3ahn, wlcax, w4cg, wlmk, w8aac, w1wv, w8adm, w2adp, w8afq, w2aif, w8ano, w2amb, w8auu, w2amr, w8axa, w2arb, w8ben, w2asw, w8cpc, w2ba, w9bwt, w2bj, w9ggv, w2buy, w2byp, w2bxa, w2cfo, w2cj, w2cuc, w2cuq.

By VU2AH and BERS13, Aircraft Depot, Sind, India. 14 M.C. (L/C). From 22-12-30 to 5-1-31:—aulai, ct1al, f8ji, f8kwt, g2cj, g2yq, g6nf, g6np, g6wt, g6vp, on4jb, hb9q, lulca, oa4l, oh2og, pk4as, pk4yy, st3wt, swlaq, ti3xa, vk2gw, vk2ns, vk3cp, vk6wi, vq2ttw, vs3ac, wlga, w2rs, zl2bg, zl2bv, zl3as, zslz, zt6j, zt1f, zt1t. 28 M.C.: vk5ag.

By G2WS, while staying at Shrewsbury, December 28, 1930—January 1, 1931. 1.7 M.C.: ei8b, g2ml, g5cx, g5um. 3.5 M.C.: d4blb, d4ijn, d4irg, d4lnb,

d4lqt, d4pko, d4rzn, d4uab, d4vob, eu2kt, eu3bd, g2bm, g2kb, g2lz, g2mi, g6qb, la2b, oz7tj, Pa0bp, pa0oo, wlabi, wlaif, wlbii, wlhd, w4sy, w8bdx, w8jx.

By BRS405, 75, Canterbury Road, Harrow, Middlesex. 3.5 M.C.: d4oyx, d4pab, g2bm, g2ip, g2kb, g2wp, g2zn, d4brv, d4ggg, g5bc, g5qy, g5xm, g6ou, g6wy, g6zh, haf3ap, oh5ng, ok2ak, pa0oo, pa0qq, pa0zg, wladu, wlmk, wlmx, w2aiq, w2csc, w2izg, w2zc, w3gs, w8fu. 1.7 M.C.: g2bm, 2ju, g2kb, g2xo, g5bc, g5um, g6fo.

By S. F. SHARPE, B.E.R.S.14, Signals Section, R.A.F., Amhala, Punjab, India, December 20-25. 13.00 G.M.T.—16.00 G.M.T., on o-v-2:—ac3gb, diow6, fm5r, kalhr, likol, pk1cr, pk4aj, vk2hb, vk3ac, vk3bz, vk3yx, vk5bm, vk5hg, vk5mb, vk6hy, vk6mo, vk6wi, vs1rn, vs2af, vs2hf, vs3ac, vs6af, vs7ai, vs7ap, vs7gj, vu2ah, vu2jb, vu2kh, vu2pn, vu3wr, w9gv.

NEW MEMBERS.

OLE WINSTEDT (OZ2Z), 149, Strandvej, Hellerup, Copenhagen, Denmark.
A. WESTON (BERS52), Waziristan District Signals, Wana, Waziristan, N.W.F.P., India.
T. C. FRESHWATER (CT2AW), Western Union Cable Station, Horta, Fayal, Azores.
A. S. ANDREWS (ZS5F), c/o P.O. Box 49, Durban, Natal.
F. HARDMAN, 55, Thomson Street, Carlisle, Cumberland.
J. MACINTOSH (BERS51), Engineering Branch, Posts and Telegraphs, Kuala Lumpur, F.M.S.
L. LIDDELL (BRS461), Norwood, Lilybank, Port Glasgow.
J. T. SHROUDER (BRS470), Beech Lea, Maghull, Lancs.
W. C. CROPPER (BRS471), Maycroft, Grays Lane, Hitchin, Herts.
K. H. RANDALL (BRS472), 25, Baring Road, Addiscombe, Croydon.
R. W. B. PARSONS (BRS473), 25, St. Peter Street, Tiverton, Devon.
T. S. BRISTER (BRS474), 53, White's Road, Cleethorpes, Lincs.
G. A. WRIGHT (BRS475), "Melbury," Kingston Hill, Surrey.
A. W. RICHARDSON I (BRS476), 60, Cambridge Road, Teddington, Middlesex.
H. OSBORNE (G5NC), 77, Barrett Road, Walthamstow, E.17.
Miss B. SALTMARSH (G6SF), Sandridge, near St. Albans, Herts.
D. P. MCNEISH (G5MH), 29, Wiverton Road, Nottingham.
F. A. HORTON (2AXG), 51, Coval Road, East Sheen, S.W.14.
H. V. BOOTH (BRS477), 21, Dodsworth Street, Mexboro', Yorks.
S. C. BAVEYSTOCK (BRS478), 29, Long Lane, Finchley, N.3.
E. A. KINGSCOTE (BRS479), Willohayne, Hueclecote, Gloucester.
W. G. ROAF (BRS480), 86, Tennyson Road, Stratford, E.15.

H. MOHRSTADT (SUIAQ), 1 Company Egypt Signals, Polygon, Cairo.
C. D. PRICE (G6PC), "Ardath," Butcroft, Darlaston, Staffs.
A. N. PORTER (2AUN), 32, Tyndalls Park Road, Redland, Bristol.
T. L. MCCORNICK (BRS462), "Maxton," West Parade, Bexhill-on-Sea.
G. SPENCE (BRS463), 107, Dumbiedykes Road, Edinburgh.
R. A. BALDWIN (BRS464), 45, Gordon Road, Gillingham, Kent.
T. W. B. ELLIS (BRS465), 16, Kitchener Road, Strood, Kent.
W. A. PANTON (BRS466), "Broxholme," Mayfield Road, Bridlington.
L. N. GROVER (BRS467), Ropewalk Cottage, Colyton, Devon.
W. MCKENZIE (BRS468), 183, Great Junction Street, Leith.
R. BISHOP (BRS469), 10, Kilton Road, Worksop, Notts.
A. W. ALLAN (2AWA), 3, Lansdowne Terrace, Gosforth, Newcastle-on-Tyne.
J. H. REYNOLDS (VE3DA), 333, Charles Street, Belleville, Ontario, Canada.
N. E. TURNBULL (VK6NO), Radio Inspection Branch, G.P.O., Perth, W.A.
E. N. ARNOLD (VK2OJ), 610, Olive Street, Albury, N.S.W., Australia.
D. W. BUCHANAN (ZL3AR), 74, Wills Street, Ashburton, New Zealand.
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Members' Headed Notepaper (per 100 sheets)	2/-
Enamelled Car Plaques of Emblem	3/6
Call Sign Brooches... ..	2/6
Rubber Stamps of Emblem	1/6
K.C. Metre Charts	6d.

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"T. & R. Bulletin."

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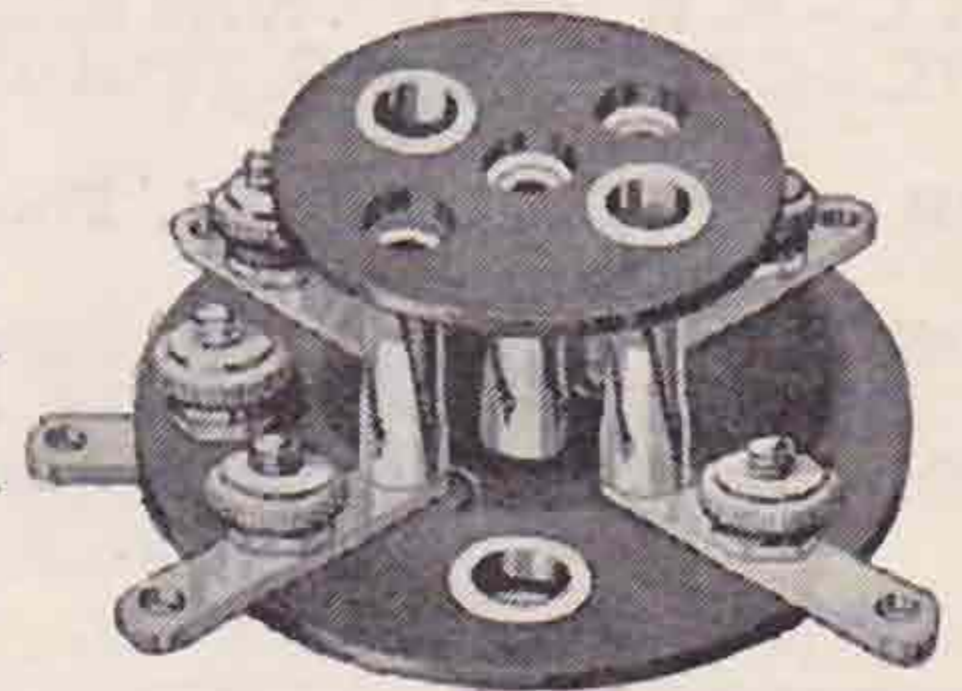
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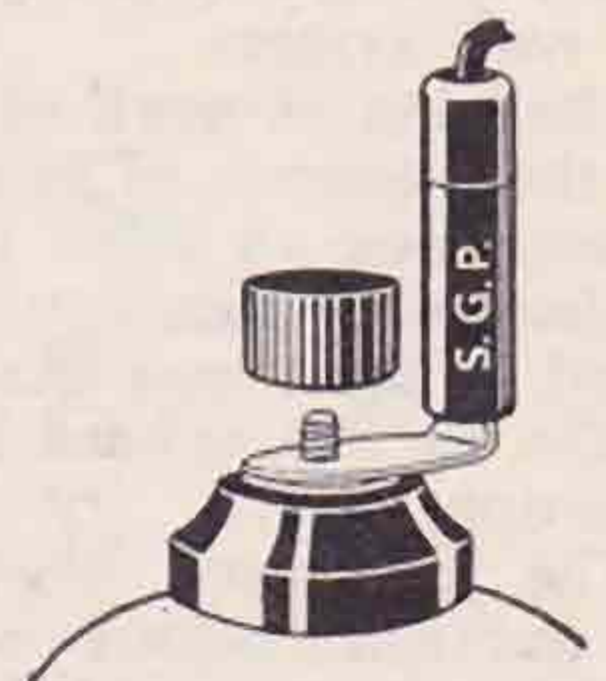
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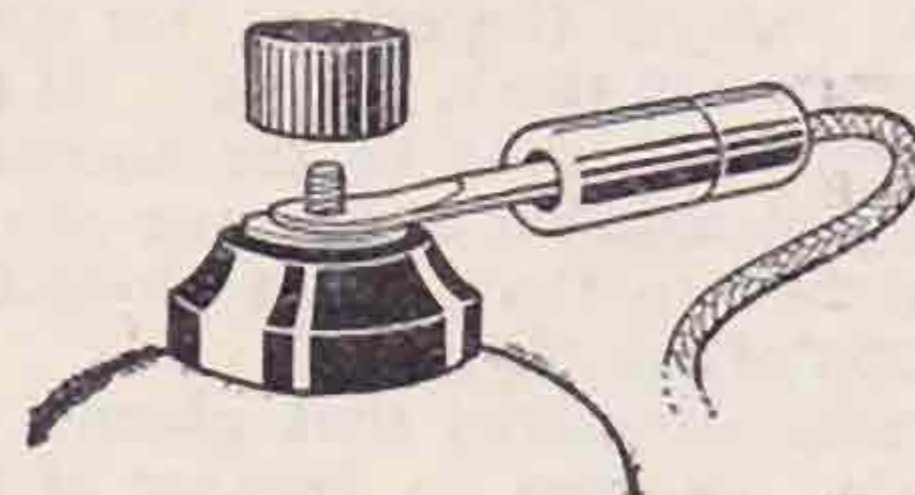
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M. W. P.

Correspondence.

The Editor does not hold himself responsible for opinions expressed by correspondents. All correspondence must be accompanied by the writer's name and address, though not necessarily for publication.

"A Speculation—"

To the Editor of T. & R. BULLETIN.

DEAR SIR,—Mr. Ramsden's article in the January BULLETIN is exceedingly interesting and novel, but calls, I think, for criticism on several points. May I be allowed, therefore, to make a few observations thereon?

Mention is made of areas in the Milky Way which are singularly devoid of stars. The appearance through a telescope is very striking; the field comprises myriads of small stars enclosing a space totally devoid of anything *visible*. It has been proved, however, that such spaces often contain non-luminous nebulae, which are of sufficient density to obscure the distant stellar background. Dark pits free of all matter, as Mr. Ramsden suggests, would not in any case be sufficiently near to affect our own system.

The idea of vortices being caused in the ether by the presence of large bodies such as the earth presupposes an ether drift. This theory was exploded some years ago, when it was shown that the speed of light was exactly the same in opposition to the earth's orbital movement as in the reverse direction.

The statement that "ether cannot penetrate the electron" seems contradictory to modern ideas, as it has been asserted that the electron is nothing more than a special *state* of the ether; for want of a better term we may call this a "kink." If the latter can be destroyed we come to the anomaly that everything may be reduced to ether or empty space, truly a bombshell to the ancient physicists and their conservation of matter laws.

Finally, Mr. Ramsden remarks that planets do not twinkle or "fade" as stars do, because of the huge difference in distance as with local and DX reception. My reply to that is the light from a star is to all intents from a point source, and therefore the slightest lack of atmospheric homogeneity will cause differences in intensity. On the other hand, planets are viewed as comparatively

large discs sending a *beam* of light to the earth. In this case slight irregularities in the atmosphere tend to balance out, and there is, therefore, little or no twinkling. It is significant that at the summit of high mountains, where the atmosphere is rare, both stars and planets shine with a steady light.

In conclusion, I must apologise for the apparent irrelevance of this letter to everyday ham radio, but in defence I would point out that only by discussing all theories, however fantastic, can we hope to explain many of the problems in transmission which have so far escaped elucidation. In this respect, Mr. Ramsden's article is a welcome diversion from the usual hackneyed and well-worn paths.

Yours faithfully,

J. ERIC JOHNSON (G2ZN).

25, Clivedon Road,
Highams Park, E.4.

—exploded."

To the Editor of T. & R. BULLETIN.

DEAR SIR,—I am only a physicist in embryo, and have little knowledge of Einstein's work and no texts immediately available, but there seems to me to be one fundamental objection to Mr. Ramsden's theory of fading (January BULLETIN), viz., he postulates the real existence of an ether, and I think I am correct when I say that such an idea is obsolete, and only taught now as a classical theory in order more fully to grasp modern developments. Furthermore, if the ether did exist, in order to fulfil mathematically the requirements made of it, it must be infinitely dense, perfectly elastic and homogeneous, under which conditions I do not think it could have currents flowing in it.

As for the black pits in the Milky Way, I am no astronomer, but I remember a recent lecture by Sir James Jeans in which he described the Milky Way as being like the rim of a cart wheel, whereof the spokes are stars: possibly the pits are gaps between the spokes.

All this is destructive criticism, and I have nothing to put in the place of Mr. Ramsden's theory; I only hope I have not made a fool of myself in making it!

Yours sincerely,

K. E. BRIAN JAY (G2HJ).

"The Quinta,"

Elm Close, Amersham, Bucks.

The Length of Antennas.

To the Editor of T. & R. BULLETIN.

DEAR SIR,—I note in his article on "Antennas," Captain Courtenay Price states that he does not know "where the 1.56 comes from" in the formula given for the correct length of a Hertz antenna. Just as a matter of interest, we may see that it is presumably obtained as follows:—

If λ be the wave-length in metres of the proposed aerial, lf its length in feet, and lm its length in metres, we are expected to start with the assumption that the natural wave-length of an unloaded Hertz radiator is equal to approximately 2.1 times its length in metres—an assumption which is, I think, generally held—though twice its length is, perhaps, more usual.

From this it follows that:—

$$\lambda = 2.1 lm = 2.1 \times .3048 lf.$$

$$\text{Thus } lf = \frac{\lambda}{2.1 \times .3048}$$

$$\text{Now } \lambda = \frac{300 \times 10^3}{\text{Frequency in KC's}},$$

from which, by substitution in the previous equation

$$lf = \frac{300 \times 10^3}{\text{Frequency in KC's} \times 2.1 \times .3048}$$

$$\frac{300 \times 10^3 \times 1.56}{\text{Frequency in KC's}}.$$

The "1.56" is simply a lumping of the constant, and the metres-to-feet conversion factor.

I must agree with Captain Price that, personally, I have always found the length so obtained too short. Perhaps the "2.1" is wrong—who knows?

With best wishes for the continued success of the BULLETIN.

I remain,

Yours faithfully,

J. A. FARRER (G5FA).

The Willows,

The Park, Buxton.

Derbyshire.

Liverpool Area Meeting.

The first meeting of the newly-formed Liverpool area was held at the Creamery Café, Whitechapel, Liverpool, on Saturday, December 20, 1930. The list of those present includes G5GP, G2RV, G2QV, G2OA, G6RW, G5KL, G6FA, G2II, G6OM, G2DH, G6RH, G5WG, G6GL, BRS369, and Mr. Hill and Mr. Bircher, both of whom we were very pleased to see present.

The meeting assembled at 5.30 p.m., and after tea the meeting proper began. G2QV, being the ham of longest standing in the district, filled the position of chairman most successfully. In a short address he mentioned that the rooms where we were then assembled revived memories to him of the pre-war days when the old-time spark merchants used to gather for rag-chews at the same place. He also mentioned the name of Mr. Wardle (G6FA), who was also present, as being another of the old-timers whose work dated back as far as 1910.

The question of an official broadcast was then considered, and after a lengthy discussion it was decided, on a proposition of G2II, and seconded by G6OM, that the broadcast should take place on Sundays at midday and on the 1.75 M.C. band. G2OA was the station selected to make the transmission, which will be preceded by the preliminary call of "Test LG" for one minute.

The holding of monthly meetings was next considered and at the outset G2RV very kindly offered the use of his very commodious shack for the purpose.

G2QV, on behalf of the meeting, offered his thanks to G2RV for his very kind offer. It was suggested by G5KL that at each meeting one of the members should read a paper and that the paper should be published in the BULLETIN or some other radio periodical. In passing, G5KL mentioned the lack of research, which seems to be very prevalent at the

moment, and mentioned two very interesting lines of experiment which he himself is pursuing, namely, to determine the means whereby a signal may be rendered inaudible except at a given point, and also a new method of converting electrical energy into sound. G6FA, in agreeing with G5KL's remarks, admitted that at the moment he was following no particular line of experiment himself, except the study of aerial systems. He suggested that visits should be paid to various stations. On a motion proposed by BRS369, and seconded by G2RV, it was decided that a general meeting should be held every two months and that every alternate month the meeting should be held at some station's "shack." It was unanimously decided to hold the next meeting at G2RV's station on January 17.

G6RW then opened a discussion on aerials and also on the very vexed question of clickless keying. The discussion on aerials was most interesting, and G6RW promised to read a paper on the subject at the next meeting. All business was then temporarily suspended and a real rag-chew such as only a keen ham knows, was the order of the day. This lasted about half-an-hour, after which Mr. Salmon (G6RW) very kindly offered to deliver a short talk on the manufacture of a modern receiving valve. This proved most interesting, as it traced the story of the valve from the ore from which the filament is made up to the question of a suitable carton to dispatch the finished article. At the conclusion of G6RW's interesting talk a vote of thanks, proposed by G5KL, and seconded by G6FA, was carried with acclamations.

After the thanks of the meeting had been offered to G2QV as chairman, and to G2OA as honorary organiser, the meeting adjourned. The first meeting of the "LG" was a great success and our thanks go to G2OA for his work in getting the gang

together and for making the arrangements. The following stations sent their best wishes and expressed the regrets at being unable to attend: G5MQ, G5PO, G5XD, G6YQ, G5GY, G2SW, BRS401, 421, 437, 2BWQ, and 2BIK. It is to be hoped that future meetings will continue to show keenness in the district.

G. R. L.

Notice to Contributors.

The Editor is pleased to have manuscripts submitted to him for publication, but would remind contributors that, owing to lack of space, a delay often elapses between the receipt of the MS. and the date of its appearance in these pages. All matter intended for publication should be written on one side of the paper only and preferably typewritten (double spaced). Diagrams should always be shown on separate sheets. Rough sketches can be re-drawn by our draughtsmen. Photographs, if any, should not be smaller than ¼-plate as otherwise the reproduction will be poor.

After publication, authors may, if they so desire, purchase from the Society any blocks used in their articles at the following prices:—Half-tone, 1s. per block; Line, 6d. per block (post free). Application should be made after the appearance of the article in question.

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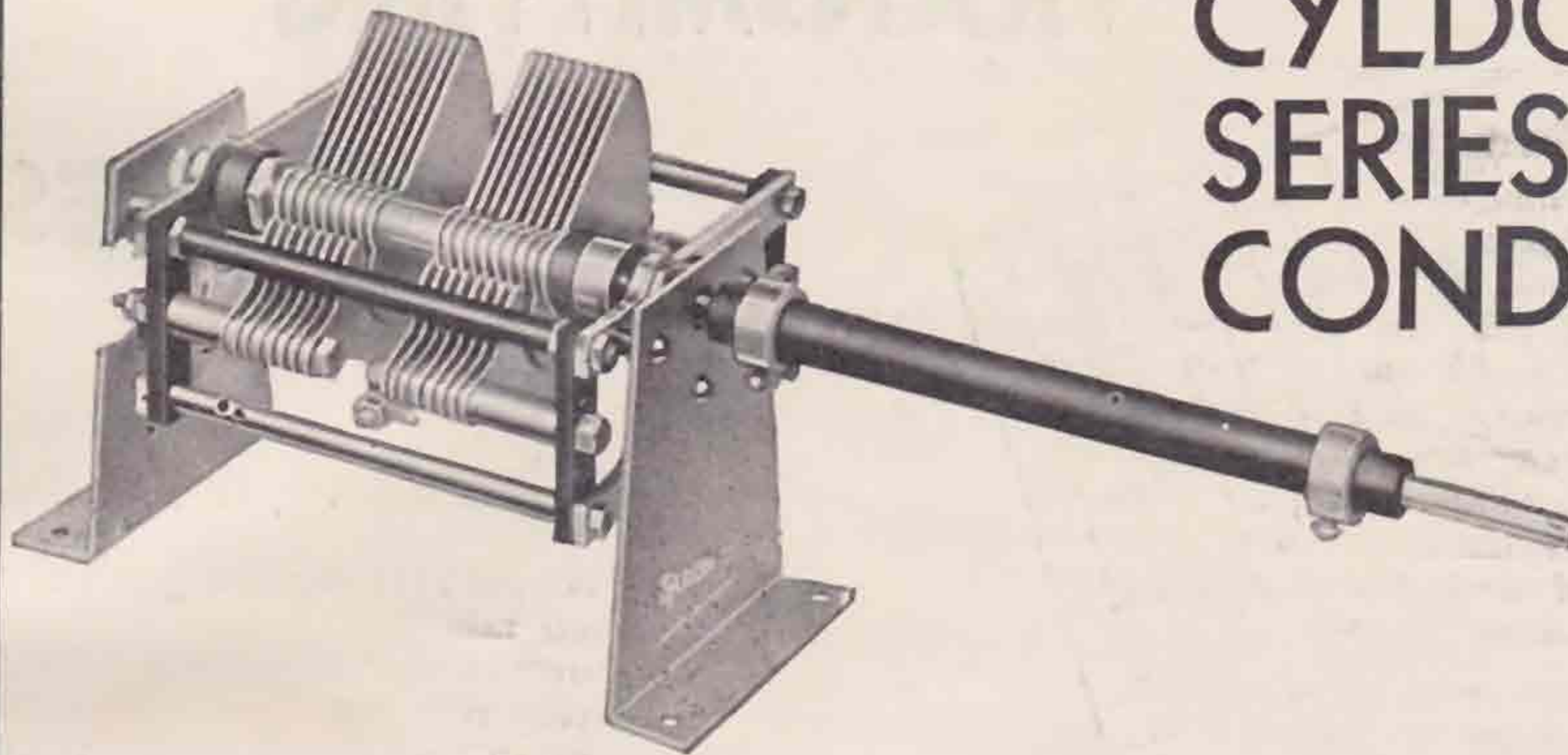
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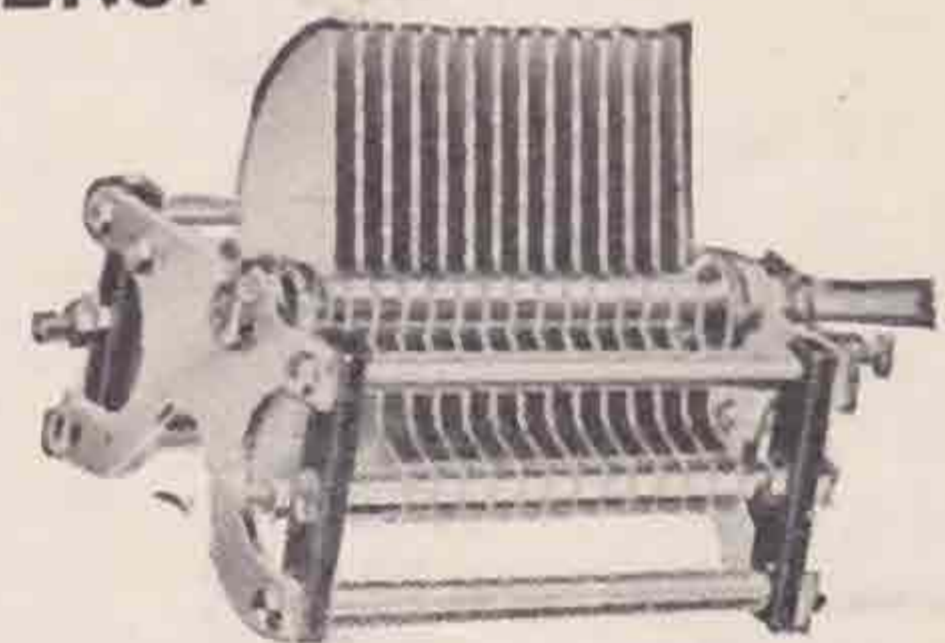
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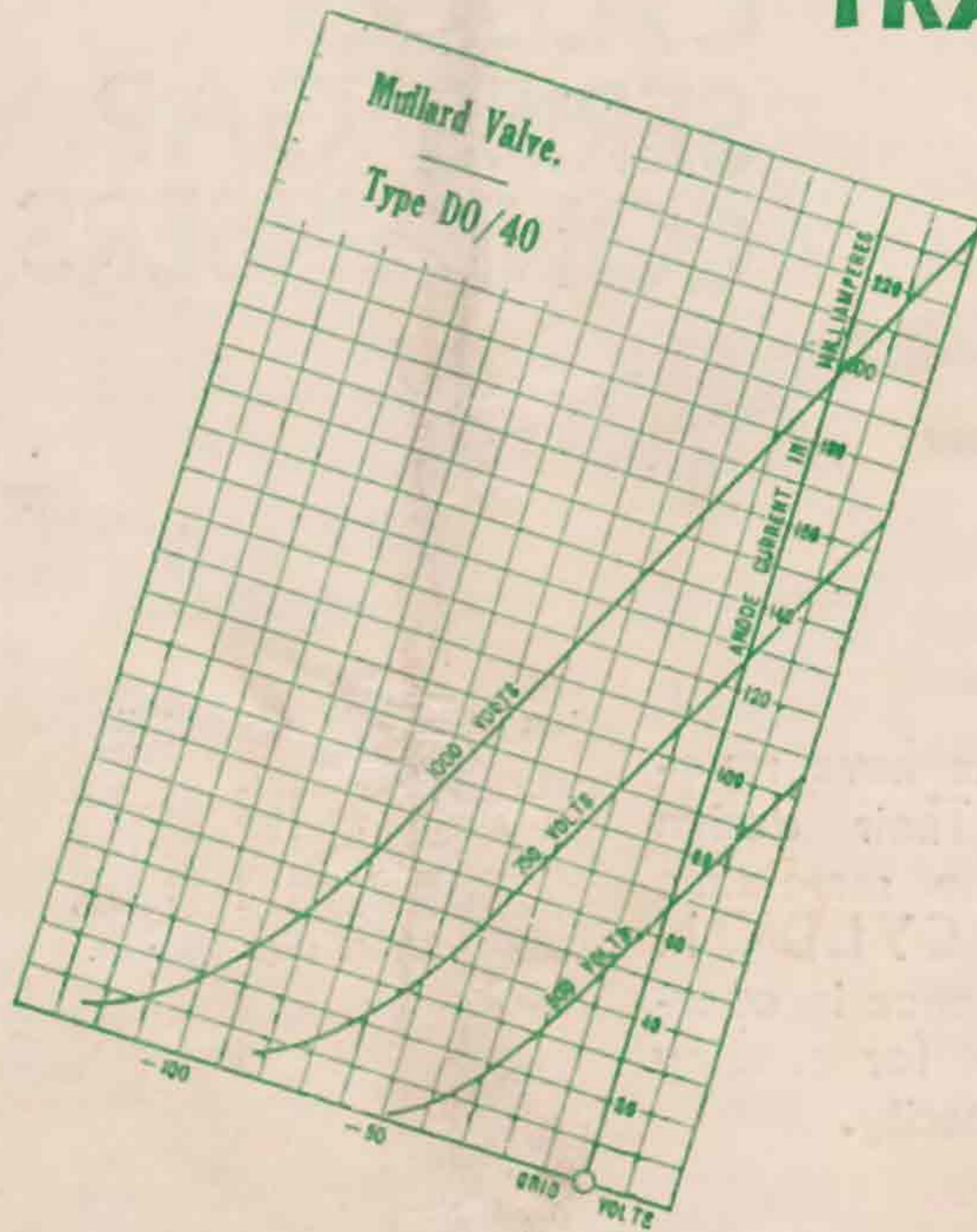
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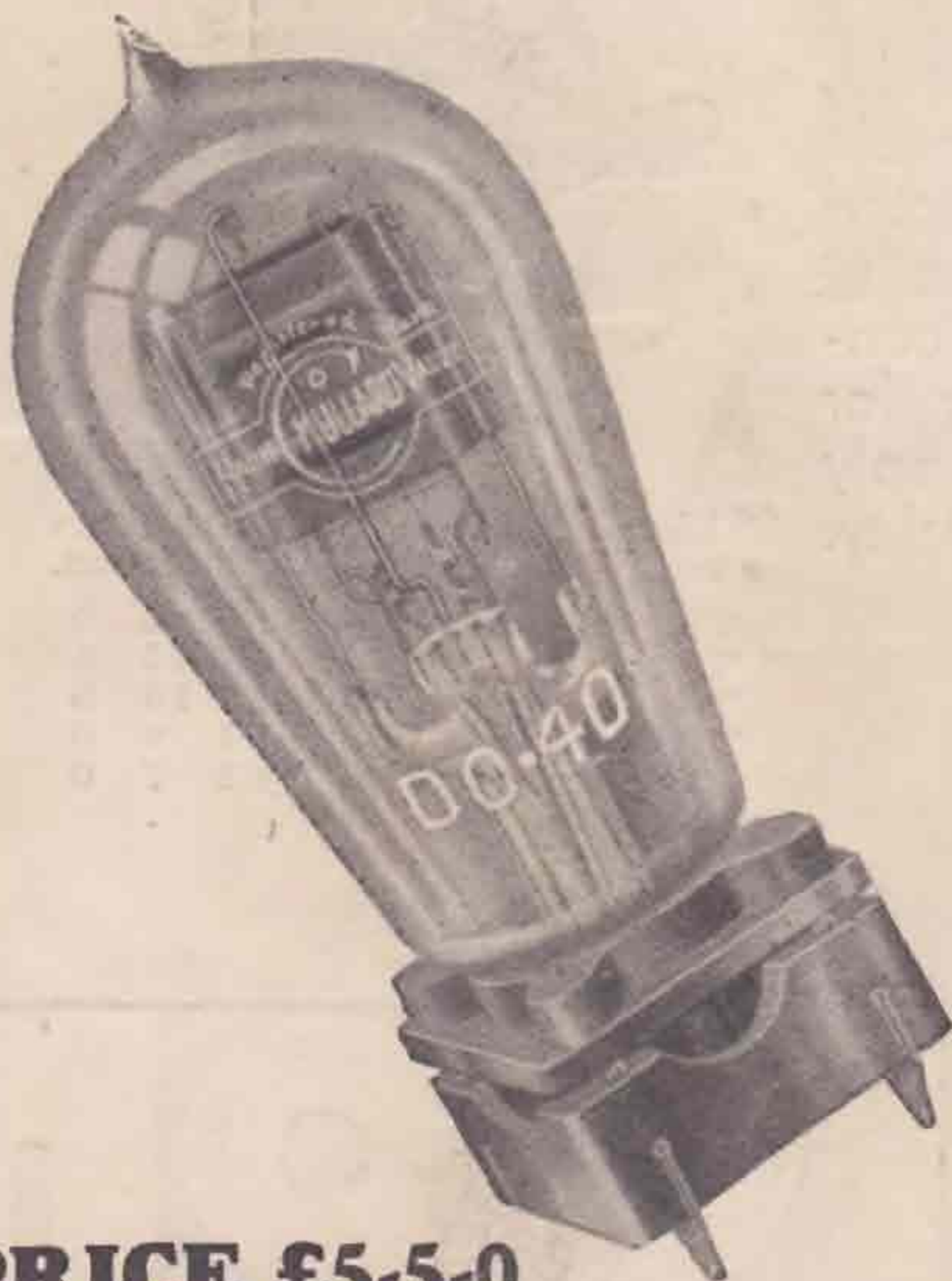
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