T. & R. Bulletin

Incorporating

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T&R BULLETIN.

The only British Wireless Journal Published by Amateur Radio Experimenters

FEBRUARY, 1928. Vol. 3. No. 8.

EDITORIAL

Splendid.

Both financially and otherwise the response to my last month's editorial is extremely gratifying. Despite the fact that these lines are being written but a few days after the publication of that editorial, we have already received many dozens of subscriptions, quite a number of suggestions and many assurances of good will and continued support. With such a condition of affairs the Society is assured of success and prosperity in 1928. Last month's editorial might have been to a certain extent doleful and in the nature of a "whip," but from the results it is becoming evident that we are "getting into tune" quite nicely and that many members are fully realising their responsibilities, and have no need of reminders. Let us all resolve to keep it up throughout the year—it is true that only one subscription is called for in each year, but let us not forget the other little matters upon which our success so greatly depends. Thank you all for your very kind letters, criticisms, suggestions and cheques. Also, the response as regards recruiting has been satisfactory : over 50 applications have been received to date.

Washington.

I have been asked not to mention this again, but everybody knows that to tell an editor not to mention something is the most certain way of getting it mentioned ! Many dozens of letters of appreciation of the article under this heading in last month's Bulletin have been received and the general opinion is undoubtedly that "plain speaking" is good for the soul. Mr. Maurice Child, late Hon. Secretary of the Society, contributes a letter on this subject elsewhere, and he is well qualified to judge of the merits and demerits of publicity in such matters. The lesson of Washington must not be forgotten, and every member should keep it well before him in time to come. It is only by continued hammering that concrete can be broken, and some concrete takes a deal of moving even under the most favourable circumstances. The amateur must keep his hammer at hand and his hammer, the R.S.G.B., cannot fail him.

That New Committee.

The new General Committee has its first meeting on Friday, January 27, and will have done something by the time these lines appear. Let us all hope that it will get busy in earnest and arrange some useful and interesting items for 1928. Speaking of this Committee reminds the writer of the fact that our worthy Hon. Secretary is apt to refer to this Committee as the House of Commons, and the Council or Board of Directors he calls the House of Lords. This analogy is a particularly sound one, and members should do well if they remember that if they want to get something on the move one or other of the members of the General Committee would be pleased to hear from them. There is no need for undercurrents of complaint, and anybody who fancies he has a grievance would do well to air it right away to the General Committee, for he has no excuse for keeping it to himself, and certainly is not doing his fellow members a service by allowing his grievance to go unchecked.

The C.B.

In the November issue, details of the new Contact Bureau were announced, but T. P. Allen tells me that he has not had a very great response.

The reason is probably that many members do not realise that this Bureau has great uses for the serious experimenter, and it is suggested that you turn back to November and read up the scheme and see how you can best make use of this extra free service.

B.R.S. Stations.

Elsewhere we print a letter raising a question as to whether those with no technical knowledge should be given a B.R.S. number, *i.e.*, should Associates be entitled to this privilege? The question is open for discussion, and the Editorial Pen will maintain a discreet silence while the battle wages. It is nice to think that the B.R.S. people so value this privilege, and if it transpires that they wish to keep it to the Corporate Membership by all means let us hear to this effect. In the meantime, the big noises such as 1 to 100 watt transmitters should keep silent, for, to quote an oft-repeated phrase, "It's none of their business." By the way, you B.R.S. people, an article or two on "How to Receive" or on "My Best Short Wave Receivers" would be of interest even to the Transmitting Section. I have a sneaking feeling that those fellows do not know all that there is to know about receivers these days!

The 1928 Annual.

Of course, this has been criticised before it has appeared. A certain worthy gentleman has asked why it has to be paid for this year! Everybody will remember those famous lines, "Their's not to reason why, their's but to do or die!" So it is now as it was then. If we want something extra we have to pay for it. If we spent valuable time or reasoning why we have to pay out every shilling we should rarely spend: so much of our time would have been absorbed in the reasoning. The facts are that we have an Annual and that many dozens of the best Treasury notes have had to be expended in order to produce this Annual. It is the real goods and is right up to the specification which we printed last month. Unless you want us to put up the shutters we must have your money in return for the book. Such a book would easily fetch its money in America, and at least one similar American publication fetches 4s. in this country without a Log Section or the tables, etc. If it is not worth 3s. to the individual member of the R.S.G.B., then that member is not active. As for us who have worked at it for many months, it seems to be worth every shilling that we are paying the printers for it. Much midnight oil and many pints of ink, many hours of labour and a great deal of thought have been spent on this book, until now its value seems greater than ever. Better hurry up and send that 3s. before H.Q. raise it to 4s. ! !

And so, Farewell.

Looking back over this Editorial it seems impossible that this is the last which the writer will prepare. For nearly three years he has worked at the BULLETIN, nursing it from a small sixteen-page concern to its present dimensions. It is even now all too small for us and its pages threaten to bulge and spill month by month. He has had great ambitions for the "Bull," as it is so affectionately termed by its readers, but few of these have as yet been realised. Progress is all too slow for those who anxiously watch the balance sheet and the printer's bills; those who have to be cheeseparing with the type lest the costs are too high in any single month. Nevertheless, certain things have been accomplished, certain good work has been done. The "Bull" is now firmly established, built up from nothing except enthusiasm and co-operation on the part of its supporters. Better still, in the process of building the writer has gathered together a host of pleasant friends, in many cases dear friends who will never be forgotten by him. These friends have come gradually into the picture: they started with simple offers of help at a time when things were none too rosy for the "Bull." Gradually they developed into the complete picture of the BULLETIN, as necessary to its form and pleasantness as the paint to a picture. Without them nothing could have been accomplished, and their letters, advice, criticisms and consolation have done more than anything else to build the Society and the BULLETIN to its present size.

Now it comes that the BULLETIN and the writer must part company; business matters have compelled him to relinquish his duties as Secretary-Editor, but he will not lose touch with these friends. They are far too numerous to mention in these pages, for they embrace many hundreds of readers, but they each will realise that he has appreciated very deeply their kind help in the pioneer work which he undertook in 1925. He hopes to hear from them when they can spare the time, and will always be interested in the doings of the amateur. It is sincerely hoped that the writer's successor will receive the same amount of support as he has experienced and that in consequence the movement will continue to prosper.

So now, having taken up far more space than was originally intended, the writer takes this opportunity of wishing everybody 73's and good luck for 1928.

J. A. J. C.

All readers of the BULLETIN will hear with regret that Mr. J. A. J. Cooper, who has been editor of the BULLETIN since its inception, has been compelled to relinquish that post upon taking up a new appointment. In fact his editorship ceases with the present number. Readers know only too well the excellent work he has done and how his persevering efforts have built up our little magazine to the importance it has attained. While we shall feel the loss keenly, the spade work which he has done has been so well performed that it will be comparatively easy to carry on, although we fear that we shall never be able to equal his able achievements. Still, we know that we shall always be able to seek his advice when required. We wish him every success in his new position.

It has been suggested in one or two quarters that readers might like to join us in making a small presentation to our late Editor as a token of our regard and thanks for all his work. We have therefore decided to open a subscription list limiting contributions to 2s. 6d. per member. Any reader wishing to subscribe should send his remittance by postal order to the Hon. Secretary, Incorporated Radio Society of Great Britain, 53, Victoria Street, S.W.1, marking the envelope in the top left-hand corner with the word "Testimonial."

The R.S.G.B. Five.

Selective, Sensitive, Stable, Simple and Capable of faithful Reproduction.

A Broadcast Receiver embodying the latest and most efficient practice and the pick of the components of British Manufacture.

Despite the fact that the Society is primarily a scientific body engaged in research and experiment, it seems that it is not out of place to now and again present to members a design of receiver or transmitter embodying the essentials of the results of the work of its members and others, and inviting attention to practical methods of adapting such principles as are from time to time disclosed. Articles of this description are not "blue-print" articles and are not intended as "constructional articles," and those members who read "Q.S.T." will appreciate the type of article which is intended.

The receiver illustrated in the accompanying photographs is one which has been built from some of the best component parts obtainable, and in the case of the Dubilier toroids, the only components of this type, of British manufacture. It is of such design that it can be confidently recommended to all those interested in good quality broadcast reception of both short and long distances, and covers a wide range of wavelengths. An advantage is that no oscillating valves are used, and in these days when "oscillation" threatens to ruin the enjoyment of Broadcast in many districts, this is a highly desirable feature. It depends for its stability upon the well-known Neutrodyne principle; yet this also is applied in a novel method.

The Dubilier Toroids.

It is common knowledge that when a current is passed through a solenoid there is produced, in addition to the electro-magnetic field concentrated along the axis of the coil, an external field extending outwards in all directions.

The presence of this field in a radio receiver, particularly when more than one stage of H.F. amplification is employed, is the cause of much trouble to the set designer.

Shielding by interposition of metal screens will, it is true, overcome to some extent the difficulty, but at the same time eddy currents are set up in the screens themselves, and the losses on this account are considerable.

With two H.F. stages, very elaborate shielding becomes necessary, and the screening boxes occupy valuable space.

It is clear, then, that if the external field can be eliminated a considerable increase in efficiency will be gained, while at the same time a more compact layout may be achieved.

By bending a solenoid into a circle, as shown in Fig. 1, a coil of toroidal form results, and the field produced by a current passing through it will be found to be confined very largely within the physical limits of the winding.

It will be apparent, however, that the bending of the coil causes the turns to become separated around its outer periphery. In the Dubilier Toroid a form of winding has been adopted in which this separation does not occur. As a result, the electro-magnetic field is so confined within the coil itself that it cannot exert any appreciable influence upon any other external coil, or set up eddy currents in a conductor, even though these may be in close proximity to the windings.

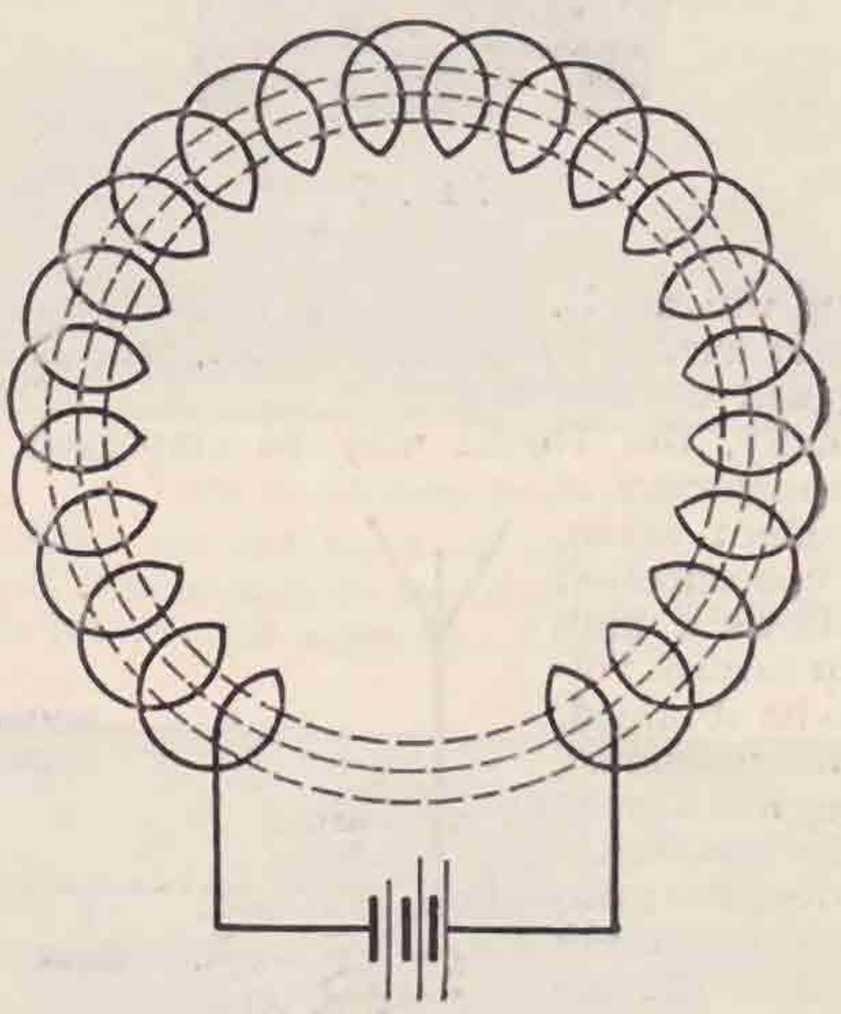


FIG. 1

Fig. 2 illustrates the Dubilier Broadcast Range Toroid, and a careful examination will make clear the method of winding employed. It is produced by an ingenious machine, and is largely responsible for the success of the component.

It is now possible to carry the matter a step further by the introduction of a primary winding of a few turns within the toroidal secondary. This is illustrated in Fig. 3, and we have what is in effect an H.F. transformer.

The term "H.F. Transformer" has, however, been narrowed in its application of late years, so that it is, perhaps, necessary to point out that the

Dubilier Toroid has two distinct uses, and that in each case it has several unique advantages.

In the first place, if the primary is connected in the aerial circuit of a receiver, the secondary being tuned by a variable condenser, an efficient aerial

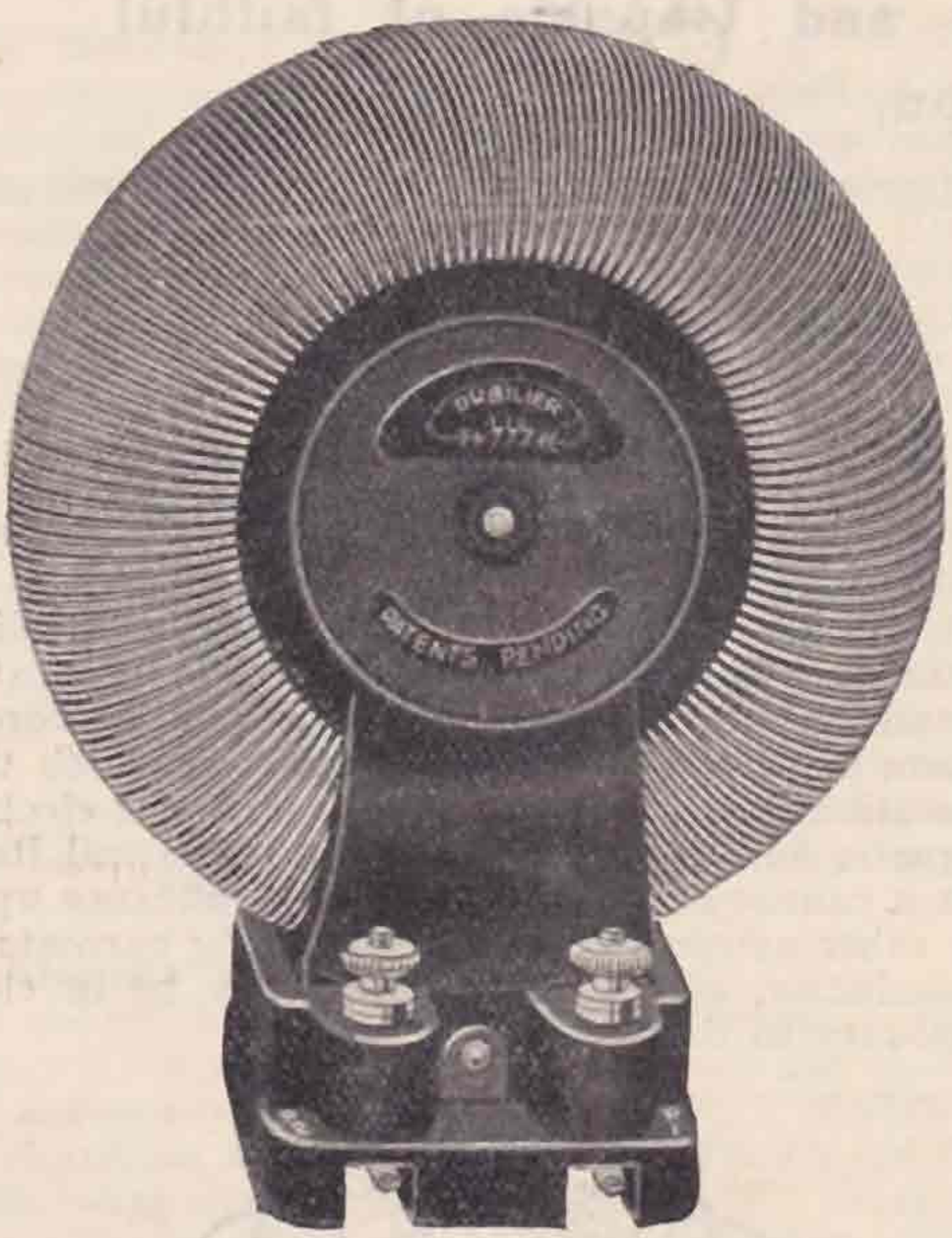


FIG. 2

coupling will result. Selectivity is good, and if the condenser used is the Dubilier K.C., true Kilocycle tuning will be obtained.

Secondly, the Toroid may be employed as an H.F. transformer in the modern sense. The concentrated field allows a high step-up ratio of voltage to be obtained, while the secondary winding has a very low self-capacity.

Further, the principle which confines the field to the interior of the winding also prevents the Toroid from picking up direct from a nearby transmitting station, and it will be noted that if the aerial and earth are disconnected from a receiver employing these transformers, even using several stages of H.F., no signals will be heard.

Two types of Toroid are manufactured. When tuned with a Dubilier K.C. Condenser (maximum capacity 0.0005μF), the wave-length ranges are respectively 230 to 600 and 750 to 2,000 metres. The secondary winding of the Broadcast Toroid is red, whilst that of the Long Wave Toroid is blue. Either Toroid may be obtained with the secondary centre-tapped.

The Toroids are supplied complete with holders carrying terminals and soldering tags, and are interchangeable.

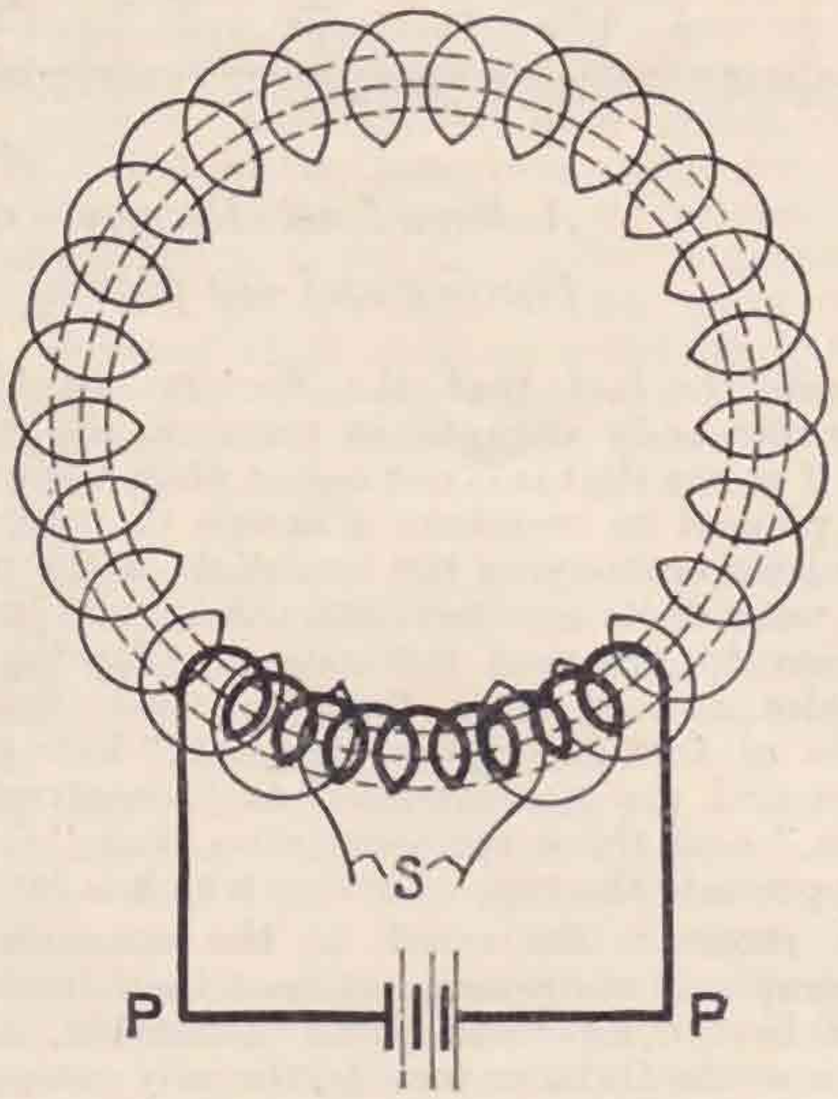


FIG. 3

An efficient method of neutralisation has been developed, and is illustrated in Fig. 4. It enables a larger part of the total available voltage of the coupling transformer to be utilised than is possible with the majority of other methods of neutralisation, and this circuit is stable over a wide range of wavelength.

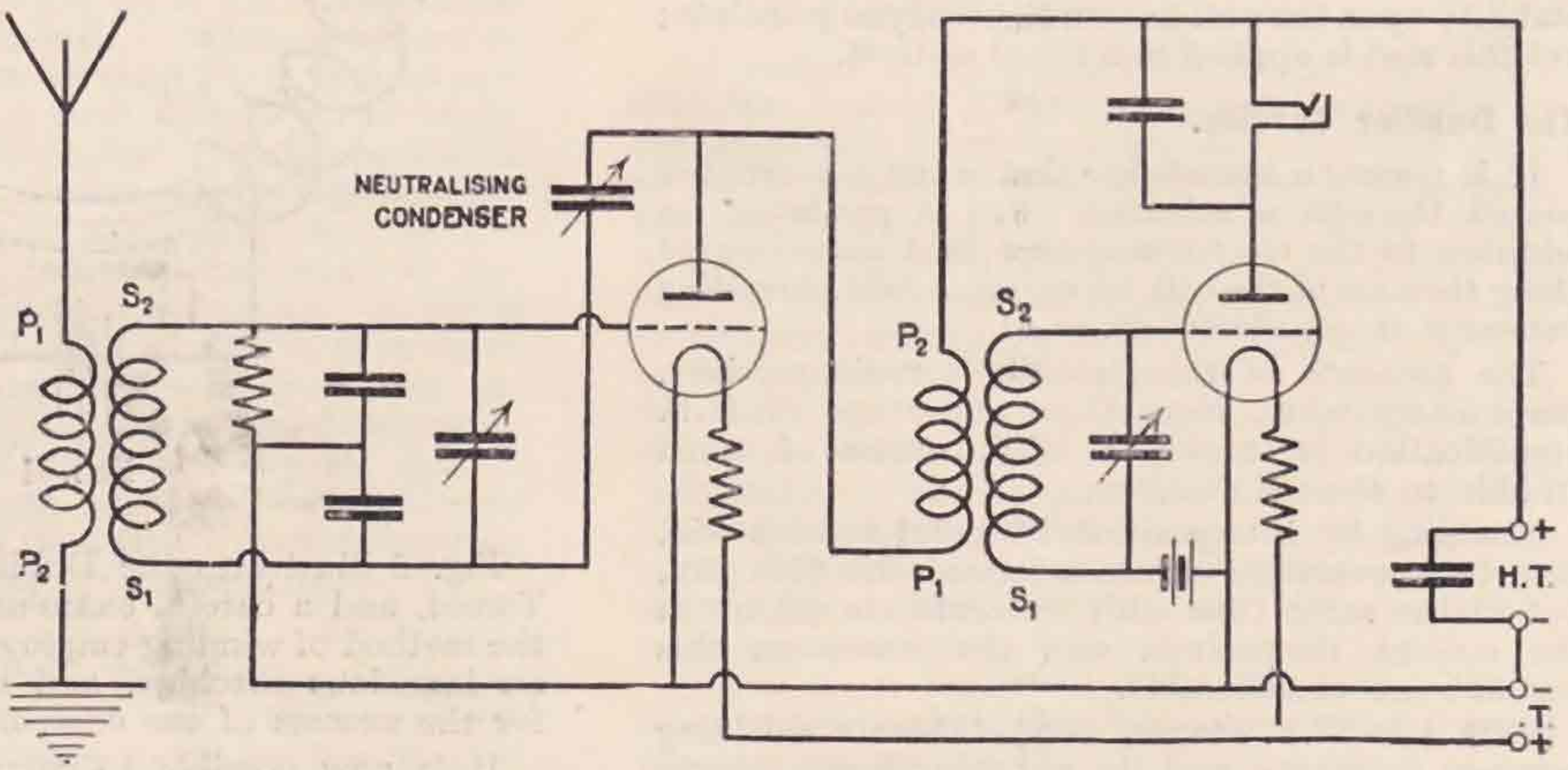


FIG. 4

Suitable capacities for the two series-connected "bridging" condensers are 0.0001μF. and 0.0003μF the smaller condenser being that shown shunted

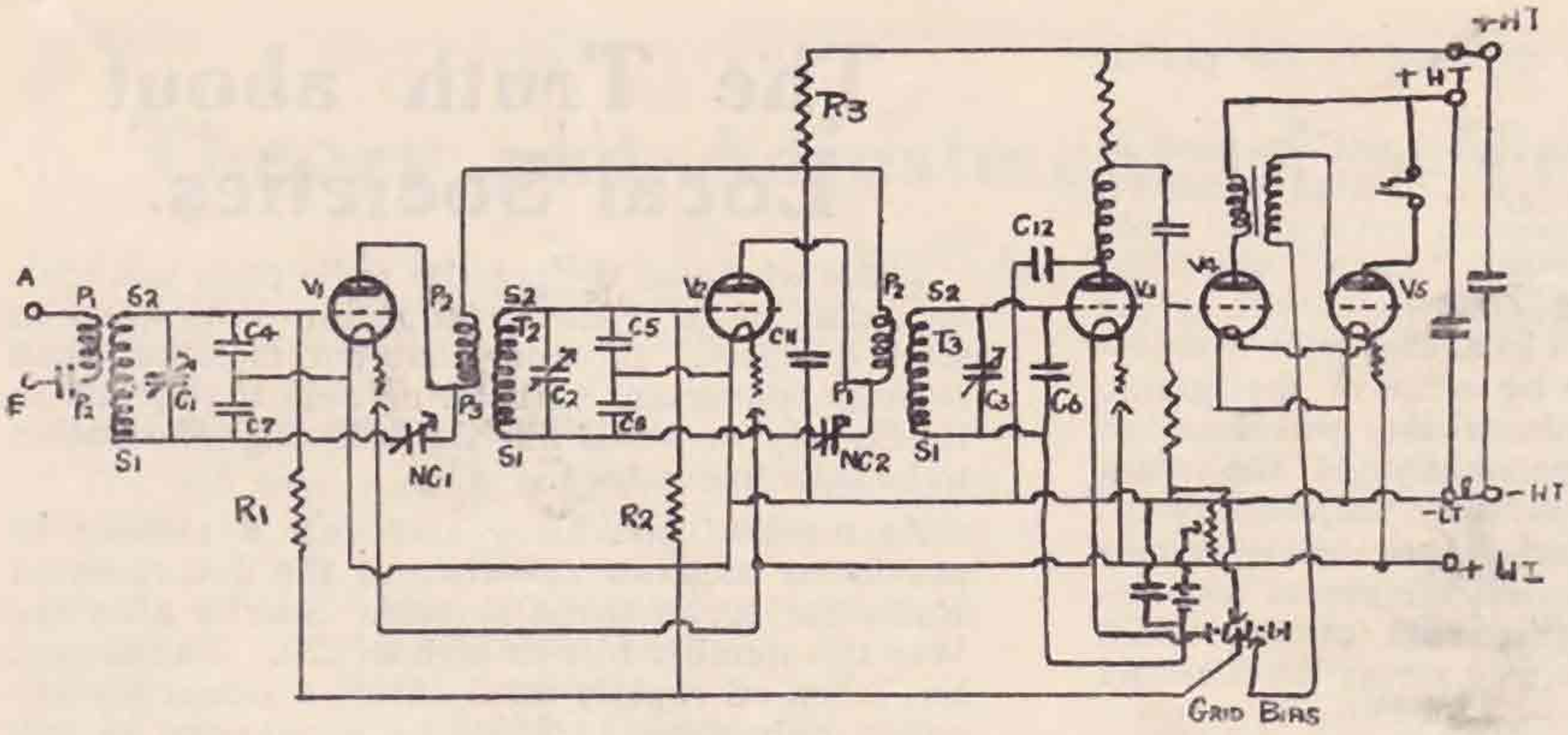


FIG. 5

by the 0.5 MΩ grid leak. The circuit is protected by patent application.

The following data will be of interest :

	Broadcast Toroid.	Longwave Toroid.
Secondary Inductance ...	200μH	2100μH
Self Capacity	10μμF	10μμF
Turns Ratio (Primary/ Secondary)	1:4	1:3
Natural Wavelength ...	90 m.	300 m.

The circuit diagram of the completed set is shown in the sketch, Fig. 5, where we see the application of many recent improvements in design adapted to the construction of a de Luxe receiver which will be the vogue for many months. The component parts used in the set are as follows :—

3 Torvid H.F. transformers (tapped or untapped may be used).

1 Ripault 3-gang variable condenser.

1 Ferranti A.F.5 L.F. transformer.

1 Ferranti OP2 output transformer (for moving coil loud speaker).

1 Ferranti R3Fa meter (flush pattern).

1 McMichael H.F. choke.

1 Dubilier 20,000 wire-wound anode resistance (for H.F., H.T. circuit).

2 5 Megohm Dumetohm resistances.

*2 Dubilier condensers, type 610 .0003 mfd (C7).

*2 Dubilier condensers, type 610 .0001 mfd (C4 and 5).

*1 Dubilier condenser, type 610 .0001 mfd (C6).

1 Dubilier condenser, type 610 .006 mfd (potentiometer by-pass).

1 Dubilier condenser, type 610 .0001 mfd (H.F. choke to L.T.).

6 Bretwood base boards mounting anti-microphonic valve holders.

2 Mansbridge type reservoir condensers .5 mfd (T.C.C.).

" Excel " terminal tags (Collett's).

1 Tapa plug and jack (Bulgin & Co.).

1 Competa safety lamp and base (Bulgin & Co.).

1 Igranic 600-ohm potentiometer (specially produced).

2 Gambrell Neutrovernier Balancing Condensers.

3 Lissenstats (Lissen & Co.).

2 ordinary brass terminals.

5 Clix terminals (parallel plugs and sockets), and two spade terminals.

1 pair panel brackets, by Collett's.

6 Mullard valves, 3 P.M.5x, 1 P.M.5b, 1 P.M.

1 Mullard resistance-capacity coupling unit.

BATTERIES :

1 30-volt grid bias battery (British Battery Co.).

1 9-volt grid bias battery (Eveready Battery Co.).

1 set Hart 6-volt 40-ampere-hour accumulators.

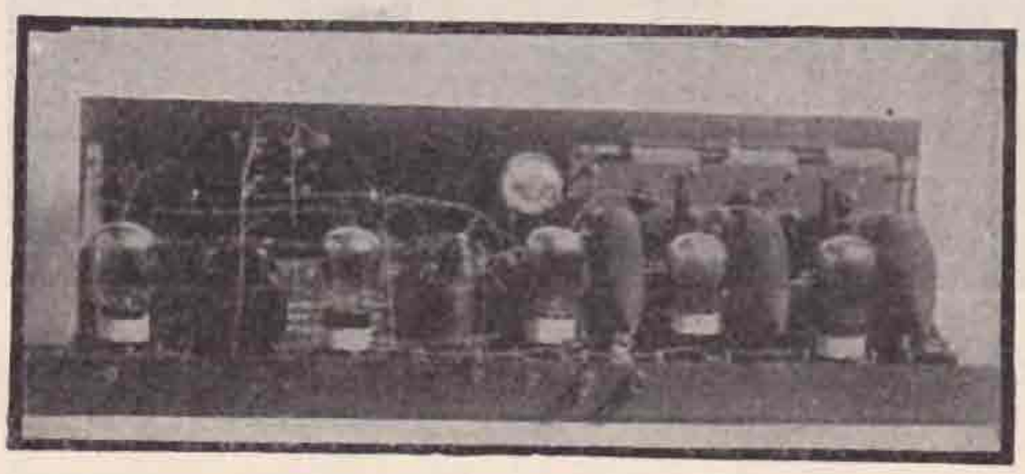
Cabinet and baseboard by the Artcraft Co., Croydon.

Ripault ebonite panel (8 in. by 26 in. by ¼ in.).

1 " Ekco " H.T. unit, type V2.

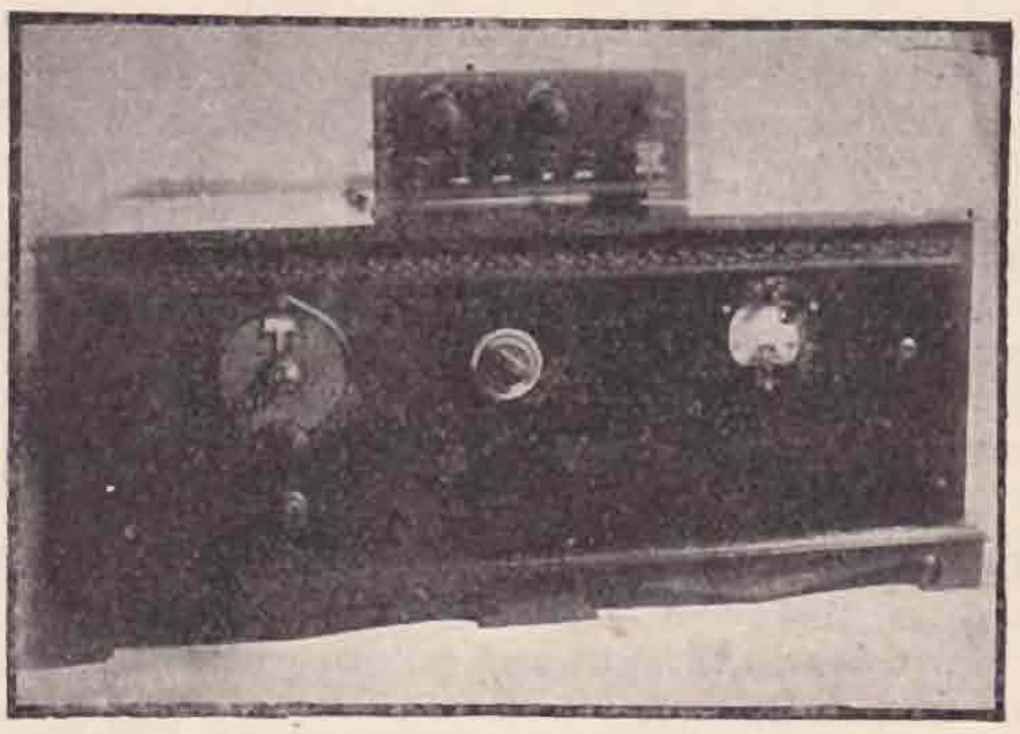
*These condensers are critical, and must be ordered from the Dubilier Condenser Co., as they are required for use with the neutrodyne system.

The reader will realise from the opening paragraphs of this article that it is not our intention to give a " How to Build " article ; the purpose is to bring to attention a set embodying the features



View of receiver from rear.

enumerated at the head of this page. For this reason it is necessary to incorporate in the gear the various component parts specified, taking care that



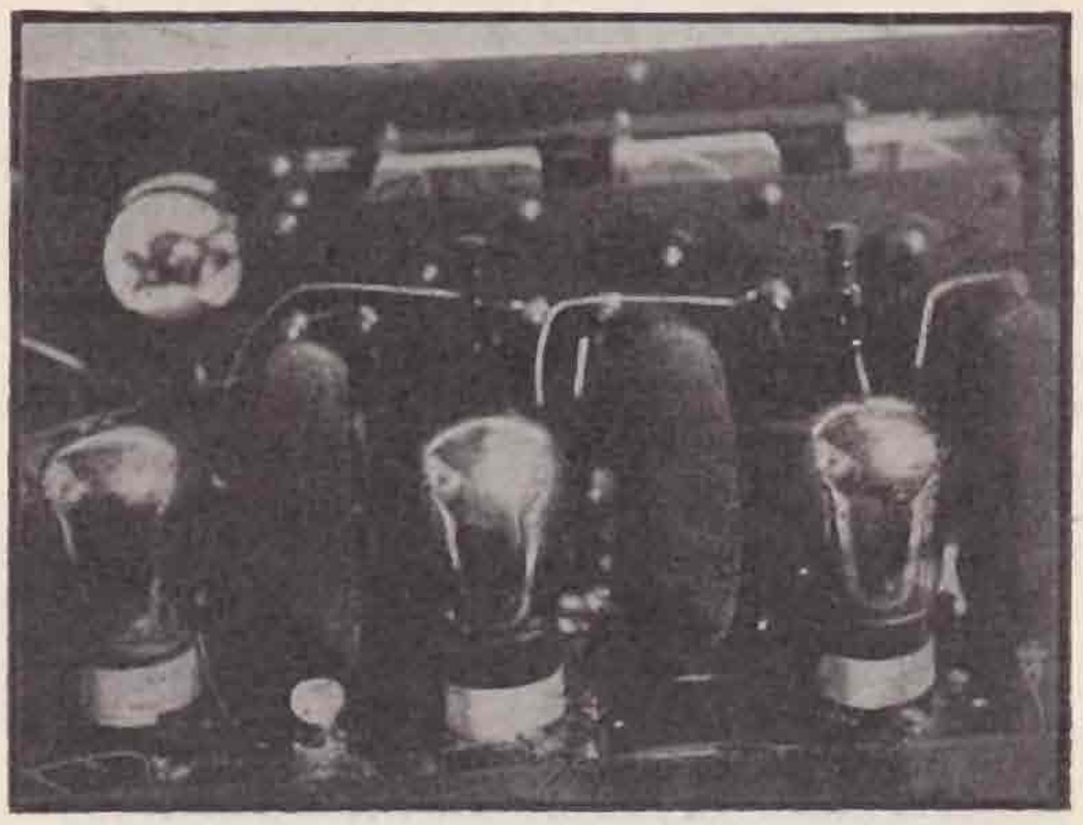
Note one knob control except for anode bend potentiometer.

in the event of a departure from the specification, due regard is paid to the fact that the electrical characteristics of alternative component parts are the same. The main dimensions of baseboard, panel and cabinet are given, and the reader may

easily copy the layout as depicted in the photographs.

The set was primarily designed with a view to operating the moving coil type of loud speakers, and in this it is highly successful, but a small reed-cone type, as for instance the " Beco " was used with isolating choke and condenser with great success. When tuning in a local station it is necessary to regulate the volume by means of the Igranic potentiometer which regulates the grid bias on the detector valve independently of the main grid bias battery (British Battery Co.).

It will also be noted that a Ferranti voltmeter is used in the set. The voltmeter serves a three-fold function, as by adjustments of the small switch on the front, the voltage across the filament



" Close up " of high frequency end of receiver showing compact arrangement of Transformers, etc.

of the power amplifies, the voltage of the H.T. supply and the current dissipated by the valve can be measured. Furthermore, the instrument serves as an indicator of " blasting " in the last stage of the amplifier.

The " Ekco " H.T. unit proves to be an exceedingly silent and efficient source of H.T. supply when connected to the 230-volt mains, and anybody installing a 5-valve set such as this would be well advised to install one of these units as the drain on the ordinary dry H.T. battery is fairly considerable, and such a battery will in consequence have a very short life.

Social Sub-Committee.

In order to provide social entertainment for members this committee has been formed. To further this end, I want two or three more London Area men to join me on the sub-committee in the course of formation. I have asked Mr. Bradley (2AX) and Mr. Denny (6NK) to assist ; both have accepted.

Suggestions and ideas are wanted. Please let me have them now.

Is anybody in favour of an Easter Conventionette ?

J. CLARRICOATS (6CL).

The Truth about Local Societies.

Those who read the popular radio press will have seen that we have been getting into hot water in some quarters. In order that our members shall be fully conversant with all matters that go on in the Society we would like the following information to be fully understood.

As most of you know there are a number of provincial societies affiliated to the Incorporated Radio Society of Great Britain. Shortly after the War this number rose as high as 220. But since it has fallen off rapidly until during a recent investigation only some 15 could be ascertained as still existing, or who had continued their subscriptions. Much of the falling off could be traced to the inability of the parent Society to find the supply of lecturers which had been part of the original programme. Attempts had been made to form a list of lecturers from the members all over the country and after considerable difficulty one was got together. Unfortunately when it was attempted to put this into practice it was found to be abortive. When some of those upon the list were called upon to fulfil their obligations excuses were offered and in other cases although promises were given to attend meetings they were not kept. In fact the list soon was reduced to some four or five " willing horses " and practically useless. Obviously it was impossible to continue to find lecturers. Now many of the societies had only joined to get this advantage and were naturally disappointed at their repeated requests for lectures being turned down. As a result the Council decided to drop this part of the programme and wrote those of the remaining societies to that effect. This has been taken in some quarters as a complete throw over by this Society of the affiliated societies and we have been accused of it in the press. We further notice that an Association has been formed who are going to carry on the work which we have *neglected*. We shall watch with interest their efforts and hope that they will be more successful than we were, but personally, we have our doubts. We feel it much better to be honest in the matter than to continue to make promises which are not in our power to fulfil.

As we can claim perfect innocence of the accusations which are now being hurled at our heads, we hope every loyal member of the Society who reads these lines will do his best to support us in the matter and help to correct any bad impressions which they may come across as a result of these unfair attacks.

Strays.

NI-G2SH.—Public tests at Akureyri, Iceland, on January 26, 27 and 28, 10 p.m. to 10.30 p.m. ; on January 29, 9-10 p.m. Reports to following address will be appreciated :—Mrs. C. F. Hogg, 37, Bishops Road, Highgate, London, N.6.

NB-BE3 asks for QSO's with EG. His QRL is 41, tone RAC, and QRA A. E. Redman, Devonshire, Bermuda (via EG6PP).

Theory and Adjustment of a Transmitter.

By F. G. Aughtie.

Value of Grid Excitation.

We will now roughly calculate the grid swing required for maximum output, in order to show that it is much larger than might be anticipated. Let Ra be the Anode A.C. Resistance (Impedance)

m ,, Amplification Factor.
Ie ,, Total Emission
V ,, D.C. Supply Voltage.

Now, if V^1 is the anode voltage required to obtain total emission with the grid at zero potential,

$V^1 = Ie \times Ra$ (this is approximate only).

A potential on the grid of V^1/m is roughly equivalent to this, hence the grid must reach a positive potential of (roughly) Ie.Ra/m.

We will assume the grid bias to be sufficient to bring the mean operating point to the foot of the static curve. This requires a bias of about V/m volts. The positive half cycle of the excitation must therefore swing the grid from —V/m to +Ie.Ra/m : a total of (V+Ie.Ra)/m. The total swing must be twice this : —2(V+Ie.Ra)/m volts.

Actually the grid will not be taken quite so positive as the figure given above, because, firstly, the anode potential will not fall to zero, and, secondly, a part of the total emission will pass to the grid and will not reach the anode. This figure may, however, be taken as an indication of the excitation required. If the figure be substituted for the various constants for any valve commonly used for low power transmission, it will be found that the excitation required is of the same order as the anode swing. It will only be appreciably smaller in the case of valves of high m-value. Thus the *voltage amplification of an oscillator valve giving full output at a reasonable efficiency is of the order of unity*. This explains why the Hartley circuit, in which the grid swing is equal to the anode swing, does not over excite the grid. An oscillator valve, in fact, does not give a *voltage* amplification, but a *power* amplification from grid to anode. A reasonable ratio of grid input, to anode output, power is ten to twelve. Higher values can be obtained, usually at the expense of reduced output from the valve. On the short waves ratios of five or six are quite common.

Amplification Factor.

We have seen that the voltage amplification actually obtained is very small and depends more on the operating conditions than on the actual "M" value of the valve. Thus, in practice, the amplification factor of the valve is of secondary importance. The A.C. resistance of the valve is of far more importance, as this decides the power which the valve will handle when running from a power supply of a definite voltage.

Thus the original question of high or low impedance valves is reduced to the question, what H.T. voltage is to be used, coupled with a knowledge of the power required. If power can easily be obtained at a high voltage (over, say, 600 volts), then use high impedance valves ; if, however, a convenient source of supply is available at a lower voltage, such as D.C. mains, then use low impedance valves in parallel to obtain the required output. This assumes that the filament supply presents no difficulty.

There will be certain differences between the operation of the two types when handling the same power. The low Ra valve will require more grid bias even though its H.T. voltage is lower than the other ; its grid current will also be smaller, due to there being less wire in the grid. These two facts combined demand that the grid leak for the low Ra valve must be much higher than for the high Ra valve. If the leak is made too high a howl may result due to the bias rising to such a value that oscillations cease, recommencing again when the condenser has discharged to a sufficient extent to permit them to commence again.

Sometimes a low Ra valve will not start to oscillate when used with a grid resistance and condenser for bias, if the H.T. is too high. This is because the zero grid ordinate cuts the static curve beyond the saturation point. The remedy for this is, increase the filament temperature ; or, if this is unsafe, add a little battery bias ; failing either of these the only alternative is to reduce the H.T. value.

When oscillating the dynamic curve of the low Ra valve lies well in the negative range of grid potential, while that of the high Ra valve lies mainly in the positive region of grid potential. As a result the mean feed current to the low Ra valve is less than its anode current at zero grid potential ; the high Ra valve, however, has a smaller anode current at zero grid potential than its mean feed current. Thus, when the former stops oscillating—due, say, to too tight a coupling—the feed current rises, while when the latter stops oscillating the feed current falls. This assumes both valves to be operated at normal H.T. supply voltage.

Effect of Loading the Valve.

Now consider what takes place as load is gradually put on an oscillation valve, by tightening the coupling between the anode and aerial coils, supposing loose coupling to be employed. We will examine, firstly, the case of a separately excited valve as being simpler than a self-excited valve. At zero coupling the circulating current in the anode circuit will be high and the anode swing proportionately high. Tightening the coupling is equivalent to increasing the resistance of the anode circuit—from the point of view of the valve—hence, the circulating current will fall in value ; so also will the voltage swing on the anode. This means that it will be more positive when the grid is positive, than it was before loading up. It will also be less positive when the grid is negative than

it was formerly. Since the grid is biased so that no anode current flows when the grid is negative, the final result is that the feed current rises. (Fig. 3) indicates the state of affairs loaded and unloaded.

As the (equivalent) resistance of the anode circuit increases, the power in this resistance increases to a maximum and then falls, corresponding to the change of aerial current as the coupling is tightened. The feed current, however, continues to rise so that optimum efficiency is obtained at, or just before, the position of maximum output.

The problem of the self-excited valve is more complicated, because the grid excitation is dependent upon the value of the circulating current. As the (equivalent) resistance is increased, the circulating current falls, and so does the grid swing; this causes a reduction of grid current and grid bias. The net effect is that the grid still swings to about the same positive value but to a smaller negative value. Hence, the feed current rises for the same reason as for the separately excited valve.

If the anode circuit resistance is increased beyond a certain value, oscillations are no longer maintained, and the feed current jumps to the value of the anode current at zero grid potential. This may be an upward or downward jump according to the valve and H.T. used.

Hence, to summarise, as an oscillating valve is loaded—

(*a*) Anode voltage swing falls.
(*b*) Grid swing falls.
(*c*) Grid current falls.
(*d*) Grid bias falls.
(*e*) Anode current rises.

Ultimately oscillations cease, and the feed current jumps up or down as already explained.

If the anode feed does not rise on loading up, it indicates poor efficiency, due either to excessive losses in the grid and/or anode circuits or insufficient grid bias. Try increasing the grid bias first, and if this does not improve matters examine the circuits for excessive losses. H.F. chokes are a frequent source of loss if they are of unsuitable size.

Note.—This assumes anode circuit *exactly tuned* to working frequency. If this is not so there will be a phase difference between Anode Circuit Current and Anode Voltage.

R.S.G.B. Annual Dinner, 1928.

The annual dinner for this year will take place on Friday, March 9, at The Piccadilly Hotel. Dinner 7.30 p.m. Reception by Captain and Mrs. Fraser at 7 p.m. Tickets for the dinner, 12s. 6d. each, may be obtained by application, with remittance, to the Hon. Secretary, 53, Victoria Street, S.W.1, as soon as possible. Dancing will be available following the dinner, an extra charge of 2s. being made for dance tickets, obtainable at the Hotel during the evening.

Y.L. Section.

Yet another interesting side to amateur radio will be afforded by the formation of the Y.L. Section, which Miss Dunn has now in hand. Miss Dunn is an enthusiastic transmitter and has recently been co-opted on to the Q.S.L. sub-committee. Most members know at least one Y.L. if not more. Please don't forget that a letter to Miss Dunn, c/o. Hon. Secretary, Inc. Radio Society of Great Britain, will be gratefully received.

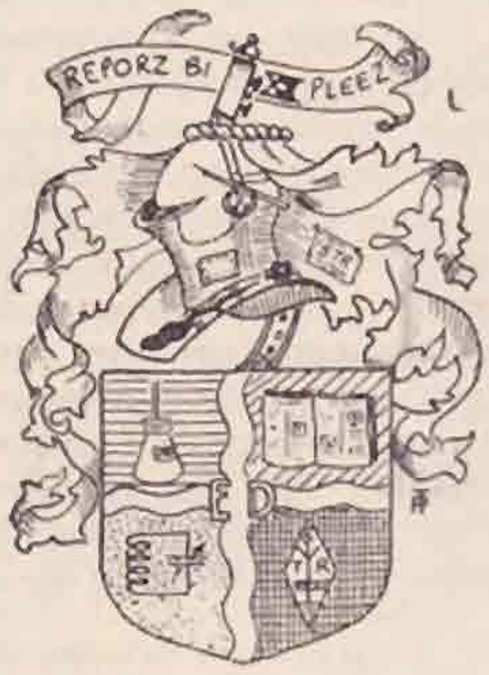
90 Metres.

By 2NH.

To anyone who knows what a desert the 90-metre band has been during the last two years this little note is addressed. Next Monday night dust up the 90-metre coils about 23.00 G.M.T. and take a listen. You will receive a surprise for you will hear signals such as are seldom heard on 45 metres. Steady sigs. that don't wobble or QSO, and even though some of them are weak you can read them for hours on end without straining your ears or missing a single word. If you are fairly new to this little old game of radio and don't remember the good old 90-metre days you will be able to realise the friendly chats and useful tests you have missed. Please do not stop at listening, but make up some 90-metre coils and get the transmitter going and join in the fun. You will learn a lot and have some interesting QSO's at the same time. For the benefit of those who are new to 90-metre work, I might suggest that your present transmitter will get there with a simple alteration of the size of the coils. It you are using the T.P. and T.G. circuit of the series Hartley, each coil will want 14 or 15 turns about 4 in. in diameter, whereas the straightforward Hartley requires an inductance of about 24 turns of the same diameter. Try it O.M. and see for yourself. Amongst others the following stations are definitely known to be taking part in our 90-metre parties every Monday from 22.00 onwards :— G, 2CX, 2WR, 2CI, 2NH, 2QB, 5MA, 5JA, 5FO, 5HJ, 5BO, 6QB, 6QT, 6JV, 6TA, 6HP, 6OH, 6YQ, and by the time you read these notes there will be plenty of others.

E. L. Dedman (G2NH).

Editorial Crest!



PER CROSS ON A CROSS UNDEE ARGENT BETWEEN IN DEXTER CHIEF, ON A FIELD AZURE, A POT, PASTE, PROPER TROOPS FOR THE USE OF, IN SINISTER CHIEF, ON A FIELD PURPURE, AN OPEN BOOK OF THE SECOND, YE BULLETIN TO WIT IN DEXTER BASE ON A FIELD GULES, YE OSCILLATIN G CIRCUIT OF THE SECOND, WITH A PERIOD OF ONE MONTH WITH YE ZENITH AT YE 10TH, IN SINISTER BASE ON A FIELD SABLE YE EMBLEM OF THE HOLDER'S ORDER, RAMPANT OF THE SECOND, THE SIGNATURE OF THE HOLDER USED WHEN "PUTTING ONE ACROSS" A CONTRIBUTER TO THE CHIEF SINISTER

WANTED.—A thousand or so members to advertise their surplus gear for sale in these columns.

Memo . . .

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Mathematics for the Ham Experimenter.

THERE appears to be some diversity of opinion as to the necessity for super-elementary mathematical knowledge in the amateur radio experimenter. At first sight, it does not seem necessary to the ham who is, say, building a transmitter and getting acquainted with its adjustment to put a strong, crisp, steady signal into a distant country. All the same, there are many things cropping up in this work which border on higher mathematics, and in a great number of cases do not entail his knowledge of how certain values or formulæ are arrived at, but only of how relatively important, and how they should be used in his work.

The characteristic curve of a valve and a knowledge of the grid current, etc., when the valve is oscillating, could be used to tell how to work the valve with a minim of harmonics being generated. A knowledge of the principles of high frequency conduction would tell him how important, relatively, are the "low-loss" properties of his components and parts of a circuit. Need we use super low-loss grid condensers, and if not, can we go to the other extreme and use a condenser, say, with a poor dialectric? Is it quite correct to put up the plate turns when we change the valve for one of higher impedance? Or have we merely picked a freak valve? Why has Hoyt-Taylor pensioned off a rusty drain-pipe to act as the 20-meter aerial at NKF, and why can he look the "low-loss" world in the face?. In all such things as these, a little knowledge of the mathematics of radio would, at the least, ease an experimenter's conscience.

For the experimenter who is not so much concerned with experimenting on the set itself, but is more interested in what happens to his signals when they leave his aerial, a more complete knowledge of mathematics is useful.

After he has found his skip distance and his distance of maximum signal strength, after the skip, he can, by means of spherical trigonometry and knowing the height of the reflecting layer, determine such useful things as the angle of maximum radiation from his aerial and the distance at which a "Weather System" will affect his signals most.

After he has some idea of the path of a wave on long distance, he can set to work on such interesting work as the effect of weather on DX and form some opinion, right from the start, of the importance of all the things that go under the heading of "weather." For the sake of argument, suppose the percentage of water vapour in the air is such that the power absorbed from a radio wave increases as the square of the amount of vapour, *i.e.*, increasing the amount of vapour to double the present value absorbs four times as much power. Knowing this the experimenter can allot "water vapour" its proper significance in his table of data. And so on, with temperature, barometric pressure, height of clouds, etc. If he has no idea of how the various things affect signals, he must treat them all equally in the fineness or accuracy of his observations on them, and in doing this, they will appear in their proper significance as he continues his experiments.

It thus appears that there are two things in this question of mathematical attack on radio problems. There is the part entailing formulæ and how they are applied to find values of one thing when we know the values of some other things connected with it. Then there is the part which concerns the handling of yards and yards of data from an experiment so that we can squeeze all there is to be got out of it, neglecting those things which may be of trifling importance and stressing the things which are more concerned with the result, which brings us back to the "formulæ" part of mathematics, since our knowledge of these relative imports is derived from them.

I would suggest that the radio experimenter gets acquainted with the elements of algebra (a fierce name for "thinking mathematically by symbols") and trigonometry, with the addition of a study of some work on analysis of observation, and then on to the heavy work of looking through treatise and abstracts which will be sure to be full of otherwise incomprehensible symbols, signs, etc. There is at the present day a fine introduction to mathematics going on in *Experimental Wireless and Wireless Engineer*, by F. M. Colebrook, of the N.P.L., and should be just the thing for the keen ham. I should be glad to hear from any hams who would like some help in selecting books, or wanting help in puzzling out odd equations or other mathematical-radio problems.

R. Pollock (5KU).

Trade Reviews.

We have tested a "Beco" loud speaker in conjunction with the "RSGB Five," and have found this an exceedingly useful little instrument. Although the set was primarily designed to operate a loud speaker at great volume, and a moving cone-coil at that, it handled a considerable volume with every satisfaction. The instrument is but small, and it is surprising that so small a loud speaker can handle so great a volume without distortion arising. The speaker was isolated from the steady D.C. current by means of a 20 henry choke and a 4-microfarad condenser.

Excel Terminal Tags and Brackets.

Excel terminal tags are very useful gadgets to use when undertaking a big wiring job, and they reduce soldering difficulties and "fiddling" jobs of this nature to a minimum. They can be recommended with every confidence to anybody who wants to cut out the drudgery in wiring up a multi-stage receiver. The panel brackets are probably very well known to many readers, as they form a rigid method of mounting up the panel of any instrument.

Clix Terminals.

These useful accessories were used throughout the RSGB Five, and no other type of terminal was used even to the HT and LT leads. They also formed a ready means of making and breaking connections in the shortest possible time during the experimental bench work on the receiver. Light and quickly attached to any type of wire, they also are very desirable when the amateur is carrying out any experiments which entail changing a number of connections in the shortest possible time.

Beat Notes in Receiver.

By GI6YW.

A good method in use for keeping a check on the steadiness and quality of one's CW is to listen to a beat note above the wavelength in use. This upper note is usually a better representation of the transmission than a lower one, but the notes above the fundamental wavelength are often miscalled "harmonics," whereas they are really receiver harmonics beating with the transmitter fundamental or one of *its* harmonics.

If a transmitter is working on a wavelength of λ^1 metres it will produce an infinite series of harmonics represented by

$$\lambda^1, \frac{\lambda^1}{2}, \frac{\lambda^1}{4}, \frac{\lambda^1}{6}, \frac{\lambda^1}{8}, \frac{\lambda^1}{10} \text{ etc.}$$

and as 2HK explained in his excellent article, odd harmonics may also be produced, *viz.*:

$$\frac{\lambda^1}{3}, \frac{\lambda^1}{5}, \frac{\lambda^1}{7}, \frac{\lambda^1}{9}, \text{ etc.}$$

Let us assume that all the harmonics are produced, and they may be represented by $\frac{\lambda^1}{n}$ where n is any whole number.

The receiver, being an oscillator, will also produce a range of harmonics, and for any setting of wavelength λ we have harmonics represented by $\frac{\lambda}{N}$, where again N is any whole number.

We will hear a heterodyne note when any one of these receiver harmonics beats with any one of the transmitter harmonics, *i.e.*, when their frequencies are the same (for zero beat).

There will be a beat, therefore, when

$$\frac{\lambda}{N} \quad \frac{\lambda^1}{n}$$

i.e., the wavelength of each beat on the receiver will be—

$$\lambda = \lambda^1 \frac{N}{n}$$

Assuming λ^1 to be 45 metres, we will have a series of beat notes—

$$\lambda = 45, \frac{45}{2}, \frac{45 \times 3}{2} \ldots\ldots, \frac{45}{3}, \frac{45 \times 2}{3}, \frac{45 \times 4}{3} \ldots\ldots \text{etc.}$$

Taking only the first three harmonics, beats occur at—

$\lambda = 135, 90, 77{\cdot}5, 45, 30, 22\frac{1}{2}, 15$ metres.

Others may be calculated in the same way.

These calculations neglect spurious oscillations which may be present in the transmitter or receiver, exclusive of harmonics.

If one uses a calibrated receiver over a wide range, it will be easy to check the accuracy of one's wavelength by means of a simple calculation after finding the wavelength of a known beat note.

IS YOUR SUBSCRIPTION DUE?

What's Wrong with Amateur Radio?

AN OPEN LETTER FROM A G TO ANOTHER HAM.

DEAR GEORGE,—You ask me my opinion of British Hams, so let's have a chat and review the whole outlook.

There are several types of hams, and there are several types of eggs, and the latter are just like the former, in that some are good, some are bad and many are indifferent.

Talking of indifference, that is to my mind the prevailing spirit amongst the greater part of our hams, and the more's the pity of it.

You may ask how I arrive at this, but the answer is obvious if you read your BULLETIN (which as you may know is our very own paper).

Therein you ought to find the pages filled to overflowing with articles from our members, but do you? Not a hope, as apart from a very few who do their best, the others just read the articles and criticise them for all they are worth, and I'm sorry to say it is mostly adverse at that.

Next there are some folk who give time to the collecting of Area Notes, but you will observe that every mother's son of them does much ink slinging month after month, in trying to get others to send in notes, and the reports seem to get less and less.

Why? do I hear you ask! Well, OM, it's the same story—just apathy (say, look this word up in your dictionary; get it well into your head, and make a vow never to practise it where wireless is concerned, as you will be doing a good turn to everyone by doing so).

Again, you will have seen that a "Contact Bureau" has recently been started.

As you are aware, every G ham gets his ticket for experimental purposes, and this C.B. business is just the thing for them to join, so as to get the names of others interested in the same experimental work as they are, but do they?

Look for yourself at the number who have offered to co-operate—something like thirty (and I think our membership is around 1,500). So here again that indifferent feeling is prevalent.

If I were the P.M.G. (on second thoughts, I'm glad I'm not) I would be inclined to look over the membership roll of this C.B. affair when the time comes for the renewal of transmitting tickets and just see for himself who are really experimenters and who are not, and, unless my eyes deceive me, this revision must come about this year, after the result of the Washington Conference.

Talking of Washington (and your name being George), can you tell me how some hams come about finding the watts they use, as it is perfectly astounding how well "under 10 watts" can travel, when another nought is forgotten, when reporting the input being used?

These same hams at the same time have heard of the word "QSL" and use the word a lot, but why don't they practise it as well? After all, this QSL job is really a small token of courtesy, and surely courtesy should be studied.

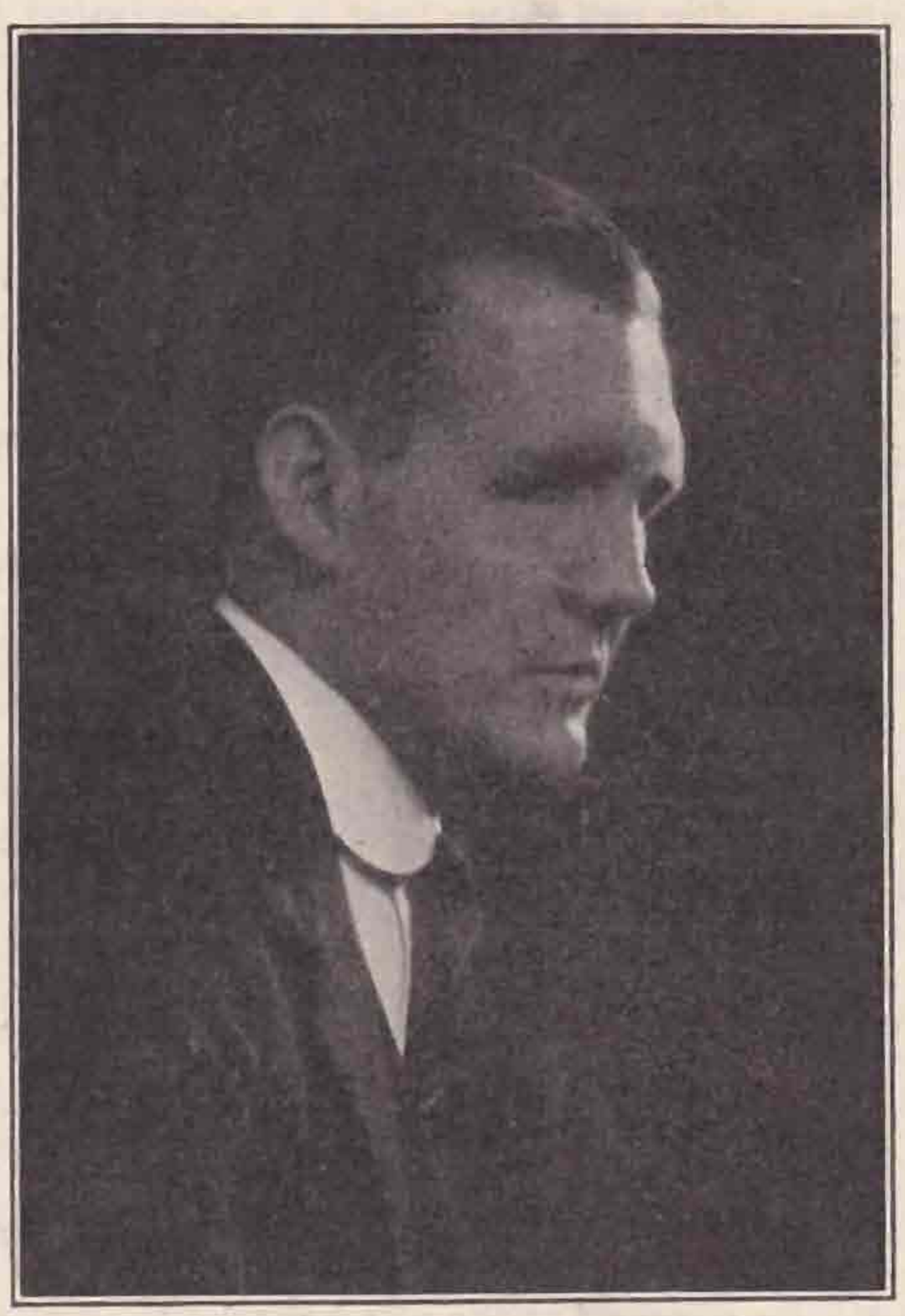
By the way, how about the components you borrowed from me. They cost money to buy, and so, as they are of use to you, might they not be of use to the owner? Try it!

Now OM, I must close, but just a word more.

Where would we be if the A.R.R.L. had not studied our interests, backed up by the R.S.G.B. ?

Let's start you off afresh (I'm O.K., as you can't accuse me of lacking in anything under review, can you ?) and just see if we can't become real hams, bringing the spirit of co-operation and of honour, in place of this terrible word APATHY, which we have earned for ourselves, and well earned it too.

Support the " Bull," the R.S.G.B., our brother hams, and, above all, for goodness sake let us *DO*



Captain Ian Fraser, C.B.E., M.P.

President R.S.G.B., 1927-1928.

something, for a change, instead of this infernal talk or grouse, which helps or pleases none.

Let me remind you that I have no part in the management (Aera Section, C.B. Staff, etc.), and am just your well-wisher, in that we are both " BROTHER HAMS."

Yours, with 73,
HARRY.

Keying.

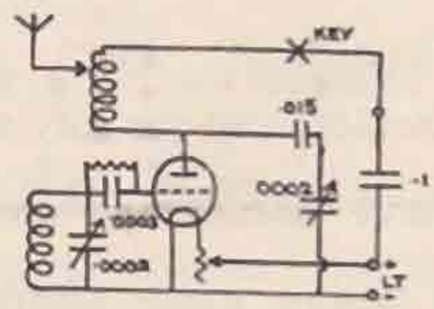
By G. W. THOMAS (5YK).

There has been an absence lately of dope on keying in the BULLETIN (I hope it's not the Editorial blue pencil), so I am going to break the ice with apologies.

So much has been written about keying ,with its attendant spacers and chirps, that I am loath to say much about it ; still I must. I once thought that somebody's stunt of absorption keying had hit the mark : it was O.K. for low power but not for high, and I never quite got rid of the spacer. Spacers are so simple but should never be used except during quiet hours : there is no other excuse for them. That horrible system of keying in the H.T. negative with a leak across the key is—well, less said the better.

Keying systems must be considered under two headings : (1) Where the load on the supply may vary, as in battery and R.A.C. supplies ; (2) where the load must remain dead constant, as in generator supply.

For the first heading, there is one really good system ; the fundamental idea is in June, 1927, QST, but it requires modifying. The circuit diagram is shown in the figure ; the key breaks no H.F. or high voltage lead, and there is no sparking



on 50 watts. The resistances have no fixed values, but convenient ones for a D.E.T.1 valve with 1,000 volts are :—R_1 80,000 ohms, R_2 1,000 ohms, R_3 19,000 ohms. The principle of the system is as follows :—When the key is up the grid obtains a negative voltage of

$$\frac{R_2+R_3}{R_1} \text{ times H.T. volts :}$$

in this case 200, which is quite sufficient to prevent the valve passing any plate current at all. The H.T. voltage rises when the key is up to very nearly peak value on R.A.C. supply as the total drain is only 10 milliamps on R.M.S. voltage ; this means a rise to nearly 1,500 volts on a good supply. However, unless the set is being badly forced no chirp will result, and the 100,000 ohms will take care of any surges and so protect the smoothing condensers. In the original system in QST R_2 was omitted, but it is very important that it should be used. When the key is pressed the additional grid bias of 200 volts is shorted and the valve should go into oscillation. This is OK for some tubes but not for a valve of the D.E.T.1 or L.S.5 class, where, on closing the key, the surge of grid voltage from 200 negative is so great as to carry the grid far on the positive side of its normal operating point : there is also a very heavy plate current surge and the usual result is that the valve never gets into oscillation, but takes a plate current equal to its filament emission. If the valve does go into oscillation there will be a very heavy surge of R.F. voltage in the plate circuit, possibly half as

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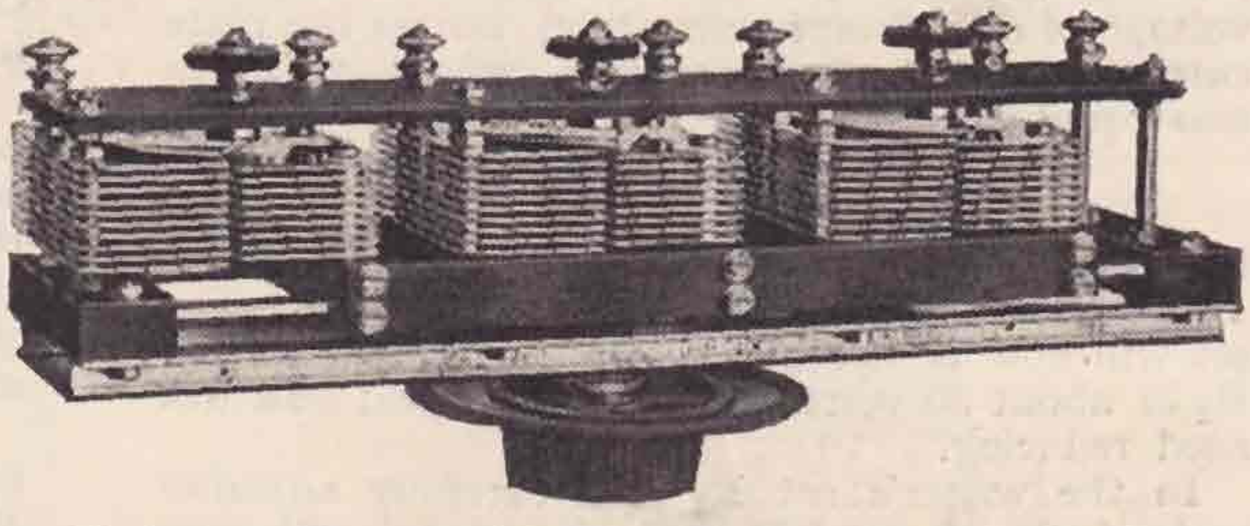

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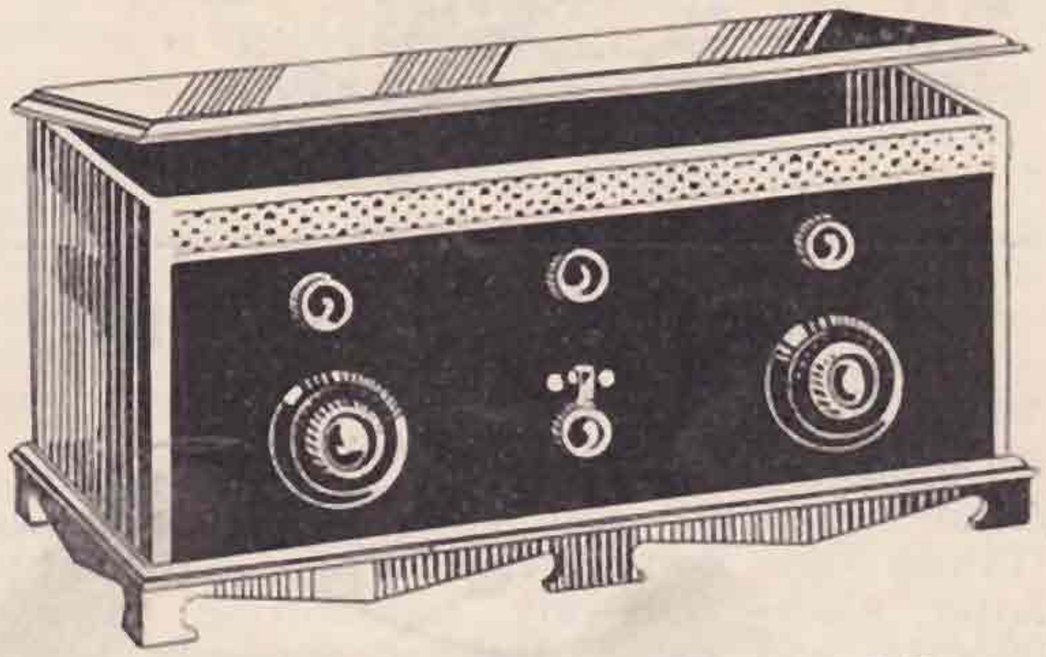

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much again as the normal R.F. voltage. Both these surges are very injurious to the valve, and here is where R_2 comes in. When the key is up R_2 contributes 1/20th of the biasing voltage, and on pressing the key the grid starts at a negative voltage of only 8 (approximately), but as the plate current begins to flow the grid receives an extra bias equal to

$$\frac{\text{total milliamps}}{R_2}$$

in addition to the bias provided by the grid leak. This prevents the surges mentioned before. The set will now be operating with a grid bias due to R_2 of about 50 volts negative so the grid leak will need reducing.

In the writer's set R_1 is a carefully adjusted water leak ; R_2 and R_3 are wire-wound with taps to vary the biasing voltage. This system of keying works very well and is well worth a trial.

In cases where the load on the supply must remain dead constant there are two possible alternatives : (1) By replacing the load due to the valve by an equivalent resistance load across the supply ; (2) by using carefully adjusted values of grid bias and leak so that the input to the valve under normal conditions and when thrown out of oscillation is constant, and then keying through the back contacts of a relay so that sufficient of the grid coil is shorted when the key is up to prevent oscillation. This system has been used successfully by 5AD. The anode will have to dissipate all the power when the key is up, but unless the valve is being overloaded this should not be harmful.

Mullard P.M.2 Valves for Transmission.

During a recent short-wave transmission at a distance of about 850 miles north of Sandakan (British North Borneo) with the radio station at the latter place—VQB—my transmitting valve, a 30-watt, and *not* a Mullard, suddenly became painfully dark (owing to a break in the filament ! !) and I was faced with no other alternative but to cancel the message I was in the middle of sending, and also five more which were waiting their turn. As a last desperate resort I removed the last valve from my *receiver*—a P.M.2—and hastily placed it in the transmitting socket. I reduced the filament supply to ·15 amps , and the H T. voltage from 1,500 to 750, and started off again. Sandakan radio station, after I had cleared off the whole of my waiting " list," told me my signals had reduced from R8 to R6 by the change !

I think this speaks volumes for your valves, especially as it had been in use for over ten months in my amplifier for approximately 20 *hours per day*.

Contact Bureau Notes.

Due no doubt to the festive season, very few applications can be reported this month, but GW11B, GI6WG and BRS102 have been entered in the files.

Evidence has come in that 6CJ's method has not been entirely successful in some cases of " threshold " howling. I want the names of workers on this problem please.

I also want information or volunteers for work on indoor aerials with QRP. This should be an interesting line.

With the kindly co-operation of GW11B, it has been arranged that NX1XL, the University of Michigan Greenland Expedition, will QRX for G and GC stations at 1730 G.M.T. and GI stations at 1745 G.M.T. each Saturday. At 1800 G.M.T. NX1XL is QRW GW. His wavelength is 47 metres and approximate position is 66° 50′ N. and 51° W. QRP is getting over nicely.

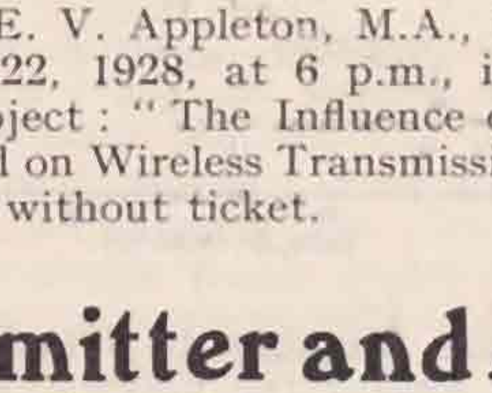
There has been an indication that EK stations are interested in this Bureau, and it is hoped that some sort of co-operation may be arranged between the C.B. and the D.F.T.V. It is also hoped that amateurs in other countries will join up. But—and it is a big " but," no good work can be done on these lines by the C.B. if we have not got the backing of our own amateurs, and at the present moment that backing is weak and discouraging. Is 18 transmitters and 7 BRS stations the best we can do ? If so, the C.B. may as well be buried in the graveyard of many arrangements killed by apathy. Do you experiment ? Do you ever require someone to help or to discuss things with ? Do you want arrangements such as that with NX1XL to be made when possible ? This Bureau is here for your benefit, and if you don't want it there will be no reason for its further existence. You may want it and have not said so, or you may not need it and have not said so. Even if you are not actively engaged on experimental work at the moment, let's know what you are interested in, and it will help us.

I am grateful to those members who have given us their support, and I hope that by next month I will have a longer list of new members than I have this month.

We need help—will you give it ?

Stray.

Is there any truth in the rumour that certain French station operators insist upon their laundry marks embodying the signs similar to the example given, *viz.*, CQ100/AC? 2XV.



Correction.

Radio 8ZZZ wishes us to correct his QRA as given Editorially at top of right-hand column, page 26, November BULLETIN, under "Help for All." This should have been Payne Avenue, and the intermediate NU, not NN as given.

Birkbeck College Physical Society.

Distinguished Visitor's address will be delivered by Professor E. V. Appleton, M.A., D.Sc., F.R.S., on February 22, 1928, at 6 p.m., in the College Theatre. Subject: "The Influence of the Earth's Magnetic Field on Wireless Transmission." Admission free, and without ticket.

Transmitter and Aerial Efficiencies.

By C. W. GOYDER, B.Sc., A.C.G.I. (2SZ-2HM).

The problem of comparing two circuits or aerial systems is one which every transmitter meets. It is usually solved by comparing the range of the set in the two cases; but, due to variable atmospheric and other conditions, a test of this kind must be extended over a considerable period of time to get reliable results, and the results even then are relative not quantitative. The method described here is more fundamental in character and can be used to compare circuits or aerials in one afternoon.

The input to a transmitter is partly converted to useful radio frequency energy and partly to heat. By far the greater proportion of the heat is dissipated at the anode of the valve; the heat losses in coils and condensers are small in comparison to this. If, therefore, the power lost in heat at the anode is subtracted from the total input, the useful power is obtained approximately. It is this useful radio frequency power which will determine the range of the station. By comparing the relation between heat generated and radio frequency energy generated for any two cases the efficiency, as well as the suitability, of the system for radiating can be obtained.

It is evidently only necessary to know the input to the set and the heat lost at the anode to accomplish this.

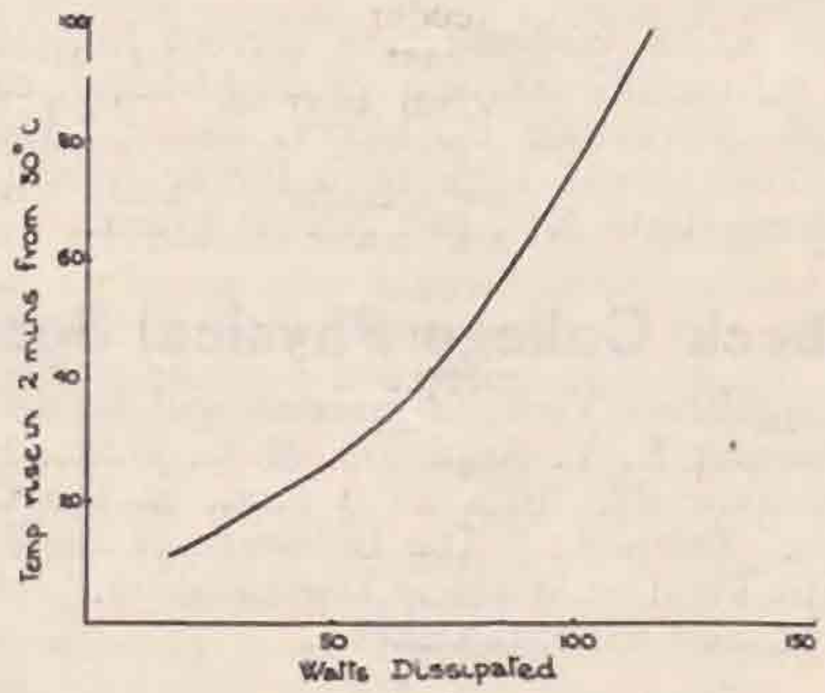
Measurement of Anode Dissipation.

Though several methods were tried for measuring the heat lost at the anode, the following simple way was found to be the best. The only "apparatus"

required is a thermometer. The reading of the thermometer can be related to the watts input to the set.

When the set is not oscillating the total input to the anode is converted to heat. To find the relation required, the temperature rise, say, in two minutes with a known input is found. The rise for four or five other inputs is then found, and from these results a graph may be plotted which will show the watts lost as heat when the temperature rises a certain amount in two minutes. It will be found that the graph is a straight line except for very low values of heat loss.

If, now, the transmitter is allowed to oscillate only a part of the energy will be converted to heat. The input is perhaps 100 watts for two minutes.



The temperature rise may be found to represent 40 watts heat loss at the anode. The radio frequency energy is then the difference—60 watts. If another circuit or aerial gives less heat loss and more useful energy, it is obviously superior.

The question now comes where to place the thermometer to get a reasonably accurate result. Heat measurements are notably difficult to make. With a valve, all the heat reaching the glass (except that travelling up the supports) is radiated through the vacuum; there is no conduction. It is important to remember that heat can travel by radiation (such is the case with electric "fires") or by conduction, as exemplified in hot water radiators. If the thermometer is placed a few inches from the glass the heat will reach it partly by radiation, and partly by conduction from the heated glass through the air. The conduction through the air is affected by every little draught and must be avoided to get satisfactory results. To accomplish this the end of the thermometer is simply placed touching the glass envelope of the valve and soft lead foil is wrapped around the mercury bulb and extended over the envelope for a few square inches. This makes a sort of connection between the valve envelope and the thermometer. The only conduction is through the glass and foil for a very short distance, and is not affected by draughts. This is the only arrangement giving results which are reliable and which can be repeated.

After a measurement has been made the valve must be allowed to cool again before another can be taken. To cool right down to room temperature requires a very long time. This is not necessary. Room temperature may be 17° C. Then only let the valve cool to 30° C., which it does reasonably and quickly, and make this the starting point from which all temperature rises are taken.

A graph showing the watts lost in heat when the temperature rises in two minutes a certain number of degrees above the fixed starting point (30° C.), is shown in Fig. 1.

The number of minutes required to give a suitable rise will depend upon individual circumstances. This method is suited for the lower-power man as for the high. No red-hot plates are necessary!

The temperature rise during a certain number of minutes, rather than the maximum steady temperature, is chosen as it saves a great deal of time.

Practical Applications.

The setting up of the thermometer and deduction of the graph is really simpler than would be gathered from the previous rather lengthy explanation. The graph need only be taken once and may then be used in all experiments.

The applications of such an arrangement are really useful and interesting. For instance, where is the best position for tapping on the feeder to a current-fed Hertz? By moving the feeder along two metres at a time and each time measuring the efficiency and useful power Graph 2 was obtained.

Whether the current or voltage feed method is better may be determined also.

The following experimental values taken for a voltage-fed Hertz on 32 metres show the comparative merits of coupling the feeder to the transmitter by a direct tap onto the plate inductance and by a tap onto a coupling coil.

Direct Tap.

Temperature rise in two minutes 40°. From graph this represents 70 watts heat loss.

Total input ...	225	watts
Heat loss ...	70	,,
Useful power	155	,, Efficiency 69 per cent.

Coupling Coil.

Temperature rise in two minutes 26°. From graph this represents 50 watts heat loss.

Total input (with same H.T. voltage)	190	watts
Heat loss ...	50	,,
Useful power...	140	,, Efficiency 74 per cent.

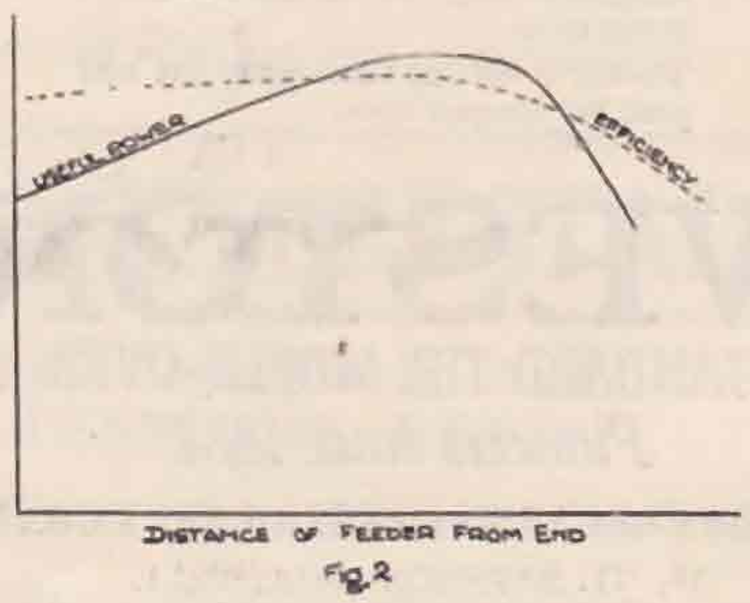


Fig. 2

This indicates that, although the coupling coil system is more efficient, it gives less available useful power, probably due to smaller coupling to the aerial. The coupling can now be increased and a similar measurement made until the optimum coupling is found.

Therefore, quite simply, a test of this kind can be made, which gives satisfactory and useful results. Comparison of range would hardly show up this difference and comparisons of feeder current are absolutely useless as the current distribution is altered by such a test.

By making similar measurements for double-feeder Hertz aerials, Zeppelin aerial, etc., their relative capabilities for radiation may be deduced.

Another puzzling question which may be solved is whether a low feed and higher voltage is better than a high feed and lower voltage, etc. When the valve warms up visibly, and the input is higher, it is sometimes assumed that the efficiency is not so good, but the radiated power may have gone up correspondingly, due to better coupling or some other effect.

Transmitter Efficiency.

The efficiency of a transmitter is very largely determined by the grid bias. If the bias is arranged so that the valve is working about the centre point of the characteristic curve, as in a low-frequency amplifier, the efficiency is always less than 50 per cent. More than half the power is lost as heat.

Generally the grid bias is made much higher, so that the representative point is much lower on the characteristic curve. This gives a higher efficiency ; it increases with the grid bias until an efficiency approaching 100 per cent. is reached when the bias is so high that practically no power is being radiated. This case is of no practical use ! The problem is to find the best bias for the conditions existing at any given transmitter, which can be done by progressively varying the grid leak value or the bias battery voltage and calculating the efficiency and radiated power.

It is also very interesting to compare the ratio of heat to useful power when the transmitter is working on 23, 32 and 45 metres. The efficiency should gradually increase with the wavelength. A low efficiency on one of the waves can be detected and the necessary alterations to the aerial coupling or circuit made.

It is a great advantage to have a simple method handy which can be used to check up the working of the set in a few minutes when the range is apparently poor and the atmospheric conditions are not definitely known.

The Design of Short-Wave Transmission Aerials.

By E. Megaw.

(Concluded from last issue.)

(*c*) Known by the name of Lévy on the Continent and by that of Alexanderson in America. It is one of the best systems, as will be seen from the current and voltage curves. The feeder length may again be any multiple of $\frac{\lambda}{2}$. If this range of values is seriously departed from the efficiency of the system falls off rapidly, and it will probably only draw a very small amount of energy from the oscillating circuit. Modifications of aerials (*b*) and (*c*) are easily arranged to suit individual requirements once the general principles are understood.

(*d*) This is the most fundamental type of voltage feed, although actually it was developed by T. P. Allen (GI6YW) as a modification of aerial (*g*). It is ideal in cases where the oscillator is at about the same height as one end of the radiator, but may be used with success in other cases. The wire measures $n\frac{\lambda}{2}$ from the free end to the aerial tap, which should be near the high potential end of the coil, n being any whole number. A variable condenser may often be used with advantage in series with the lead-in. The current distribution is in general slightly distorted at the fed end, as shown in the diagram, but this is not serious.

(*e*) Generally known by the name of Zeppelin. One of the best systems and has the advantage of having a minimum feeder length of $\frac{\lambda}{4}$, while the feeder must be at least $\frac{\lambda}{2}$ long for an efficient aerial of type (*c*). With correct feed system the current distribution is practically perfect. The free end of the " compensating feeder " must be carefully insulated and care should be taken to see that the two feeders are exactly the same length and that they carry equal currents ; if the feeder lengths are correct the latter follows automatically.

(*f*) Another effective method of voltage feed which has been used at certain American commercial short wave stations. It can give almost perfect results if properly designed, but it is not very suitable for amateur use. The same remarks apply to the double feeder as for aerial (*b*). The L-C circuit in the vertical part of the feeder must have the lowest possible losses as it will carry a heavy circulating current. It is tuned to the frequency of the oscillator. The vertical part of the feeder must be short if radiation losses are to be avoided. It should be noticed that, although part of the system is earthed, it is *not* a Marconi type aerial.

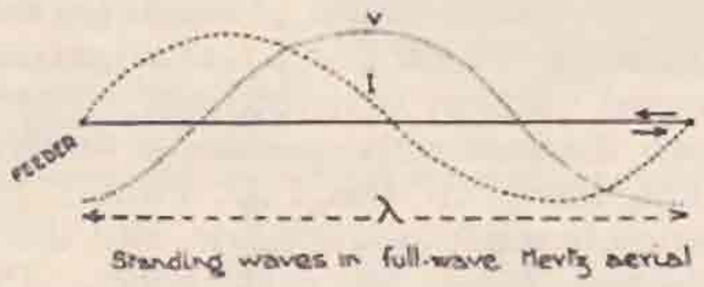


Fig. 2 (omitted from last issue)

(*g*) Although this aerial is generally known as *the* Hertz aerial, and seems to enjoy an inexplicable popularity, it is quite the least satisfactory of the feed methods illustrated in Fig. 3. Its most obvious but not its most serious defect is the inevitable distortion of the current distribution in the radiator due to the presence of the feeder ; this, however, may not be of any very great importance. The whole trouble arises from the fact that the " transmission line " theory advanced for this aerial is, as already shown, fundamentally incorrect, or rather incomplete. Unless the feeder is very short it is bound to radiate owing to reflection of its upper end. The writer recently investigated the current distribution in this and other aerial systems by means of lamps, shunted across a few feet of the aerial, at short intervals throughout the length of the aerial. The results of these tests, together with theoretical considerations, indicate that this aerial was probably oscillating

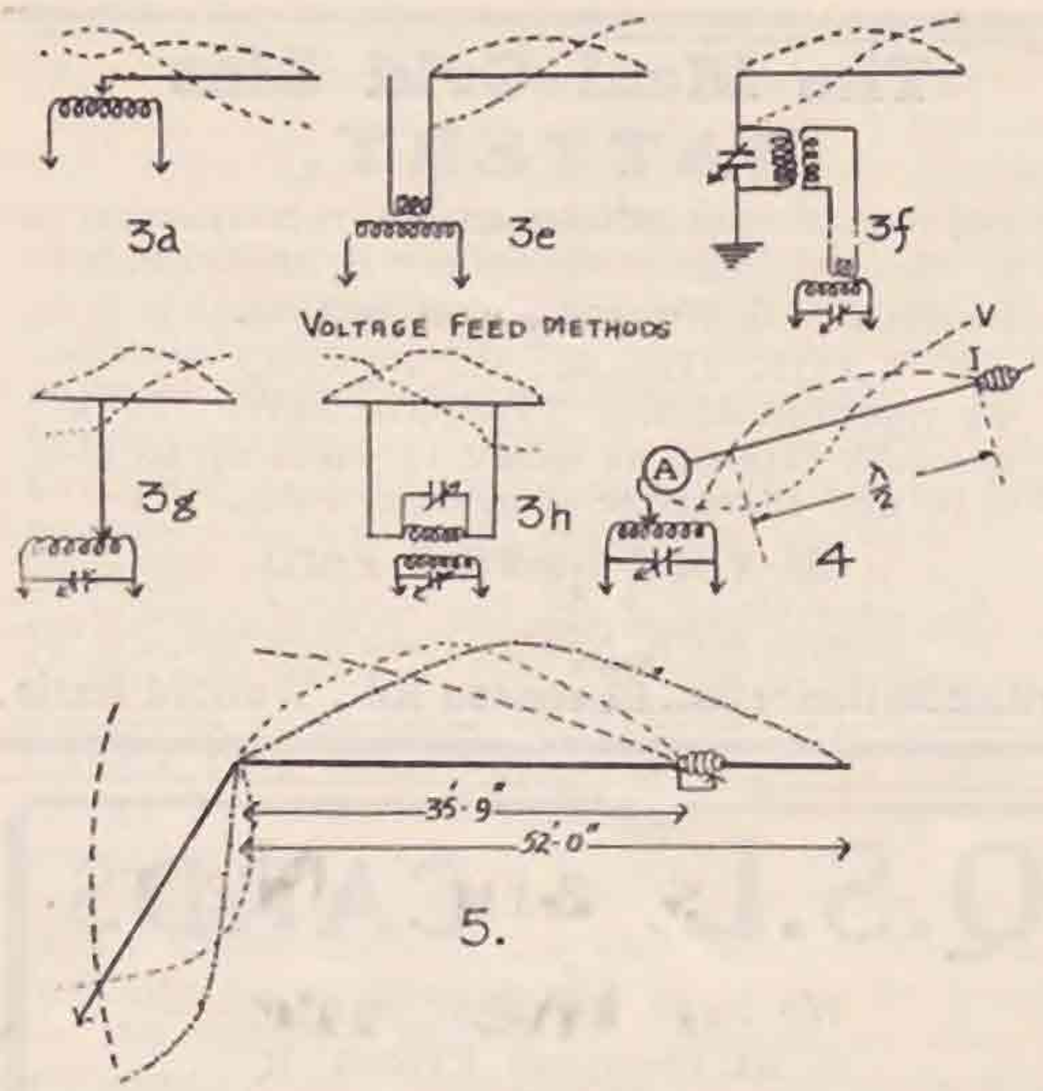
in no less than five different ways simultaneously :— (1) " Radiator " oscillating fundamentally (as desired) ; (2) the longer part of the " radiator," the feeder and part of the inductance oscillating as a modified Hertzian radiator (see further remarks on oscillations in any length of wire) ; (3) the shorter part of the " radiator," the feeder and part of the inductance acting similarly ; (4) the feeder and part of the inductance acting similarly ; (5) the feeder oscillating " freely " as its own natural frequency, and so producing a " harmonic " whose frequency is not any particular multiple of the oscillator frequency. This last effect is not altogether understood, but it is evident that something of the sort occurs. It is difficult to imagine what the result of all these oscillations will be, but it is evident that there will be a considerable loss of energy by undesired radiation. Working on the assumption of a non-oscillating feeder, it has been shown that the optimum position for the feeder is one-third of the way along the radiator. Actually for a given length of feeder its position on the radiator should be adjusted so that the voltage naturally occurring at the end of the feeder is equal to the voltage required at that particular point on the radiator. This is approximately indicated by maximum current at the centre of the radiator, since more energy reaches the radiator under these conditions. Alternatively the one-third feeder position may be used and the feeder length adjusted to give the same condition as before ; the minimum length to do this would be rather less than $\frac{\lambda}{2}$. Under these conditions the aerial is quite efficient, though, of course, radiation from the feeder is in any case inevitable. The foregoing facts are doubtless sufficient to account for the fact that some experimenters have obtained excellent results with aerials of this type, while others have not ; but in any case the voltage-current method of feed is hardly to be recommended.

(*h*) This is a modification of aerial (*g*) due to A. L. Stainier (EBS2), which gives a symmetrical though still distorted current distribution. The fields due to the two feeders only partially neutralise each other. The losses in the L.C. circuit joining the two feeder ends must be very low, and the insulation of the lead-in must be very good. Precautions must be taken to obtain as nearly as possible equal and opposite instantaneous voltages at the extremities of the inductance. The corrected theoretical feeder position is quarter way along the radiator, but otherwise the same remarks as before apply to the feeders. Although this aerial appears to be capable of excellent performance it is likely to be troublesome to erect and to operate.

We will now consider what happens when any length of wire is directly coupled to the oscillatory circuit of a transmitter as in Fig. 4. In the case shown the length of the wire is somewhere between $\frac{\lambda}{2}$ and λ, but the actual length is immaterial. The current distribution in aerials of this sort was investigated by means of lamps as previously described and the action appears to be as follows : The wave travels from the oscillator along the wire to the free end, where it is reflected and returns along the wire, interfering with the next incident wave and producing standing waves as shown ; this continues indefinitely as in the ordinary Hertz aerial so long as power is supplied from the oscillator. The wire and the oscillator L-C circuit together from a sort of Hertzian oscillator. The current in the ammeter is proportional to the ordinate of the current curve at the point at which the ammeter is situated and automatically adjusts itself to this value, which depends on the frequency of the oscillations and the length of the wire. In the case shown the ammeter reading will evidently be high. The free end of the aerial must be a voltage loop and a current node and each voltage and current node must be (approximately) $\frac{\lambda}{2}$ from the next ; with due allowance for any variation of aerial inductance or capacity per unit length this definitely fixes the voltage and current distribution for a given frequency and aerial. Hence, for satisfactory working a particular voltage is required at the oscillator end of the aerial for a particular aerial power, and the aerial tap should therefore be connected to a point on the inductance at which a similar voltage occurs. If the voltage is low at the oscillator end of the aerial and the current high, as in Fig. 4, the voltage tap must be placed near the low potential end of the coil to fulfil the condition stated, but the aerial will then draw only a very small amount of energy from the oscillator. If the tap is moved up the inductance the power in the aerial will increase, but the normal voltage and current distribution in the L-C circuit will be upset, resulting generally in increased losses ; also the low potential end of the coil will no longer be at earth potential, and this will cause losses in the form of capacity and leakage currents to earth as well as undesirable hand-capacity effects. If the oscillator filament is fixed at earth potential the system will probably function simultaneously as a Marconi and a Hertzian radiator, and the resulting complications are likely to involve increased losses and poor radiation ; in any case it is advisable to isolate the whole transmitter from earth, but if the oscillator filament is naturally at earth potential when the aerial is drawing a reasonable amount of power it is an indication of satisfactory working. Now, to achieve this we require a high voltage with a small current at the lead-in end of the aerial, which should therefore be approximately a multiple of $\frac{\lambda}{2}$ in length. An aerial of this sort will, however, radiate tolerably well if this condition is not strictly adhered to, but by way of example it may be stated that on substituting an aerial of total length λ for one of total length about $\frac{3}{4}\lambda$ at the writer's station an appreciable increase in signal strength was reported from almost all parts of the world. The best radiation is generally obtained if the horizontal part of the aerial is a definite number of half wavelengths long ; this is as might be expected from theoretical considerations. Good radiation can also be obtained if the " flat-top " and down lead are each $\frac{\lambda}{4}$ in length.

Most of the various aerials normally suitable for amateur transmission have now been dealt with, and the results may be summed up as follows :—

Where possible use aerial (*c*) or aerial (*e*) of Fig. 3, aerial (*e*) being perhaps slightly preferable. Where neither of these is possible use an aerial of the type just described, the down lead and the flat-top each being preferably a definite number of half-wavelengths long. In special cases aerials (*a*) and (*d*) of Fig. 3 may often be used with advantage ;



5.

for very short aerials a modification of one or other of these often makes the best of a bad job.

As an example of the application of the principles outlined above, the aerial at present in use at the writer's station will now be described. As the permanent use of a double feeder system is not possible, it was decided to use an aerial of the type shown diagrammatically in Fig. 4. The actual arrangement is shown in Fig. 5. It can be used on 22, 32 and 44 metres, and the curves show the current distribution in each case. For 44 metres and 22 metres the link L is open, and for 32 metres it is closed. As will be seen from the curves, the " flat-top " acts as a half-wave radiator at 22 metres and 32 metres, and as a quarter wave radiator at 44 metres. The length of the down-lead is arranged to allow its lower end to be fed at fairly large voltage and small current for all three wavelengths. It will be seen from the curves that the largest current at the aerial tap occurs at 32 metres, the next largest at 22 metres, and the smallest at 44 metres. The actual readings in an ammeter placed at the aerial tap are found to agree with these results. The radiation from this aerial system is very satisfactory on 22 metres and 32 metres, and appears to be almost equally good on 44 metres. The radiation from the down-lead being more or less horizontally polarised probably does not contribute materially to the effective radiation from the system and for the most part simply represents an inevitable loss of energy. There is, however, room for further investigation in this direction.

Now that the theoretical side of aerial design has been dealt with, a few practical points may be of interest.

Length Correction Factors.

It has been shown that the wavelength of an H.F. oscillation in a wire is less than the wavelength in space due to the oscillation owing to the inductance and capacity of the wire. The length of wire required for a given wavelength can conveniently be found by multiplying the wavelength by a suitable correction factor; the value of this factor naturally depends on the inductance and capacity of the wire per unit length. Suitable values for a single horizontal wire fairly high up are from .98 to .995, and for down-leads and feeders from .88 to .97. These values have been determined experimentally and cover most normal aerials. For general design .99 for horizontal unscreened wires and .95 for down-leads and feeders are quite close enough.

Aerial Current.

The current at any point in an aerial depends on three factors: the aerial dimensions, the frequency, and the power in the aerial. If, and only if, the first two are kept constant, the current at any point is a measure of the aerial power. Actually the power radiated is proportional to the square of the aerial current under these conditions. It should be borne in mind that many aerial ammeters designed for medium frequency work do not give a reading even proportional to the current passing through them at very high frequencies. With a single feeder aerial it is immaterial where the ammeter is placed. With a double feeder aerial one metre should be placed at a corresponding point in each feeder. A lamp is often just as effective as any other form of current indicator; the brighter a lamp is the more sensitive it becomes to current changes. For current distribution investigation flash-lamp bulbs shunted across from 6 ins. to 3 ft. of the wire are quite satisfactory; the greater number of lamps used the more accurate the results. Great care should be taken to match the lamps on *H.F. current* before use, as they vary greatly in sensitivity. This method is satisfactory if upwards of 15 to 25 watts of aerial power is available.

Wire.

Solid bare copper about 14 s.w.g. seems perfectly satisfactory. It is doubtful whether there is any appreciable electrical advantage in using stranded wire enamelled or otherwise. There is no point in using enamelled solid wire, as the oxidation of copper in air does not measurably increase its H.F. resistance. Cage and multiwire aerials are entirely unnecessary and frequently undesirable for normal amateur powers.

Insulators.

By far the best are quartz and pyrex. The small pyrex reception insulators are quite suitable; two should be used at each end of the aerial; three or four may be necessary for high powers and high frequencies, especially if wire halyards are used. The link L in Fig. 5 may consist of two or three pyrex insulators with a copper shorting strap. The lead-in insulator is worthy of careful design; ebonite is very unsatisfactory and quartz or shellac varnished glass tube is much better. The spacing insulators for double feeders may also conveniently be varnished glass rod or tube; the spacing may be from 4 ins. to 2 ft.; 1 ft. is a good value. Unless the insulation of an aerial to earth (or between feeders) reads almost infinity on a megger in wet weather, it is not good enough.

It is realised that these notes have ignored many important branches of aerial design, in particular that of directional aerials, a most interesting and important subject, and the mathematics of the subject have been almost entirely avoided, but if the foregoing remarks and suggestions are of any assistance to his fellow amateurs the writer will feel amply repaid.

QRA Section.

By C. A. JAMBLIN (G6BT), 82, York Road, Bury, Suffolk.

With reference to the announcement in last month's BULLETIN of the appearance on March 1 of the "1928 Annual" of the Inc. Radio Soc. of Gt. Britain, I would like to emphasise the fact that this year our society is financing this publication. I happen to know that the cost of producing this book is very considerable, and I hope that every member will not only purchase a copy, but also do all he can to let other radio enthusiasts know of its existence. In the QRA Section of the Annual, the "Wireless World" and ourselves have made a great effort to collect all the known QRA's of licensed stations, which, of course, will be published.

It can hardly be expected that the society will continue to publish the Annual in so complete a form as this year, unless it at least returns the outlay involved. If every member orders a copy the Annual will become a permanent publication; therefore, will you order your copy NOW, and support "home" industries?

QRA's FOUND.

EI1GL.—G. Loreti, via Properzio N. 2, Rome. (Inf. GC5YG.)
AGRANN.—(Unlicensed) QSL under cover to: Telefona 5, Wiktor Chiobaki, Baku, U.S.S.R. (Inf. J. des 8.)
ED7FR.—H. V. Rodsbjerg, Aagade 132, Flenshoe, Copenhagen. (Inf. "Wireless World.")
EWH2 (Officially Licensed).—Istvan, Kemény, Személynök, U.21.III.2, Budapest, Hungary.
LA2B.—B. I. Larsen, Fredrikstad, Norway. (Inf. G6PP.)
EP3AM.—J. A. Martins, Castelo Pico, Funchal, Madeira. (Inf. G6PP.)
ES1AB.—Major B. Petrelis, Albertink 40, Helsingfors. (Inf. G6PP.)
EI1FO.—F. S. Orefice, Palamaio 40, Vicenza....(Inf. GC5YG.)
EP1BL.—C. J. Mumford, Rua Bocage 59, 3D, Lisbon. (Inf. "Wireless World.")
FL1AB.—Govt. Station, Monrovia, Liberia. (Inf. "Wireless World.")

"G."

2ABR.—W. A. Allwright, 80, High Street, Lewes, Sussex.
2AUG.—W. E. Rowles, "Selwor," Easy Bay, Colchester.
2AYN.—C. E. Harwood, Westley House, Westley Road, Boscombe.
2BGM.—J. H. Cant, 295, Hither Green Lane, Lewisham, S.E.13.
2BMI.—R. H. Cook, "The Roost," Harewood Avenue, Rochford, Essex.
2LK.—G. A. Vandervell, Maidenhatch, Pangbourne, Berks.
5FG.—F. A. George, 40, Bell Street, Edgware Road, N.W.1.
5QB.—E. J. Reid, 120, Mill Lane, W. Hampstead, N.W.6.
5UX.—G. Hume, 124, Eversleigh Road, Battersea, London.
6CO.—H. B. Crowe, 256, Ladbroke Grove, London, W.10. (Inf. G6JY.)
6GJ.—D. Gwyn Johns, "Caereithin," Mumbles, Swansea. (Inf. "Wireless World.")
6IN.—F. Inchley, 127, Holly Lane, Erdington, Birmingham.
6NT.—C. S. Hunt, 53, London Road, Bromley, Kent.
6VJ.—A. Cross, 337, Anlaby Road, Hull.
6VQ.—L. S. Crutch, B.Sc., 15, Mundania Road, E. Dulwich, S.E.22.
6UJ.—A. Watson, 52, Middle Street South, Driffield, Yorks.
6WY.—H. A. Maxwell Whyte, "Burtleigh," Church Road, Forest Hill, London, S.E.23. (Inf. "Wireless World.")

CHANGE OF QRA.

2BWB now Ivy Cottage, Costessey, Norfolk.
2AP now "Montpelier," High Street, Wick. (Inf. GC5YG.)
2AY now 48, Melford Road, Dulwich, London, S.E.22
2JK now 67, Queen's Road, Richmond, Surrey.
2VO now 40, Aire View, Cononley, Keighley, Yorks.
2ZL now Electra House, Worcester Street, Gloucester.
6JJ now 30, Wellesley Road, Colchester.
6JU now "The Gables," Victoria Park, Stockport.
6NG now 5, White's Terrace, Whetley Hill, Bradford.
6ZP now "Wilivere," Stamford Road, Audenshaw, near Manchester.
GW15C now "Glebelands," Ratoath," Co. Meath, Irish Free State.
Lieut. H. O. Pargetter (ex-G6PA) now 2nd (Indian) Div. Sigs., Quetta, India.
BRS93 now 1, Friston Street, Fulham, London, S.W.6.

CHANGE OF CALL SIGN.

2AWH now G6VQ.
2AXI now G6IN.
2BHY now G6NT.
2BOQ now G6VJ.
2BWX now G5FG.
2BXZ now G6CO.

BRITISH RESEARCH STATIONS.

Number Relinquished.

BRS23 by D. K. Forbes.

Numbers Issued.

BRS107.—R. E. Wilkinson, 64, Western Road, Crooksmoor, Sheffield.
BRS112.—J. Less, 17, Trevose Gardens, Sherwood, Notts.
BRS113.—W. F. Cope, 18, Cambridge Road, Teddington, Middlesex.
BRS114.—L. A. Carter, Rutland Cottage, Heathfield, Sussex.
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BRS124.—E. A. Eglinton, 46, Elm Park Road, London, N.21.
BRS125.—E. T. Somerset, Inholmes Park, Burgess Hill, Sussex.
BRS126.—J. B. Morton, 3, Ashfield Road, Altrincham, Cheshire.

[NOTE.—Preceding BRS numbers were published in the August, 1927, and subsequent issues of this magazine. The majority appeared in the August number.—ED.]

Notes and News from the Areas.

Special Notice to Area Managers and Others.

In accordance with the unanimous decision of the Second Annual Convention of the Radio Society of Great Britain, held September 30—October 1, 1927, the following is the procedure to be followed in future when reporting for these columns:—

Each report furnished by a member will be written on one sheet of paper and shall consist of: (1) The call sign of the station reporting; (2) the programme of the station as regards lines of experiment and objects; (3) results of recent work. Special note: The total number of words is not to exceed 27 for each member, and such details as number of QSO's will no longer be published.

The object of the Notes is to keep in touch with one another members who are mutually interested in certain aspects of the work.

Those Area Managers who do not possess a typewriter are requested to write *clearly*.

Northern Division.

Division Manager: 6CL.

Reports are very sparse again. Obviously due to the cramping of the style of yester-year. If things don't buck up you Northern fellows, I shall suggest that these notes be cut out; so, if you still want them, let me have a card as soon as you read these notes on about February 14—Valentine Day!!! (Probably 16th.—ED.)

6PP has again done exceptionally well with his four watts. Madeira was raised for first time, and a half-and-half QSO with NC1BR made on the 10th.

6UN has got out on 45 satisfactorily. After a few London QSO's he called EP and was reported R6. Several other countries have been worked.

2AXL has again tried for his open aerial licence, and in the meantime is helping 6CL with all experiments and tests made from the latter station.

2AX had several good European contacts, but no confirmation from over the pond. His 'phone is reported "FA" everywhere.

BRS92 has been receiving 180-metre 'phone stations. This band, he says, is good and worth working on. (How many of us are licensed up there?) He has converted his RX to a straight circuit and says it is an improvement on the proverbial Hartley. (A BULL. article is promised. Good man!—6CL.)

The following have not reported:—5AD, 5KU, 5HS, 5VY, 6DP, 5HJ, 6OT, 5UP and X others. It is sad to think that so many of you fellows have finished all your experiments, and apparently have only QSO's left to work.

Stations Visited.—5YK, 5IV and 2CB to 6CL, 5UM to 2MI and 2MJ.

6CL has spent much time studying skip distance effects on 45

metres and preparing for the week of tests with 6PP and 6NK as co-operating stations. FM has at last been raised.

5UM is still testing radiating systems on 160 metres, and finds sigs. are loudest in an easterly direction.

South-Western District.

Area Manager: Capt. G. Courtenay Price, Associate I.R.E. (2OP), 2, St. Annes Villas, Hewlett Road, Cheltenham.
Consisting of Counties of Cornwall, Devon, Somerset, Dorset, Wilts, Gloucester and the Scilly Isles.

I have to report with much pleasure visits during the month from 2YX and 6JK.

The proposed dinner and meeting is still somewhat "up in the air," as, although I have now received a few more names, I still require many more. I hope by next time to get a sufficient number to be able to make an announcement. The evidence is in favour of Bristol as the centre.

2YX.—Best DX Bagdad. In future will be on 90 m. for telephony, and is keeping 45 m. for the key only.

5VL is continuing experiments on 23 m., and at the moment is measuring R.F. resistance of chokes.

6JK is testing new type of transmitter with ½ wave Hertz voltage fed. Reports increased QRP DX nearly all Europe on 4 watts. First QSO's on 23 m. Algeria R3, Denmark R2. Has been away, but returned to station on January 19.

6ZR.—Operations have been commenced on 45 m., and with only 120 volts on the plate, six countries have already been worked. Reception reports are particularly requested at the present time from the North of England.

6UG.—Nothing of interest to report.

Dutch Notes.

Prepared by EN0CX.

As DX conditions have been rather bad during November and December no big long distance work was heard of. A remarkable event was the sudden appearance of many Americans and Aussies on December 31—January 1, the first real DX night since a long time. The number of QRP merchants is growing bigger and bigger.

EN0MAR worked NU1CX with 7 watts input, and was reported R3 rac stdi.

EN0DJ worked PGO, who gave his QRA as Nova-Zembla. No post office over there, so no QSL cards. Hi!

EN1NA has going a 7½ watter with only 100 watts input, and yet the plate does not kiss the grid.

EN0VN now has 25 watts R.A.C. Pse don't go back to raw A.C.!

EN0CX.—Best DX Norwegian LA1R, with 3 watts input R5.

EN0PRS.—On New Year's Day worked EC1RV and EASPO on 32 metres in full daylight. Both times reported R5, input 4 watts.

Mid-Britain Notes.

Area Manager: H. J. B. Hampson (6JV).

I am pleased to note that the reports have looked up a little this month. As far as I can judge, however, the new style reporting appears to be less popular than the old, and several members complain that they cannot compress a useful report into the number of words allowed. May I draw the attention of such to the Editorial note at the foot of last month's Mid-Britain Notes and suggest that members should take the Editor at his word and express their views accordingly.

By the time these notes appear the result of the referendum upon the proposal to divide the Mid-Britain Area will probably be known, and I hope that whatever the result of this may be, all will realise the necessity of still closer co-operation if the British Empire Radio Union is to achieve its object.

Shropshire (reports to 5SI).

5SI has found conditions consistently bad, and reports little activity apart from a weekly 90-metre schedule with 6JV.

Cambridgeshire (report to 2XV by 5th please).

5YX is still conducting successful experiments with M.O.P.A. and has worked FO, A3Z, and was reported R4 on 10 watts and R2 on 5·4 watts, this on 23 metres, and I believe this stands as a record.

5JO.—Extensive research on aerial construction is being carried out here—mostly done in the middle of King Street, holding up traffic with miles of 7/22!!!

2DB.—Tests with various forms of valve rectification. So far half wave has been found almost as good as full wave at distance.

5YK.—High power (50 watts) tests on M.O.P.A. No official report to hand from this station.

6CR.—Low-power tests here with battery H.T. on 45 metres. Some excellent telephony has been done.

2XV.—Low power tests on 32 metres C.W. and 45 metres telephony, with good results on the latter. A 100-watt set is in course of construction.

2HK.—No report.

Huntingdonshire (report to 2XV by 5th please).

I regret to report that this county seems to be the most inactive for its size in the Mid-Britain Area. 6SC (late 2BAX) is no longer in the Area, having been moved to 115, Croydon Road, Caterham Valley, Surrey (note his new QRA, om's), therefore the only licence in the Area has now gone. I therefore look to Mr. Maddox to endeavour to liven things up a bit, and also would like to mention a new short-wave receiving enthusiast in the person of Mr. Huggins, of 3, Ambury Road, Huntingdon, who will be pleased to receive visits from any others who may be interested that are near at hand.

Northamptonshire (reports to 6TR).

6TR has secured a few more members as the result of an intensive recruiting campaign. (F.B.—We want more of this pse and tux.—6JV.)

Warwickshire (reports to 5GR).

Mr. Gardner (5GR) has informed me that he is unable to continue his duties as Sub-Area Manager. Will members in that area kindly discuss the question of a successor and inform Area H.Q.? We are sorry to lose the services of Mr. Gardner, and thank him warmly for his help in the past.

BRS29 co-operated with 5US in aerial tests. He reports conditions only fair to bad. He asks for QRA of SGA5.

5GR is generally QRW. He will experiment with marking and spacing keying with absorbed spacer (if possible).

Worcestershire (reports to 6AT).

6AT has been very busy, and reports that his only activity on the air has been to add Norway to the list of countries worked.

Staffordshire (reports to 5UW).

Wolverhampton and District R.T.S.—A meeting of the above Society was called for January 4, and was attended by 2AAD, 2NV, 5AF, 5UW, 5PR, 6AT, 6HT (host of the evening), 6PB, 6UZ, 6CC, while apologies were received from 2OQ, 2WN, 5LK, 5NU, 6BH, 6OH, 5NH, 2NO, 5ML. This meeting decided that this Society should acquire a quartz crystal, to be N.P.L. calibrated, and that a schedule of calibration waves transmissions should be maintained. Details as to dates and times, to be arranged later, and forwarded to the Bulletin for publication. A vote of thanks was passed to 6HT for his very kind hospitality throughout the evening. 5ML and 6CI, of Coventry, were elected members at this meeting.

2NV has been busy with moving coil loud-speakers.

2OQ has not used his transmitter, but like 2NV has been experimenting with moving coil loud-speakers.

2WN has been constructing H.T. and filament transformers, but had a fire, and is now back on QRP.

5AF is away from home, and reports having done nothing.

5LK is still busy with his recently constructed frequency-doubling outfit.

5NU reports too busy with power station to touch radio.

5UW has spent most of the month with secretarial duties to this Society, and in producing its journal "QRW." Two schedules have been kept, one with 6JV, and the other with EB4WW, both

on 33 metres. Barometrical and signal strength observations are taken in order to ascertain data in respect to relations of one to the other.

5PR is building a Mesny outfit.

6BH is busy on changing over to automatic exchange.

6UZ is perfecting his Mesny, comparing two different types of aerials, and has managed to reduce his generator hum.

2BOC has been making reception observations with an underground aerial, and is also learning code, with a view to obtaining his open licence.

2NO, 2YV, 2AAD have not reported, while the remaining members of this Society are in other counties.

Norfolk.

Nothing has been heard of 6ZJ recently, and we hope he has not got himself mixed up in the H.T.?

2BWB reports change of QRA to Ivy Cottage, Costessey. Has recently built new transmitter and receiver, which both seem promising. New 52-ft. mast erected. Hopes get going soon.

6JV has kept various schedules on 32 and 90 metres. Conditions have been unreliable and little DX has been attempted. Valve rectifiers have replaced electrolytic types for H.T. and L.T. battery charging.

Northern Ireland Area Notes.

By 6MU.

6WG has again been doing good work with the band gen. NU1, NU2 and NC1 have been worked recently and signals have been reported R8-9 in France. He is also experimenting with indoor radiators.

5WD has got started with hand gen. at new QRA; good reports are being received from various parts of Europe. His QRA has again been changed is and now:—6, Springmount, Captain Street, Coleraine.

6JA is now using a DET1 with greatly improved results; EC and EP have been worked for the first time. He intends to carry out some tests on "skip distance" on 32 m. shortly.

5HV is doing some phone work and has been testing microphone transformers.

5HN is using 2 watts from batteries and has been trying various valves for QRP transmission; he will be glad of any reports.

5MO is changing over from C.R.A.C. to valve rectifier; no DX to report.

6YW has been trying a new current-fed aerial on 32 m. and has done some fine work with 8½ watts. Hungary, Corsica, Lithuania and Greenland have been worked for the first time with about 20 other countries during the month, also AWL in the Mediterranean and sigs. have been heard by NU-8BPQ.

6TB has started tests with a new V.F. Hertz aerial.

2IT is evidently still busy rebuilding; he has been heard recently on 23 m. but with the old set.

6MU has done little DX outside schedule tests but finds conditions better for India but not yet normal. Two reports have been received from NU, 7th District.

The following message (via the Contact Bureau) is of interest to all GI's:—"NX-1XL (off Greenland) will QRX for GI stations on Saturdays from 17.45 to 18.00 G.M.T. on 45 m. band."

Irish Free State Notes.

By 11B.

Reports are again very few this month. Do please send me at least a postcard just to say on what lines you are working, O.M.'s.

12B. Observations on skip effects continue on 45m. Reports 7NU stations worked on 45m., 10 watts, also NX 1XL. Will be testing 45m. 'phone shortly.

14B. ND owing to business.

16B. Temporarily QRT owing to failure of H.T. supply.

18B. On 23m. reports about 18 NU QSO's, also Canada and WNP. On 45m. is working a daily schedule with NX 1XL. Intends to try 5m. shortly.

17C has rebuilt his station and on 45m. has worked the following new countries:—Madeira, FE, FM, AG and AQ. On 23m. worked NU twice, NC and WNP.

11D on 23m. reports 4 NU QSO's, 1, 3 and 8 districts, in addition to several European DX.

13D. Working 'phone on 45m. and wants reports.

11B. Continuing skip observations and specially wants reports from stations under 1,000 miles. Has found conditions for transatlantic QSO's very good recently for QRP.

All GW stations would welcome useful detailed reports on their transmissions.

Southern Notes.

By 2ABK.

Again there are only three reports to hand for the Southern area.

Really, O.M.'s, it makes me quite lazy not having any to write up.

Now, O.M.'s, as members of the T. & R., it stands to reason you do some radio work, and we want to know what you are doing O.M.'s, so please report, and let the other areas see we have got some life in us.

6NZ has finished 3 valve receiver, which is a great improvement. Transmitter still QRP om ¼-wave Hertz investigations. Hopes to QRO soon.

2HJ at present has experiments of a general nature, with a view to getting a consistent and good signal, after which more extensive tests will be made.

6CJ sends 2 pages of verses, which although more than regulations, are worth printing, if editorial QRM permits.

2ABK rebuilt O-V-2 to Reinartz from Hartley circuit and finds it much better and can now use set for BCL work.

6WQ has only had time for schedule with GW17C during month and reports plans for a new receiver—absolutely the last word. Now O.M.'s, please send in those reports to me **at once.**

Scottish Area Notes.

By 5YG.

I am sorry that illness prevented me from taking an active part in area matters during December and January, and judging by the scarcity of reports, I should say that there were not a few others in the same "boat." I hope, however, that February will see all restored to normal activity.

No. 1 District (By 2WL).

2WL.—Nothing of exceptional interest to report.

6NX.—Pegging away, but also nothing of interest to report.

6MS.—Doing some intreesting RX work on board S.S. "Vedic."

6WL.—First part of December QRP on 23 metres, yielding an R5 report from NU when input 4 watts. Latter part of December complete "washout." January will see tests with reflectors in conjunction with horizontal aerials.

No. 2 District (By 6IZ).

2AP—QRW at GKR and changing location of 2AP, the new QRA of which is "Montpelier, High Street, Wick. Hopes to resume in January.

61Z.—Still QRW business.

No. 3 District (By 6KO).

2SR.—Experimenting with 23 metre 'phone. Reports are few and far between, but such as have been received are reasonably satisfactory. Input is 100 watts to MESNY CRKT, valve grid leak modulation.

6KO.—QRT in December owing to absence from home. Busy refitting gear. New generator ordered.

No. 4 District (By 2TF).

2TF.—QRW December. General overhaul of gear contemplated.

2BFQ. BRS62. } QRW Varsity.

Northern Notes.

Area Manager: S. R. WRIGHT, Esq., Associate I.R.E. (2DR), 14, Bankfield Drive, Nab Wood, Shipley, Yorks.

Consisting of the Counties of Northumberland, Cumberland, Westmorland, Durham, Yorkshire, Lancashire, Lincoln, Nottingham, Derby, Cheshire, and the Isle of Man.

I am glad to see a few more reports to hand this month, but some of the sub-areas are still backward. Remember, you fellows, it is up to you to let others know the particular line of work you are doing so that they may ask you for co-operation. The only way you can let others know is by means of this column.

You have only to send a postcard, and once a month at that, so you cannot say you "haven't time." The A.M. has jolly well got to find time to collect them all up, sort them out and re-write them, so you have got the best end of the stick! Just put your backs into the job this next month and show your sub-area managers that you are not quite as dead as he thinks you are!

6OO receives apologies for his report for last month which got stuck in the A.M.'s pocket instead of in the filing cabinet. Sorry, O.M.

Yorkshire.

(Reports to 2DR by the 12th.)

6VJ (ex 2BOQ) writes to say he has just got his full permit, and is busy rigging gear and eliminating chirp and key click from the transmitter.

6BY sends his first report, for which many thanks. You haven't read the instructions at the top of these notes, O.M. Hope to hear from you next month. A rectifier is being constructed. (About time O.M.!!)

2BPH is developing a circuit for dual transmission prior to applying for a full permit. Luck to you.

BRS26 is going down in the world, having built an 8-10 metre receiver, and will be glad to report on signals on this wave-band. (See Northumberland Notes O.M.)

6DR proposes to devote the next month to testing aerials for the 23-metre band, and would welcome reports. 45 metres will be used as a stand-by.

6OO has been rebuilding transmitters for 45 and 23 metre bands, and carried out some 8 watt tests with NU on 45 metres, but has not found 23 metres good this month. Schedules with 5UY and 6QB going here.

2DR feels that unless he does more S.W. work the Editor will give him the sack. Extreme pressure of business has prevented real work for some months.

The following failed to report:—5SZ, 6BR, 6XL, 6YR, 6WD 2YU, 6IG, 2XY, 6TY, 5US, BRS107, 5KZ.

Nottingham, Derby and Lincoln.

(Reports to 6MM by the 12th.)

BRS45 is cramming Morse hard. Nothing like it, O.M. Has little or nothing to report as a consequence.

BRS103 devoted most of his time to weather observations in conjunction with reception conditions using O-V-2.

BRS111 has nothing to report except business QRM.

2AAQ would be glad of the help of anyone with tips on the T.P.T.G. circuit. Will local hams or others please help here?

5BL visited GKZ and saw thousands of watts! Is trying 90 metres on Monday evenings after 23.00. Please note. Experiments with very low half-wave Hertz aerials here.

6AH is continuing nightfall tests with 2BI and 5KU and the results are encouraging. The critical period would appear to be one hour after sunset. (That coincides with my results at Gigglswick during the Eclipse, O.M.)

6MN has gone on to a full-wave Hertz and has overcome some fading trouble thereby. Cannot get over 1,000 miles and wants to know why. (It's watts as does it O.M.!) Nightly schedules are kept for weather influence observations.

6LM although on small power would like schedules during week-ends with BRS or transmitting hams.

6UY (ex 2BPA) has been raised to a full permit and will be busy on the air by the time these words are in print.

6UO is still testing aerials and is at present trying a half-wave V.F. Hertz on 45 metres, semi-aperiodic coupled. Finds local work difficult but range increased. Reports would be appreciated.

5QT has been on the air some weeks now and keeps a daily schedule for observation of weather influence.

Cheshire and N. Wales.

(Reports to 6TW by the 12th.)

2SO has nothing to report but is open to work schedules on 45 metres. (What about the Christmas stunt I heard, O.M.?)

6TW finds a lack of G stations to work with on Q.R.P. and has to rely on the Continentals for check reports. Finds the 18-30 to 20-00 period bad just now.

Just send a few postcards round to your hams 6TW and put some ginger into them. 2SO seems the only live ham in your area

Northumberland, Durham, Cumberland and Westmorland.

(Reports to 2AIZ by the 12th.)

6GC will be on 8 metres using 10 watts of chemically R.A.C., working in conjunction with 6QT.

6QT is busy with 8 metre work with 6GC. (If you want a listener, write to BRS26 (Sheffield) who will help.)

Now you hardy Northerners, are your fists frozen? Let some reports flow in for next month, please.

Lancashire.

(Reports to 5XY by the 12th.)

5JW saved Lancashire from disaster by sending his report direct to the A.M. He has entirely rebuilt and is using 50 watts with a T.P.T.G. circuit and Zepp aerial, which he finds the "best ever." Experiments are being continued on this aerial during the month. Send the article to the Editor, O.M., and he will be grateful.

5XY is still off the air, being fully occupied with building a shack for himself. Apparently his generator has secured a speedy exit for him to the outer regions! The recent gale shifted the shack five yards and blew down one of the masts. Hopes to be O.K. for ARRL tests in February.

Now 5XY, wake your sleepy lads up for next month.

Isle of Man.

(Reports to 5XY by the 12th.)

6MI rushes into the breach this month and is experimenting with aerial couplings. Would be obliged for reports from hams in the South of England, and would like to arrange schedules.

German Notes.

By EK4CL.

During the past month, conditions seemed to be more favourable in Germany for European and DX work on the 40-metre band, whilst on 32 metres we noticed many "dud" nights.

Concerning the Washington resolutions, we fear that the traffic on 7000-7300 KC's will be rather difficult, and we should propose for European night-work the use of the 75 to 85-metre band, which is now nearly abandoned; but 41 metres we eventually recommend during dark for DX work only, whilst during daylight we could keep our European work on these precious 300 KC's.

Besides these two bands, greater efforts are necessary to investigate conditions on "20," and especially on our 10-metre band.

It might be of interest to know that three Munich "hams" are beginning to try picture-telegraphy on short waves, using the Dieckmann system. They hope that they will be able to transmit their QSL cards direct to any ham who is in a position to receive their sigs on the Dieckmann picture RX. Anyone interested in the matter is req uested to write to EK4UAH direct or via QSL Section, D.F.T.V. (Berlin).

Some Hamburg amateurs are busy grinding their quartz crystals and are having quite good success, generally; the interest for C.C. work is increasing here every day, newcomers being 4ABI and 4AN.

We wish the three London hams success during their "skip tests." We are always very pleased to co-operate with all OM's abroad in arranging schedules for experimental or scientific work.

Danish Notes.

By 7EW and 7MT.

For some unknown reason the number of reports has been very small this month. It seems that conditions for DX are still bad. European work seems to be nearly the same as in November; still rather erratic. After about 18.00 G.M.T. stations within a distance of about 1,000 kms. fade out completely, and only stations beyond this distance may be heard. Thus, stations in Spain and Italy come in pretty well after dark, however much affected by QSS. As an exception may be mentioned that 7BB reports reception of G5YX at 20.00 G.M.T. on December 30. Now for the reports:—

7BX has closed down until July for examinations.

7EW will be silent from February till July, when he hopes to have finished his exam.

7GB has just got his radiating licence. His transmitter is a tuned plate—tuned grid with a ST43 tube. He is using 220 volts D.C. for mains. He reports good 'phone reception of G5BC, 6NF and 2MN, and several others. Reports of his signals will be much appreciated and QSL'd.

7HW is experimenting with 'phone on 85 metres. He is using two Telefunken RE 134 valves with an input of about 15-20 watts. Reports will be appreciated.

7LO has worked little this month. He has been QSO AQBD1, QRK R5 with input 5 watts. His new "Zeppelin" aerial is giving good results.

7MT has done a lot of "local" work during the holidays, but finds conditions very poor for DX. His best QSO was FM8PSRV (Agadir, Maroc.), who gave R5.

7NG has tried different transmitting circuits, but finds Hartley to be the best. He is getting out well on 7 watts, and the best QSO was FM8VX (Algeria).

7ZG has been very active during December. He has worked EP3AM and 2DKA (Spitzbergen), the latter in full daylight. He is often R9 in Italy and Spain.

French Notes.

(By EF-8PY).

I take the opportunity of the New Year to assure our British friends of the sincere friendship and wishes of the R.E.F. for the days to come. May they bring to you plenty of DX and FB results!

Amongst the works of the past month, two important matters emerge: the first contact with Madagascar, made between ef-8JF and fb-8HL of Tananarive (the respective QRK's were r5 to 6), and the first contact across the Atlantic on 10 metres, realised on January 1 between ef-8CT, of Arcachon, and nu-2JN.

*This last *exploit* is one which the R.E.F. can be proud of. 8CT was received r6 and 2JN r4; both state that this wave support frequent and rapid fading, safe during the half-hour when the signals were at their maximum. The fact opens a new field of investigation, for the new international band around 10 metres; maybe it is a splendid wave for DX. Future will tell.

8FT now rebuilds; this is why his DX correspondents look for his sgs. with despair! Hi!

8MSM, a newcomer to . . . good aerials, and who uses very low inputs has had his speech received r6 in Lisbon, and r7 in Belgium.

8RGK, a new ham, with an input of 7 watts, has covered all Europe, with his 'phone; the best DX are eu-42RA and as-35RA (r5).

8PY will be soon anew on the air with two sets; a 'phone one with a 45-watts tetrode affair, and a master oscillator for DX.

EDITOR'S NOTE.—Well done, 8CT. Good experimental work this and worthy of amateur radio.

Belgian Notes.

By eb-4FT.

Amongst our members' notes of the month we are pleased to note the following:—

4CN has been in touch with a new Egyptian station, fe-3AEF.

4CK remarks that after sunset, he is unable to raise any European, since he is r8 in the U.S.A.

4ZZ still makes new DX; with 1FP in the waters of Congo (r8), sk-AQBD in Falkland Islands, sa-SFV in Buenos Aires (r9). He says that the more in the South the more QSA. Till now 4ZZ has worked 54 countries, and has been heard r9 in San Pedro (California).

4BC, of Antwerp, has a regular schedule with ARCX, which is now near the South Pole.

4AC has QSO nu-6BAX with a report of r7.

Indian Notes.

(By AI2KX.)

GENERAL.—Conditions during November showed a great improvement at the beginning of the month, but fell away towards the end. QRN has been very bad and QRM on the 34-45 metre band is terrific. Conditions for QSO with Europe in general have been very poor indeed, and do not compare at all favourably with those of last year. European signals are first audible on the 32-34 metre band at about 12.30 G.M.T., and remain good until about 16.00 G.M.T. After this time stray signals are heard, but the wave is generally speaking dead. Signals on the 44-46 band

are first audible at about 19.00 G.M.T., and remain steady until about 01.00 hours G.M.T. QRM is very bad on tihs latter wave, chiefly from commercial and service stations in the East. At present nearly all AI stations are using the 30-metre wave; if, and when, the new wave-lengths are enforced, it is most likely that AI stations will use the 20.73-21 : 42 band.

2KT reports a very successful month with OA and FO, but that conditions are very poor for European QSO. NU has been worked and this makes him a WAC (congrats., OM!). Total ex-India QSO's for the month, 112, using a maximum power of 60 watts. 'Fone QSO's have been made with OA and FO.

2BG is back on the air after a long silence, and is putting out very good RAC sigs on 30 metres. QSO with OA and EM was made during the first week; 2BG will be remembered by the old gang as one of the pioneer AI stations.

2KX reports a very successful month after a very bad start. QSO has been made on the 30-33 metre band with five continents. He is running a very successful every-day schedule with LA1X at 13.00 G.M.T., signals on this schedule are usually R.6-8 each way F.B. Europe in general is very disappointing, very few stations are heard on the 32-metre band. The best time for QSO with AI on this wave-band is between 13.00 and 14.30 G.M.T. Extensive experiments have been made with aerial during the month.

2KJ is very bsuy fixing up a telephony station, for which he hopes to get a 1 kw. licence. Since making a very FB DX QSO with OA, using his Reinartz receiver keyed as a transmitter, he has done nothing of note.

7VX (Ceylon) is still plodding away on 32 metres and is putting out very good RAC signals. QSO with OA and FO has been made, reports will be very welcome and will be acknowledged.

2KW reports a fairly successful month with OA and FO, but ND with Europe. No G stations have been heard at all during November. Successful schedules are being run with OA and FO on 30-32 and 30-40 metres, respectively. 2KW is always QRV with pure D.C. (60 watts maximum) from 12.00 to 16.00 G.M.T. on 30 metres.

Correspondence.

Instructions to Correspondents.

We are always glad to hear from members. Correspondence published in these columns should be written clearly on one side of the paper and marked "For Publication."

All correspondence should be addressed to the Editor, T. & R. BULLETIN, *who reserves the right to refrain from publishing any material which is lacking in general interest or for other reasons. Correspondence for publication will* not *be acknowledged.*

Correspondence must be kept reasonably brief.

RE EDITORIAL ARTICLE "WASHINGTON."

DEAR SIR,—Under the sub-title "What the R.S.G.B. Did" an unfortunate wording of the first paragraph has crept in and somewhat spoils what is otherwise an excellent article.

As a matter of historical accuracy, the R.S.G.B. was not in existence when the Wireless Telegraphy Act of 1904—to which you obviously refer—was passed, in fact the Society did not form until some nine years later.

The provision of the Act which ensures the experimenter's position (Ed. query: existence?) in this country is important and what I call the experimenter's charter. It reads as follows:—. . . "provided that nothing in this Act shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages."

In 1925 the Government brought forward a new Wireless Telegraphy Bill in which the above clause was eliminated.

The new Bill was completely withdrawn after a short but vigorous opposition in which the R.S.G.B. took a not inconsiderable part, obtaining the active support of the daily Press, and but for a very short amending Act for clearing up "matters of doubt" and defining the position of the B.C.L. the original Act of 1904 still stands intact on the Statute Book.

The Washington Conference was allowed to take place without a vigorous Press campaign by amateurs in this country, but as you rightly suggest the older work of the R.S.G.B. no doubt still remained in the Official Memory. However, it is a good policy to jog the "Memory" now and again and scientific work will always receive Press and public sympathy and protection in this country if a good case is made out and official curtailments "nipped in the bud."

Yours faithfully,
MAURICE CHILD.

"Oakfield,"
20, Shoot-up Hill, N.W.2.

[EDITOR'S NOTE.—Mr. Maurice Child has taken a very active part in the work of the R.S.G.B. for many years and is able to speak with authority as to the facts of the 1925 "Bill." The statements which he now makes are exactly what the writer had in mind when he wrote the article under discussion although for the purposes of brevity the detail was omitted, and unfortunately it somewhat spoiled the "punch" of this particular paragraph. Our thanks are due to Mr. Child for his kindness in bringing this forward.]

To the Editor of T. & R. BULLETIN.

DEAR SIR AND OM.—With reference to the new "5s. memberships" I feel I would like to point out on behalf of myself and other BRS hams, that although new members are of course in ham-spirit, heartily welcomed, is it advisable to allot a BRS number without the person qualifying in some way, seeing as they need not be recommended! This is in my opinion, departing from the Society's ambitions, *i.e.*, to be able to QSO, or test with a fellow-member, knowing full well that he is to be *relied* upon (as otherwise he would not be a R.S.G.B. chap!)

It will be realised that quite a lot of wireless fiends will be glad to get into the "old R.S.G.B." at so low a "price," and we shall probably be getting some BRS's with no technical "brains" and also no knowledge of *amateur* radio! I, personally, could get one or two members, who know quite a lot about *receiver-building*—probably they could build a *better finished* set than myself—but whose knowledge of amateur radio is absolutely *nil*. Will this please the *Xmitters*? This is where the trouble begins. Formerly BR stations were looked upon by the Xmitter as someone upon whom at least he could rely for *accurate* reports. Therefore, unless something is done, BRS's will no longer be of any standing—their one aim on giving "the goods or nothing at all" will be washed right out!

Again some BRS's have kept an accurate log for years past, and have got their receivers, and results, by their aid, more or less standardised. If conditions are bad, they know if the receiver is at fault so to speak, and give their reports accordingly. Is it fair to them even?

Could not some code word be introduced, so as to tell the "qualified" BRS (hi!) Anyway, what do other BRS's think about it—also Xmitters?

Sincerely yours,
F. APPLETON (BRS-12).

To the Editor of T. & R. BULLETIN.

DEAR OM.—I think it is just about time that someone thought of a method that would knock enough sense into the gang to clear some of them out of the appalling mess that 45 metres is turning into now. On Sundays all the stations in Europe seem to be fighting over the 44-46 metre band (a quite disinterested BCL on hearing my short-wave receiver last Sunday remarked that it sounded just like a dog-fight!)

I tried to start a 90-metre party, and 2NH did the same. The result is that there are about five stations who go up there on Mondays, and on all the other days of the week—nil.

I don't think anyone cam realise what 90 metres is capable of, or there would be more up there. There is *no* French phone or raw AC, and even if they argue that there will only be Britishers up there—well, hang it all, it's surely better to have a decent QSO and try some real tests on one EG station than to spend the whole day making abortive attempts at QSO's and ending each one up by losing the other man?

Anyway, there are other foreigners who would be only too glad to QSY permanently to 90 if they heard a few more of us up there. I have worked 7JO and SMTO on 90 metres recently and both have said that if only a few more EG's were to be heard they would be on the look-out more frequently.

I think that the best thing that could happen to amateur radio at the present day would be for the G.P.O. to suspend about half the present 45-metre licences. I would be one of the first to volunteer to give mine up, and would spend my time very happily divided between 23 and 90 metres, one being purely a daylight wave and the other of little use until 7 p.m. or so. If any of the "45-fiends" would tell me just what makes them go on using this wave without even trying out the other bands, and, furthermore, putting up with all sorts of horrible messes and wailing bitterly about the QRM well, I shall look eagerly at this page in next month's BULL.!

Thank you, OM. Now waiting for the replies!

Yours sincerely,
L. H. THOMAS (6QB).

To the Editor of T. & R. BULLETIN.

DEAR SIR,—May I, through the medium of your columns, mention that NU7FE has been worked five times recently on 20 metres.

The last QSO resulted from a test call given from my station whilst testing out a new H.T. supply. This was 350 volts at 25 mills R.A.C., giving an input of 8¾ watts. This seems to be a record for a QSO with the NU7th district, and I would be pleased to hear from anyone having done it with a similar input.

73's DE EG5ML (Coventry).—I remain, yours faithfully,
F. M. MILES (5ML).

To tue Editor of T. & R. BULLETIN.

DEAR SIR,—I have this morning received a card from OA2RX He says that he transmits on 22.5 metres every day at 12.00 G.M.T., and asks for QRK. He adds that eight OA stations are regularly on 23-metre band, *viz.*, OA—4go, 4cg, 4mm, 4lj, 4nw, 5hg, 2sh and

2rx. The QRA of 2RX is: H. C. St. John, 82, Gibbes Street, Rockdale, N.S.W., Australia.

Very best 73.—Yours sincerely,

V. G. Mellor (BRS31).

To the Editor of T. & R. Bulletin.

Dear OM,—Just a line to say I had a card from OA5RJ, who wishes me to make his QRA known to the EG gang. He is using a Hartley with 500 volts D.C. on a UX210 tube. His QRA is: D. M. Hancock, Esq., 14, Railway Terrace, Kadina, South Australia.

He states that this is his first EG report, NW, and wants some more. VY 73's to you all.—Yours truly,

Charles E. Harwood (EG2AYN).

THRESHOLD HOWL.

To the Editor of T. & R. Bulletin.

Dear Sir,—Having unsuccessfully tried filters and H.F. chokes in every conceivable position to cure threshold howl in a straight 0-V-2 short-wave receiver, I ultimately effected a complete cure by using as detector a Cossor 610 L.F. valve, which will oscillate and give smooth reaction effects with a voltage on the plate of only 16 volts.

Of course, it is well known that a reduction of plate voltage on the detector tends to reduce this trouble, but I had not personally come across another valve which would permit of the voltage being sufficiently reduced to get rid of it altogether.

I think it is pretty clear that, in some cases, at all events, the howl is not due to H.F. leakage into the L.F. side, but that it is in some way connected with a grid howl in the detector. Certainly in my own case no arrangement designed to stop such leakage had the slightest effect beyond slightly altering the " pitch " of the howl. However, whatever the cause, the Cossor valve has completely cured it and the tip may be useful to others.—Yours sincerely,

M. J. C. Dennis (GW11B).

To the Editor of T. & R. Bulletin.

Sir,—Would you insert in the Bulletin a short note to the effect that Mr F Dearlove, of NE8AE, is desirous of reports from British stations. 8HE has schedules with: NU2HV at 02.00 on 45 metres daily; NU2AG at 04.00 daily on 45 metres; also with G2XY on 45 metres every Sunday at 01.30—all times G.M.T. He also calls CQ at 05.00 G.M.T. daily on 36 metres. His complete QRA is: F. Dearlove, c/o Grenfell Hospital Base, St. Anthony, Newfoundland.

Many thanks in advance, and a prosperous New Year for the Bulletin.—Yours, etc.,

H. T. Littlewood.

To the Editor of T. & R. Bulletin.

Dear Sir,—In course of correspondence with my friend E11FO, he asks " Why do G stations not QSL ? " I naturally asked him to elucidate, and in reply to same he informed me that since September last and up to November 20, 1927, he had been QSO the undernoted stations (somo ef them several times) and up to December 15 had not had a card from any of them.

Now as this may be due to oversight on the part of some of the fellows, I suggest that they take the opportunity to put the matter right. If anyone is in doubt as to the date of QSO, I shall be pleased to supply it.

The stations are 2UN, 2CU, 2NT, 2XY, 2WK, 2JO, 2AK, 5SZ, 5GQ, 5UQ, 5SO, 5BY, 5RU, 6YD, 6YK, 6YQ, 6RW, 6WK, 6RM, 6TA, 6CL, 6IA, 6BY, 6HK, 6DA, 6FM.

The QRA of E11FO is: F. S. Orefice, Palamaio 40, Vicenza.—Sincerely yours,

John Wyllie (GC5YG).

Calls Heard.

Sunday, January 9, 12 to 2 p.m., 40-50 metres.—6as Melton (R.6), 6ba (R.4), 6ug Cheltenham (R.5), 6ft Cowes (R.3), 6xv Cambridge (R.5), 2ax London (R.4), 2gf London (R.4), 6uz Stoke (R.5), 2rg (?) (R.3), 6ll London (R.5), 5dc Blackpool (R.7), 2bs (?) (R.4), 6ma calling 5nv (R.5), 6wk Hayes (R.3), 6kc London (R.4), 5ml Coventry (R.3), 6xf (?) (R.2), 6fr Birmingham (R.4), 5yz London (R.4), 6vj Hull (R.4), 6bn Welshpool (R.5), also enowx, Holland. I should be much pleased to act as an independent listening station for transmitting on Sunday mornings. Receiver, 0-V-1 Reinartz.—R. J. Curry, 32, Castlegate, Grantham.

Calls heard at NU2BV, Charles M. English, 9, Park Circle, White Plains, New York, U.S.A.—November: EG—6rm, (6lw), 6rw, (6rb), 2xy, (2dn). EB—4cb. EP—3am, 1be, 1ag. EK—(4aap), 4abg. EA—spo. EI—1fo. EF—(8ba), (8yor). December: EG—(2dn), (6jy), (5ml), (5yx), 6da, (6rb), 5by. EF—(8ba), (8cp), (8btr), (8vvd), 8ssw, 8xix, 8dm. EF—8rld, 8fb, 8ef. EW—h4. EC—1uz. ER—4ur. EH—9xc. NB—be3. EI—1xw, (1rv), 1ai. EK—4abg, 4xy. EP—1ag, (1be), 1bx. SB—1ib, 1aw, 2ag, 2ib, 2ao, (2aa), 2aq, 1br. NQ—2jt. EB—4ck, (4dj). NM—9a. FM—8psrv. OA—5hg, 3wm, 2yj. OZ—2bp. Calls in brackets worked. The following owe me QSL cards: EG—6wl. EK—4aap. EF—8btr, 8yor. SB—2aa.—Member A.R.R.L. T. & R.

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Rates ½d. per word, minimum charge 1s. 6d.

FOR SALE.—Mullard 0-30B, used one hour at 10 watts, 35s.; Weston 0-5 milliammeter with shunt to 100 m.a. and portable base, 30s.; Zenith 10,000 and 30,000 ohm transmitting grid leaks, each 12s.; Sterling calibrated lab. type condenser, .0005 max., 15s.; Telesen 5:1 transformer, 5s.; Sullivan semi-aperiodic H.F. transformer, 200-30,000 metres, 15s.; Burndept H.W.A. 0-1.5, 6s.; Burndept coils Nos. 500, 150, 100, 75, S4, 4s. each; pair Brandes 'phones, 10s.; Amplion Dragonfly L.S. (new), 12s.; " Wireless Worlds " and other journals from about 1920, large quantity. Reasonable offers for any of the above will be considered.

WANTED.—B.T.H. Portable Long Wave D.F. Receiver as manufactured about 1921; case must be in good condition; approval required.—G6BR, Overdale, Ilkley, Yorks.

50-60 WATT CONVERTER wanted cheap—input 100 volts D.C.; output 600 or 500 volts D.C. at 100 m.a.; state input current, condition and price; no " Chopper " machines, please !—Livesey (6LI), 15, Rue d'Orléans, Pau, B.P., France.

FOR SALE.—L.T. TRANSFORMER 3×3, 220 volts, 50 cycles, 10s.; L.S.S. Valve, very little used, 15s.—C. Morton, Glastonbury Avenue, Belfast.

TANTALUM metal sheet for A.C. rectifiers. Make up your own inexpensive chargers. Blue Prints for H.T. and L.T.—Blackwell's Metallurgical Works, Liverpool.

DON'T forget your log pads.—6 CC.

PATENTS obtained, Trade Marks and Designs registered, British and Foreign.—Gee and Co., Patent and Trade Mark Agents (H. T. P. Gee, Member R.S.G.B., A.M.I.R.E.), 51-52, Chancery Lane, London, W.C.2. Telephone: Holborn 1525.

SEND US your dud valves; we guarantee to return them with their original characteristics at approximately half the price of new valves.—Write for full Price List to North London Valve Co., Ltd., 22½, Cazenove Road, London, N.16.

OFFERS wanted for:—1 Osram Power Valve, D.E.5, 5-6 v.; 1 set plug-in H.F. Transformers McMichael; 2 Dimic Coils and Bases.—M. J. Wright (B.R.S.111), " Coveney," Valley Road, Edwalton, Notts.

MORTLEY 50 v. ½ h.p. Motor Semiflex coupled to 2,500 v. 150 m/a. double commutator generator mounted on cast-iron bedplate with field regulator, coupling also arranged to take belt drive, in which case machine can be driven by outside source, using 50 v. motor as L.T. generator floating over accumulators. In good condition. What offers? Three Marconiphone Ideal Supersonic Transformers, as new, 25s.—H. S. Nicholls, (EG2CC), " The Whins," Stockfield, Northumberland.

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