THE T&R

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THE T. & R. BULLETIN

OFFICIAL JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

DEVOTED TO THE SCIENCE AND ADVANCEMENT OF AMATEUR RADIO

Hon. Editor: A. O. MILNE

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Vol. XIV. No. 7. JANUARY, 1939

CONTENTS

RECEPTION PROBLEMS

OF the four main Experimental Section groups the one devoted to the study of Receivers and Reception Problems is the smallest. Why this should be so, we do not profess to know, but we think the time is ripe to comment editorially on the matter, if for no other reason than that the present day problems concerning reception are as acute as any confronting the Amateur Radio movement.

Since the beginning of 1936 it is safe to say that several hundreds of highly sensitive and highly selective receivers have been purchased by British amateurs. Unfortunately for many users, increased sensitivity means an increase in car ignition and domestic machinery interference which makes long periods of listening a nightmare, particularly on the 28-30 Mc. band.

Numerous noise-limiting devices have been described in radio publications, and we have no doubt that certain of them work very well, but the fact remains that there is to-day no universal method of suppressing unwanted noise on each and every type of sensitive receiver. In our own case we have tried three really "hot" schemes which have been used with success by other London amateurs, but in no instance was a real improvement noticed at our own station. The reason does not seem hard to find—most of the limiters are designed to work into or with an audio output stage. If the output happens to be a second detector stage, the limiter will not function. True, it may be possible to incorporate a device in an earlier stage, but he is a courageous person who will make radical alterations to the wiring and layout of a receiver costing some twenty-five or thirty pounds.

Here, then, is one problem for the Receiver enthusiasts to tackle. Let us have some information of a practical nature which will enable the poor unfortunate who lives in a congested area to give R5 reports when the strength of a signal is S9!

Problem number two concerns Signal Reporting.

Can we anticipate an authoritative article dealing with Signal Strength Meters and Magic Eye Indicators? What is the relationship between a signal received on a big open aerial and one received on a small indoor aerial? We hear frequent references to a signal giving so many dB's on the S meter, but how often is a reference made to the aerial in use? Surely the input level, using an open aerial, bears no relationship to the same signal on an indoor aerial.

Problem number three concerns the aerial system itself. Recently we have been testing small indoor V aerials for 28 Mc. work and frequently signals have shown an improvement when using one of these miniature beams compared to a long indoor aerial. Which, then, is the best form of aerial for use with a modern superhet ? Are we justified in assuming that the same type is equally suitable for reception on 7, 14 and 28 Mc. ?

Reams of paper have been used in describing transmitting aerials, but receiving aerials (since the hey-days of broadcast listening !) have been dismissed by most writers in a few non-committal paragraphs.

If there is any truth in the suggestion that maximum car ignition is picked up at a height of about 30 ft. above ground level, it would seem that a high, rather than a long, aerial is desirable when this form of interference is pronounced.

Without question, an investigation of receiving aerials is long overdue.

Our last suggestion is that the Receiver Group should tackle the question of drift on commercial superhets. Many of these receivers have built-in power supplies with the result that for the first hour or so the frequency drifts badly. The drift is particularly noticeable on receivers incorporating very wide band-spread. An article outlining the results of experiments with various types of valves and receivers would, we believe, prove of unusual interest to many amateurs.

The receiver is the most vital piece of apparatus in an amateur station, and in our opinion deserves more attention than it is to-day receiving.

In the words of the well-known screen announcement " Mr. Heap and his merry men are ready to serve you "—with a list of problems to be tackled.

J. C.

Sequel

Shortly after the above remarks were written, Mr. R. H. Hammans (G2IG) delivered his lecture at the Annual General Meeting on the subject of " Recent Improvements in Receiver Design." Although several of the points mentioned editorially were dealt with by the lecturer, including the questions of noise suppression and frequency drift, we are more firmly convinced than ever that the average amateur still has much to learn insofar as present-day receiving problems are concerned.

FORTHCOMING SOCIETY MEETINGS AND CONTESTS

JANUARY

27. I.E.E. Meeting. Discussion : " Beam Aerials." Opened by Mr. F. Charman (G6CJ). Preceded by adjourned Annual General Meeting.
30. Council Meeting, 6 p.m.

FEBRUARY

4-7. Senior B.E.R.U. Contest.
9-12. Junior B.E.R.U. Contest.
14. Council Meeting, 6 p.m.
24. I.E.E. Meeting.

MARCH

14. Council Meeting, 6 p.m.
31. I.E.E. Meeting.

APRIL

2. Provincial District Meeting in Birmingham.
11. Council Meeting.
23. Provincial District Meeting in York.
28. I.E.E. Meeting.

MAY

7. Provincial District Meeting, South-West of England or South Wales.
9. Council Meeting.
21. Provincial District Meeting in Chester.

JUNE

3-4. National Field Day.
13. Council Meeting.
18. Provincial District Meeting, South of England.

The Year in Review*

By JOHN CLARRICOATS (Secretary-Editor)

I HAVE the honour of presenting on behalf of the Council a review of the Society's main activities during the year 1938.

Membership

Steady progress has been maintained in spite of troubled periods due to the International Crisis. The net gain in membership amounted to 239, compared with 295 last year, the present figure being 3,580.

This satisfactory increase has been brought about very largely through the enthusiasm of old and new members alike, who have introduced the aims and objects of the Society to their friends. New pamphlets have also proved of value in bringing to the notice of prospective members the work of the Society. It is impossible to give an accurate percentage of fully licensed members compared with A.A. and B.R.S. members, because the position changes daily, but from our records it would appear that approximately 75 per cent. of active licensed British amateurs are members of the Society.

For purposes of comparison the membership totals as at December for the past five years are given below :—

1933	...	...	...	1,980
1934	...	...	...	2,245
1935	...	...	...	2,587
1936	...	...	...	3,046
1937	...	...	...	3,341

The T. & R. Bulletin

Following the policy outlined in past years, the Society's Journal has again been increased in size. On one or two occasions the number of pages in a particular issue has, by force of circumstances, been brought up to 80, but normal issues have contained an average of 64 pages, representing an increase of about 8 pages per issue over 1937.

Technical articles have again reached a satisfactory standard and several new features have been introduced during the year. For the benefit of newer members " The Helping Hand " articles were revived under the direction of Mr. J. N. Walker (G5JU), whilst a new series of articles dealing with Workshop Practice began to make their appearance in the autumn. A series of articles dealing with television and cathode ray tubes is in course of preparation. Council records its thanks to all contributors and would, in particular, mention the names of Miss Nelly Corry (G2YL), Messrs. J. N. Walker (G5JU), L. Blundell (G5LB), J. M. R. Sutton (G2NG), L. Fryer (GM2FR) and H. A. M. Whyte (G6WY), who have prepared regular monthly features. In addition, they thank Messrs. T. P. Allen (GI6YW) and D. N. Corfield (G5CD) for their book and valve reviews.

Mr. Milne, G2MI, has continued to render valuable service in connection with the preparation of drawings, whilst Messrs. Eskdale (G2SU) and Abraham (GW3AJ) have frequently assisted the Secretary-Editor by redrafting certain articles.

The Council were pleased to award small monetary honorariums to several members who had contributed useful technical articles to the thirteenth volume of THE T. & R. BULLETIN.

Council desires to place on record its thanks to Mr. Bevan Swift (G2TI) for his continued interest and guidance during his long period in office as Honorary Editor. He is to be succeeded in the New Year by Mr. Milne, who has had considerable experience of BULLETIN work.

Other Society Publications

The outstanding achievement of the year was the publication in December of *The Amateur Radio Handbook*. Pre-publication sales amounted to over £100, an indication of the support which it is anticipated will be given to this important venture. The high technical level reached has been brought about through the indefatigable efforts and splendid co-operation of the seven London members who, with the Secretary-Editor, formed the Handbook Committee. They were also assisted in their work by several other members whose names appear in the preface to the Handbook itself. It is intended that the Handbook Committee shall continue to meet at regular intervals with a view to the preparation of material for a second edition.

The decision to prepare, in readiness for Radiolympia, a 64-page publication based on " The Helping Hand " articles was made when it was seen that the Handbook could not appear until later in the year. It is pleasing to record that, with the exception of a small stock held for publicity purposes, the whole edition of 10,000 copies has been sold.

Due to the overwhelming demand for the fifth edition of *A Guide to Amateur Radio* (published in 1937), it became necessary early in the year to prepare a 32-page publicity pamphlet outlining the aims and objects of the Society.

The Council records its thanks to Mr. Ellis, who was responsible for drafting the diagrams used to illustrate these publications and also to the many companies who gave their support by booking advertising space.

Cairo Conference

Our President, Mr. Arthur Watts (G6UN), represented the R.S.G.B. and the I.A.R.U. at the International Telecommunications Conference held in Cairo. A full report of the decisions reached was published in THE T. & R. BULLETIN shortly after the Conference concluded its work.

The Executive Vice-President, Officers and members of Council desire to place on record their thanks to Mr. Watts for having, at considerable personal inconvenience, represented the Society at Cairo.

The Council would stress the view that better co-operation between European amateur societies and their Governments seems desirable before the forthcoming Conference takes place in Rome. The delegates of many European Governments present at Cairo did not appear to be fully conversant with amateur matters in their country.

Licensing Matters

Throughout the year very cordial relations have been maintained with the licensing authorities.

* **Being the Annual Report of Council** read at the Annual General Meeting held in London on December 30, 1938.

Numerous meetings have taken place between the Society's representatives and representatives of the G.P.O., whilst a close contact has also been maintained with the Wireless Telegraphy Board.

Due to the exigencies of the Services, particularly the Air Force, some difficulty has been experienced in regard to the 3.5 Mc. band, the G.P.O. taking the view that those applying for an increase in power must, if they hold a 3.5 Mc. permit, give sound reasons for requiring the additional power facilities to apply equally to that band.

The general position in regard to high power permits is not altogether satisfactory. The number of members who have applied for permission to use power in excess of 25 watts has been much smaller than usual, but in view of the more stringent G.P.O. requirements, very few of these applications have been successful. In this connection the G.P.O. has repeatedly informed the Council that it is unable to grant permission for the use of increased power unless the applicant can substantiate his claim that experimental work is being handicapped by lack of such facilities. The representatives of Council have in their turn emphasised at Society meetings the urgent necessity for members to maintain accurate records and data of their experimental work. Members have also frequently been urged to contribute technical articles dealing with their experiments.

Negotiations are continuing with the G.P.O. in the hope of finding a suitable basis for dealing with future high-power applications.

During the year over 200 members were recommended for 25-watt permits.

The position in regard to the 56-60 Mc. band is unsatisfactory. The Council regrets that the G.P.O. has not yet substantiated its agreement made with Mr. Watts at Cairo that the low-frequency half of the band would continue to be assigned to amateurs until required for additional television services. In recent months new licensees and those granted extra power have been debarred from using frequencies between 56 and 58.5 Mc. Council has registered its disappointment at this arrangement and have asked for the full band to be made available.

The rearrangement of the 3.5 Mc. band necessitated by the Cairo decisions has not yet been decided, but the Council has been promised by the G.P.O. that the 50 kilocycles lost between 3,625 and 3,675 kc. will be "made up" elsewhere in the band.

In regard to the Cairo decision to allot, in Europe, the frequencies 7.2-7.3 Mc. to amateurs and broadcasting, the G.P.O. has made no final decision concerning British licence holders, but the Society's representatives have recommended that amateurs be allowed to continue to use the shared portion subject to the protection of any B.B.C. station working on a spot frequency in that band.

Several British amateurs have been heard off-frequency during the past year and in most cases the fault has been attributed to a defective crystal or to the use of an electron coupled oscillator. The Council considers it necessary to warn members again that in their own interests, and in the interests of all amateurs, accurate frequency measuring apparatus should be available when electron coupled oscillators are in use. Attention is also again drawn to the danger of purchasing crystals which have frequencies close to the edges of the amateur bands.

During the year there has been an increase in unlicensed operating and in some cases the Council has been able to report the facts to the G.P.O. The Council is determined, to the best of its ability, to stamp out unlicensed operating and in making that decision believe that it will be supported by the vast majority of members.

The rapid increase in the numbers of new licences has been watched with some apprehension by the Council and it is feared that unless the G.P.O. institutes some other method of dealing with applications the congestion within the next few years will become so great as to prevent any serious experimental work from being carried out. The Council is of the opinion that some form of simple technical examination is necessary.

The number of full licences issued up to the end of October, 1938, was 2,705, compared with 2,216 in 1937. The total of 2,705 includes 1,812 10 watt licences, 503, 25 watt licences and 390 licences in excess of 25 watts. A.A. licences totalled 2,198, compared with 1,734 a year earlier.

Band Occupancy

Two further band occupancy checks have been conducted under the control of Messrs. L. Hill, G5WI, and T. C. Clark, BRS565. These checks confirm the view previously expressed that activity is increasing at a very high rate. The number of British Isles stations heard working during the May check was 1,698, compared with 1,398 in April, 1937. The Council records its thanks to Mr. Hill and his colleagues for the excellent work which they have carried out in this connection.

District Activities

Provincial District meetings were held in Southport, York, Exeter, Cambridge and Nottingham. In addition, a Scottish Convention took place in Glasgow. At this meeting over 100 members from all parts of Scotland were in attendance. In March the Secretary-Editor represented the R.S.G.B. at the first Eire Convention and later visited Northern Ireland. Conventionettes were held at Hastings, Birmingham and Weston-super-Mare.

It is estimated that over 700 members attended the official Society meetings.

Frequent meetings were held in most Districts under the chairmanship of the local D.R., whilst with the extension of the Town Representatives scheme local meetings took place at weekly, fortnightly, or monthly intervals, in practically every town of importance within the British Isles.

Several changes in District representation have taken place during the year. These changes have in all cases been due to pressure of private business on the part of the retiring officer.

The Council records its thanks to all who have served either as District Representatives or Town Representatives during the year.

D.R.'s Conference

A Conference between the District Representatives and the Council took place in April, when many matters of general policy were discussed. This Conference replaced the Delegates meeting usually held during Convention.

Convention and Exhibition

The attendance at the 13th Annual Convention was the best so far recorded, with over 300 members

present at the various functions. The Conversazione and Dinner were so well supported that steps are to be taken to obtain better accommodation in 1939.

The Society's stand at Olympia, which for the first time was on the ground floor, received the usual good support. The Council records its thanks to those members who loaned material or volunteered for stand duty.

Sectional Activities

The QSL Section, which is now an integral part of Headquarters activities, has dealt with an increasing volume of work. The difficulty of the unclaimed card has been very largely overcome by advising members when no envelopes are available. The Council would, however, urge all members to keep a supply of envelopes at the Bureau for every unclaimed card causes additional work in handling it.

The QRA Section has been very ably conducted by Mr. H. A. M. Whyte, G6WY, who has prepared a monthly list of changes and additions for publication in THE T. & R. BULLETIN, and a quarterly list for the *Amateur Radio Call Book Co.*

The Calibration Section, under the direction of Mr. A. D. Gay, G6NF, has continued to provide a most valuable service to members.

The Tests and Awards Committee has again rendered very useful work in connection with Contests. As from the New Year it is anticipated that the Committee will take over the preparation of all Contest reports in addition to framing rules.

The Band Monitoring Section has been responsible for advising Headquarters of off-frequency operation, a service which has been much appreciated by the Council.

Affiliated Societies

Several local societies were granted affiliation during the year, bringing the total up to 37 as at December 30. It is pleasing to record that the majority of these societies are run in conjunction, or in close co-operation, with the local R.S.G.B. group.

Certificates and Contests

During the year the preparation of a new Empire certificate, known as The British Empire Radio Transmission Award, was authorised. To date some 35 members have qualified for this award.

The popularity of other certificates issued by the Society continues.

The Annual B.E.R.U. Contests were again well supported, but with the knowledge that very many similar contests are now being organised by other national societies, the Council decided as an experiment to confine the duration of the 1939 Contests to a period of nine days instead of four week-ends as in the past. The success or otherwise of this change will be watched with interest. For the 1939 Contests a limited operating period has also been specified.

A very successful 1.7 Mc. transmitting contest took place in January, whilst several interesting local contests were arranged by individual groups of members. This opportunity is taken of thanking those members who donated trophies for local contests. In the Western District Mr. D. Waddington presented a silver trophy as a memorial to the late Mr. W. Andrews, G5FS.

The Annual National Field Day, which was held in June, attracted an entry of nearly 100 stations. For the first time the Northern Ireland District were judged the winners.

It is not anticipated that any radical alterations to the rules will be made for the 1939 N.F.D.

56 Mc. Activities

The second Annual 56 Mc. Field Day was held in July, and although the number of entries was higher than in 1937, it was made clear in the report that very many other British amateurs were active during that event.

The annual G.W. 56 Mc. Cup Contest, which is privately arranged, attracted considerable attention and many interesting contacts were established.

The first 56 Mc. British Isles contact with Italy was made by Mr. Menzies, G5MQ.

Intensive experimental work has been carried out on this band, and although transatlantic contacts have yet to be made it is satisfactory to note that apparatus used for this work has improved very considerably since our last report.

The 56 Mc. International Contest (organised by the R.S.G.B.), which commenced on January 1, 1938, has been supported by a fairly large number of amateurs, but the inability to make transatlantic and long-distance contacts has tended to discourage certain British Isles members who at the outset of the contest reported diligently each month.

Films

Thanks to the generosity of the *Agfa Film Co.*, the Society was able to present a full length film of N.F.D. activities in the South of England. In addition, due to the co-operation of Mr. F. Wise, a second series of British amateur stations was presented, together with a general film entitled "The R.S.G.B. Scrapbook for 1938," featuring numerous aspects of Society activities.

The films after being displayed in London have been circulated around the Districts where they are being seen by large gatherings of members.

R.A.F. C.W.R.

In September the Air Ministry announced their intention to form a Civilian Wireless Reserve. For some time prior to this date the President and Secretary had been in close touch with the Air Ministry and had given useful advice concerning the interest which was likely to be shown by members in such a Reserve. Since its inauguration the Society has continued to give advice and offer suggestions. The President and Secretary have been invited to serve on the Reserve Committee in an advisory capacity.

From information supplied by the Air Ministry it is clear that the Reserve has appealed to a large number of R.S.G.B. members.

A.R.P.

The services of the Society were offered to the Home Office in connection with Air Raid Precautions, but it is understood from that body and the G.P.O. that amateur radio communication is not envisaged for such work in the event of war.

Appreciations

Before concluding this Report I desire to record my thanks to the President, Executive Vice-President and the other members of Council who have at all times given me every assistance in carrying out my duties.

(*Continued on page* 432)

The Cathode Ray Tube and its Applications in Television and Oscillography

By S. WEST.

PART I.

It is the object of this series of articles to convey information concerning present-day practice and methods employed for television reception in the hope that members will be encouraged to participate in this new radio development.

The series will be essentially practical, and numerous constructional examples and circuits will be included. This, the first of the series, deals with the C.R. tube as an oscillograph.

An appreciation of the functioning of a C.R. tube oscilloscope provides an excellent grounding in the principles of electronic television.

WITHOUT doubt one of the most valuable pieces of apparatus for any radio man to possess is a cathode ray tube oscilloscope. Not for the mere sake of rendering visible a number of variegated wiggly lines, but for the examination of transient and rapidly repetitive electrical phenomena that such apparatus permits to be made with an accuracy and time saving not possible with employment of other means.

An inherent feature of such apparatus is its relationship to the valve voltmeter, from the point of view of the small disturbance of operating characteristics in the apparatus undergoing test when the oscilloscope is attached, though later, we shall see, there are certain precautions to observe if this statement is to remain valid.

It is proposed in this article to deal briefly with some of the more useful applications of the C.R. tube oscilloscope in order to enable some insight into its functioning to be secured. Later in the series practical design data for oscilloscopes will be given, thus permitting an amateur readily to construct economical gear for himself.

The Cathode Ray Tube

Firstly, however, for the benefit of those having no acquaintance with the C.R. tube, a brief description of what it is and can do will not be amiss. All are familiar with its external form, consequently it suffices to deal only with the "works."

A cathode, usually indirectly heated at low voltage from A.C. mains and located at the rear of the tube, emits electrons. A part of this electron emission is focussed to a narrow beam; the precise mechanism of this act of focussing does not really concern us, the maker fortunately accepting the responsibility that it really does happen providing the electrodes' potentials are supplied at their respective correct values by the user. This beam, comprised of electrons moving at high velocity, is directed to the screen of the tube. Upon impinging on the screen the beam causes fluorescence, thus rendering its point of impact plainly visible as a small spot of light. The colour of this light spot will largely depend upon the screen material, and its size and quality will depend upon the magnitude and proportions of the various electrodes' potentials.

If a magnet be placed near the tube, the magnetic field will influence the beam, causing the light spot to move in sympathy with any change—that is, movement of the magnetic field. A similar interference is securable by electrostatic means. If two plates be placed either side of the electron beam, any potential stress existing between these plates will result in a movement of the beam at right angles to these plates. A variable stress will result in a variable movement.

Obviously, then, if we install a second pair of plates at right angles to the first pair, we can, by applying suitable potentials to each set of plates, cause the light spot to assume any position upon the screen.

Similarly, if the permanent magnet is replaced with suitably energised inductances, we can direct the light spot at will magnetically. It should be noted in this case that the beam movement is at right angles to the deflecting coils' axes

This latter form of deflection is not often used for oscilloscope work, though it is largely employed in television technique. The reason for this is simple when it is remembered the limitations imposed by inductances at high frequencies and the difficulty of feeding them with the power required for their operation from circuits, the constants of which must not be changed.

This difficulty does not exist when electrostatic deflection is employed, even up to quite high frequencies. Limits, of course, are set, due to the input impedance of the device reducing at very high frequencies, but we are not concerned with these for our purposes.

With two pairs of plates, then, we can move the light spot where and as we will. Add to this ability to move the spot to any desired position, the fact that the movement is entirely electronic (and it is thus almost inertialess), and we have as our American cousins tritely say "got something." Little imagination is required to envisage the possibilities of this remarkable piece of apparatus.

The C.R. Tube as a Curve Tracer

For most electrical phenomena that is varying in action the engineer has recourse to graphs, for in this way he is enabled to show the variations in a readily appreciated manner. Some of these graphs are simple and straightforward to produce, some entail very considerable skill for their production.

As examples of simple graphs we have those depicting the selectivity of tuned circuits, of wave forms and graphs of valves characteristics. Even assuming possession of the recondite knowledge

required to prepare these graphs, it is in many instances an extremely tedious pastime.

The cathode ray tube oscilloscope, for most practical cases, renders these intricate proceedings unnecessary. It is a simple matter to reproduce on the screen any of these laboriously hand-evolved graphs. We are able to reproduce resonance curves, valves characteristics (under actual working conditions), and to examine wave form, the true check for presence of distortion—all with the greatest of ease.

Let us consider a simple example, the reproduction of a single cycle of sine waveform, for this will explain the mechanism of this versatile piece of apparatus. We do not have to go far for our sine wave source. The A.C. mains will suit admirably.

Suppose we connect this A.C. supply across one pair of the C.R. tube's deflecting plates, it is obvious the potentials at these will then vary in sympathy with the mains voltage fluctuations and reversals, as a consequence the light spot will move rapidly to and fro across the screen. Due to that fortuitous defect of the human eye, namely, persistence of vision, this to and fro movement is revealed as a single vertical or horizontal line. Depending upon which pair of plates have applied to them the varying potential.

The Time Base

If we now apply a similar varying potential to the other pair of plates, our light spot, instead of merely oscillating to and fro or up and down, as the case may be, will also oscillate at right angles to the original movement. In other words, a pattern representing the two movements will result, and will appear on the screen somewhat like the diagrams depicting tricks with string that are a large and important part of the more popular of schoolboys' books. Now this pattern is not much use to us; indeed, it is of little more use than the schoolboy's string tricks, and possesses only a like measure of academic interest.

It is possible to derive some information from it, but, in the writer's view, the value of a sinousoidal time base is small. For frequency comparison tests it has value, and its employment for such purposes is later dealt with.

Incidentally, a sinousoidal time base is one that deflects the light spot sinousoidally in respect to time, *i.e.*, the light spot will not move at a uniform rate in time, but will be moving fast for the commencement of the deflection, will then slow down, and finish again at speed.

There is another minor disadvantage in employing the mains voltage as a reference sweep. It is this:

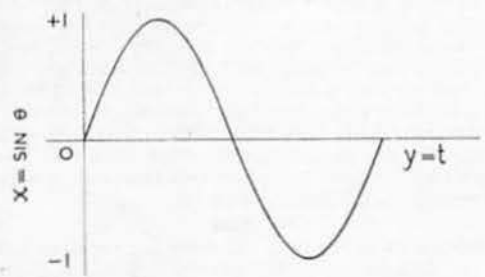


Fig. 1.—The Form and Shape of a Sine-Wave

the reversal of the cycle is at the same speed as the forward sweep, consequently the light spot will travel across the screen, say, to the right for one half of the cycle, and will then return at the same rate for the remaining half. Obviously, then, two patterns are produced, one for the "go" deflection, and one for the "return" deflection. It is a rather confusing business to derive information from the pattern thus produced.

The first defect can be alleviated somewhat by legislating for a high sweep voltage. Examination of a cycle of sine wave form (and here let us interpose a word concerning the shape of a sine wave, it has the form depicted in Fig. 1 and is not a graceful curve as it is so often represented) will reveal that for quite a large part of the voltage variation the change is uniform with respect to time. If the sweep voltage has sufficient magnitude so that only this part of the curve is rendered on the screen, certain tests can be reasonably well conducted.

The second defect mentioned is entirely avoidable, and this brings us to an electrode contained in the

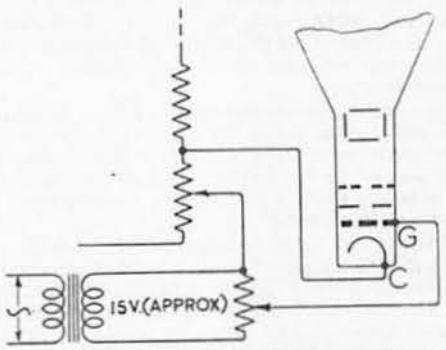


Fig. 2.—A Simple Circuit Designed to cut off the Beam Current

tube that is of immense importance for television work. It is an electrode operating in a precisely analogous manner to the grid in a conventional radio valve. Variation of its potential controls the number of electrons arriving at the screen, and therefore the light spot's brilliance.

It is a simple matter to employ this electrode to extinguish the light spot during the return half of the cycle, and there are a number of ways in which this may be effected. The simplest of these is to arrange for a portion of the voltage to be applied to the tube's grid either directly or indirectly through a thermionic valve. This potential, which is of reverse polarity to the sweep voltage, will bias the grid during the return sweep and thus cut off the beam current. The correct phase is easily arranged, and depends upon the form of connection used. A circuit showing the application of this simple principle is given by Fig. 2.

Linear Time Bases

In spite of all this, however, such a time base as has been earlier mentioned is still of little value. What is really needed is a sweep voltage varying linearly with time. Such an oscillation has the familiar saw tooth shape, and is quite easily generated in an imposingly diverse number of ways.

(*Continued on page* 432)

A Four Band Exciter Unit

By J. M. R. Sutton, B.Sc. (GW2NG).*

NO original ideas are claimed for the exciter to be described, but as it is one which has given good practical results, and enables outputs on four bands to be obtained with the use of only two crystals and two valves, it is thought that others will probably be interested.

The exciter follows current practice, and is, in fact, based on a design which is to be found in "*The 'Radio' Handbook.*" Certain alterations made have resulted in an improved performance.

The Circuit

The first valve is a twin triode, employed in a normal Jones Harmonic Oscillator circuit. The actual valve used is an American type, the 6A6, but the British equivalents—*Marconi* B30 or *Standard* 4074A—may be substituted if desired. It is also likely that the improved American version —the 6N7—would lead to slightly superior performance.

The first triode section of the 6A6 is a straightforward crystal oscillator, the output of which is used to drive the second triode section, either as a doubler, or to the higher multiple of the crystal frequency. Capacity coupling is employed, as shown in the diagram.

The second valve is another 6A6 (or 6N7), connected with the grids in series (push-pull), and with the anodes permanently in parallel, *i.e.*, a push-push doubler. Symmetrical balance of the grid circuit is essential, and is obtained by the use of a split stator condenser, the frame of which is earthed. Under these conditions neutralisation has not been found necessary. Link coupling is employed between the two valves, and the arrangements are such as to allow of the grid circuit of the P.A. being link-coupled to any one of the three tuned circuits of the exciter. When any of the latter are not in use, the high tension supply to the appropriate anode or anodes is cut off.

Bias voltage for the crystal oscillator is obtained from a cathode resistor, and, for the remaining stages, from a combination of cathode resistor and grid leak.

With a 3.5 Mc. crystal it is, therefore, possible to obtain an output on 3.5, 7, or 14 Mc., whilst, in the case of a 7 Mc. crystal, the output may be on 7, 14, or 28 Mc. There are thus available two frequencies on 7 Mc., two on 14 Mc., and one each on 3.5 Mc. and 28 Mc., giving in all six different frequencies on four amateur bands.

Band changing is a matter of moments, and the use of an exciter of this type will enable numerous experiments to be carried out with the following power amplifier and with the aerial systems used.

Construction

The chassis is constructed of five-ply wood, measures 18 ins. by 10 ins., and is supported on two runners 18 ins. long, $\frac{3}{4}$ ins. wide, and 1 in. deep. A coat of Darkaline stain makes a serviceable finish.

The four variable condensers are mounted near the front, brackets being necessary for the single condensers C5, C6, and C8; C7 is provided with a mounting base. Immediately behind each condenser is mounted the appropriate coil holder.

The first valve-holder and the crystal holder are situated at the extreme left of the chassis, the second valve-holder being mounted between L2 and L3, provision being made for this by allowing extra spacing.

The coil-holders for L1, L2 and L4 will each be of the four-pin type, two pins being utilised for the tuned winding, and two for the link winding. In the case of L3, in which a centre tap is necessary, a six-pin holder is required.

Underneath the Chassis

The principle has been adopted of confining to each stage all the currents flowing relative to that stage. At convenient points two small brass plates are secured to the wood, all the earth returns of V1 being connected to the one, and all those of V2 to the other. The two plates are then connected together, and to the common H.T.—and earth-terminal with 16 s.w.g. wire. To this important feature is attributed the excellent output and stability of the exciter.

As the valve-holders are mounted flush with the chassis, practically all the wiring can be made sub-chassis. All the small components—the chokes, by-pass condensers and resistances—are held in the wiring.

The final finish can well be left to the individual constructor. If desired, a three-ply panel, enamelled black, may be fitted, and the condenser controls brought out to dials by the use of short extension spindles. Separate meters, to read anode and grid currents of the different stages, would be a further refinement, or one meter, reading to 50 mA., may be used, and jacks wired in the respective leads mounted on the panel.

With the details given, it is thought that intending constructors will have little difficulty in building a model very similar to the original. Should any point not be clear, or should further information be required, the writer will be happy to supply it.

Arrangement of Links

At the rear of the chassis are mounted four pairs of midget insulators. One pair is connected to each of the link winding output terminals on the coil-holder, and one pair to the link going to the input circuit of the P.A. To the latter pair is connected a piece of flex of sufficient length to reach any of the other three pairs, the ends being fitted with suitable loop tags. The link terminals on the coil-holder for L3 are also fitted with a length of flex and, when the second doubler stage is in use, this length will connect to the midget insulators which terminate the L2 link winding.

The Coils

With a 3.5 Mc. crystal, the four coils required will be as follows: 3.5 Mc. Crystal Oscillator (L1); 7 Mc. doubler anode (L2), 7 Mc. doubler grid (L3),

*Member Transmitter Group (E.S.)

and 14 Mc. push-push doubler anode (L4), all being of the four-pin type, with the exception of L3, which will be wound on a six-pin former.

On 7 Mc. the C.O. coil is already available in the shape of the previous 7 Mc. doubler anode coil, *i.e.*, the previous L2 becomes L1. Similarly, the previous L4 may be pressed into service as the new L2, but care is necessary to ensure that the winding is such as to enable the 14 Mc. band to be tuned with both C6 and C8, taking into account the difference in the capacities specified. A new L3, wound on a six-pin former for 14 Mc., and a new L4, for 28 Mc., are therefore required.

The table gives exact details of the windings of each coil.

Results

The exciter has been put through extensive tests, both on the bench and on the air, and the performance has proved satisfactory in all respects.

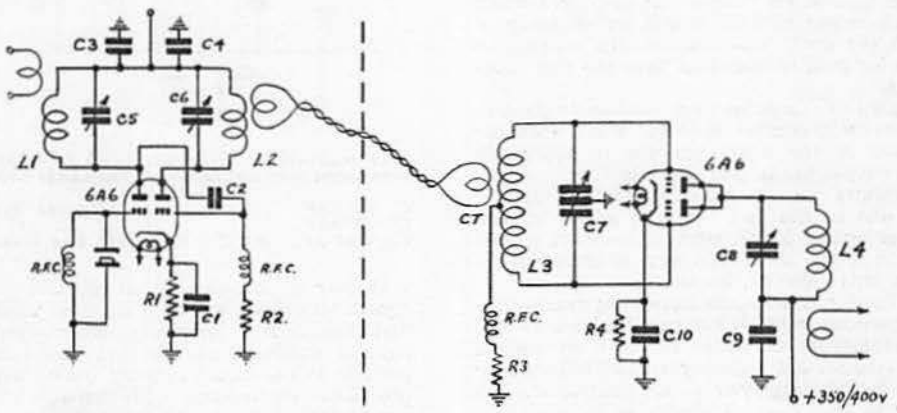
As a matter of interest, it may be mentioned that the grid current into a P.A. operated on 7 Mc. is greater when a 3.5 Mc. crystal is used (with both sections of the first valve working) than with a 7 Mc. crystal, which, of course, is as it should be. Further, there is less crystal current when the C.O. is driving the doubler section of its associated valve than when it is driving the P.A.

The output on all bands is sufficient to drive the final up to 20-25 watts.

COIL TABLE

Position	Designation.	3.5 Mc. Crystal		7.0 Mc. Crystal	
		Number of Turns	Wire Gauge	Number of Turns	Wire Gauge
CO	L1	35 Close-Wound	22 Enam.	Previous L2	—
First Doubler Anode	L2	21 Space-Wound	22 Enam.	Previous L4	—
Second Doubler Grid	L3	20 Space-Wound Centre-Tapped	22 Enam.	12 Space-Wound Centre-Tapped	22 Enam.
Second Doubler Anode	L4	7 Space-Wound	22 Enam.	4 Space-Wound	20 Enam.

Space-wound means wound in slots already cut on Radiomart (G5NI) 1½*-in. diameter 4-pin formers.*



The circuit employed in the Two-Valve Exciter Unit.

C_1, 3, 4, 9, 10, .01 μF mica: T.C.C. or Dubilier.
C_2, .0001 μF mica: T.C.C. or Dubilier.
C_5, 6, 100 μμF variable RMX: Radiomart.
C_7, 160×160 μμF variable Radiophone: Radiomart.
C_8, 40 μμF, variable RMX: Radiomart.
R_1, 4, 400 ohms, 15 watt: Premier.
R_2, 50,000 ohms, 4 watt: Premier.
R_3, 10,000 ohms, 4 watt: Premier.
RFC, 2.5 millihenry chokes: Q.C.C. or Eddystone.
Valves, two type 6A6 or 6N7 or 53: Raytheon.
Crystal and holder (open or enclosed): Q.C.C.

OTHER COMPONENTS:

Adjustable insulated brackets (3), Type 1007: Eddystone.
Extension spindles (4), Type 1008: Eddystone.
Knot dials and cursors (4), type 1026: Eddystone.
Four-pin coil bases (3): Radiomart or Eddystone.
Six-pin coil base (1): Radiomart or Eddystone.
Four-pin coil forms (threaded) (5): Radiomart or Eddystone.
Six-pin coil forms (threaded) (2): Radiomart or Eddystone.
Valveholders, large 7-pin Ceramic (2) (American): Radiomart.
Midget stand-off insulators (8): Radiomart or Eddystone.
Enamelled copper wire, 22 s.w.g., ½ lb.: Lewcos.

Some Notes on 56 Mc. Transmitters.

By N. S. Byers (G8AF) *

Several attempts were made to construct an efficient 56 Mc. crystal controlled transmitter, but no real success was obtained until a combination was built consisting of a type 47 valve as 14 Mc. C.O., RK25 as first F.D., and RK25 as second F.D. The 47 was not a good oscillator, due to the high input capacity, and to obtain the requisite drive for the first RK25 (which was used with a high grid bias) the 50 μμF coupling condenser had to be tapped on to the anode coil well towards the "hot" end. This caused the C.O. to operate sluggishly and, at times, it was difficult to induce it to oscillate at all.

The RK25 valve was found to make an extremely good doubler when used with 120 volts bias, 500 volts on the anode, and about 5 mA. grid current. Further tests showed that its performance as a quadrupler was sufficiently good to enable an output on 28 Mc. to be obtained direct with a 7 Mc. crystal. The 47 was thus taken out of service.

The L/C ratio of the first doubler tank circuit was low, but it was found desirable to make this ratio as high as possible in the second tank circuit. To attain this, series tuning was employed using the circuit shown in Fig. 1, and an efficiency of about 50 per cent. was realised, the output on 56 Mc. being greater than that from the first stage on 28 Mc.

Results up to this point were sufficiently good to show that crystal control on 56 Mc. was a workable proposition, so the next step was to apply the available output to the grid of a T20 valve. Satisfactory results were, however, difficult to obtain, possibly due to the fact that the anode voltage (440) was much lower than the recommended maximum; it was also found next to impossible to neutralise this valve on 56 Mc.

The following conclusions have been reached:—

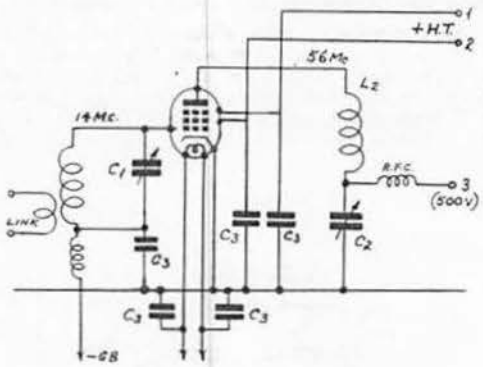
(1) A pentode valve is not suitable as a 14 Mc. C.O., therefore it is better to start off with a high impedance, low capacity triode, followed by a single RK25 employed as a quadrupler. Its efficiency in this class of service is so good that there is no need for two separate doubler stages. An output of at least two watts R.F. may be expected and if this is followed by another RK25 employed as a buffer, it is estimated that between 10 and 12 watts R.F. will be available. This is more than sufficient to drive a final amplifier employing a T20 or similar valve. Many other valves have been tried, but in every case the performance has been much inferior to the RK25.

(2) Very high L/C ratios are essential in the anode circuits of the quadrupler and power amplifier. This requirement entails very careful proportioning of the coils and condensers and difficulty may be experienced due to the following high load impedance required, but this can be overcome by careful design and experiment. Series tuning is recommended.

(3) The anode voltage applied to the final stage should be as high as possible and the grid bias should be at least three times "cut-off," with a consequent high value of drive.

(4) Only components of the very best type will be found satisfactory, and great care must be taken to see that all soldered joints are strongly made, with no possibility of "dryness." All trace of flux must be removed.

(5) Due to the considerable falling off in efficiency, experiments with grid bias and suppressor grid modulation proved abortive. Anode modulation appears to be the only satisfactory method to adopt for telephony.



This quadrupling circuit used with an RK25 valve has been found very satisfactory. The anode circuit utilises series tuning.

C_1	40 μμF.	L_1	10 turns 2 in. dia.
C_2	25 μμF.	L_2	7 " 1¼ "
C_3	.002 μF.	R.F.C.	Type 1011 Eddystone.

It may be considered that the use of a 14 Mc. crystal was risky, but as it is by no means easy to find the correct frequency when using several doubler stages, it was decided to get as near as possible to the final frequency before the doubling processes commenced. No trouble has been experienced with the 14 Mc. crystal.

Most of the experimental work at this station has been carried out on artificial aerial. The situation is in a low lying district and is more or less surrounded by buildings containing much steel, so that, with the interference experienced on the receiving side from several local high power stations, it has been difficult to do much practical work over any considerable distance. These experiments were the most interesting so far carried out on any band.

Trade Notice

The 1939 edition of the Raymart Catalogue is now available, price 1½d. post free, from 44, Holloway Head, Birmingham, 1. Within its 16 pages appear a description of the many useful components marketed by *Raymart*.

In addition to listing several new lines, price reductions are given on many current items.

* *Member Transmitter Group (E.S.).*

Improving the Performance of Short Aerials

By M. J. Heavyside, B.Sc.(Hons.), (G2QM)

THE writer, having read that when directional aerials are employed for the higher frequencies, the ends can be bent at right angles without much loss of efficiency, decided to carry out experimental work to further this idea. It has also been stated that the centre portion of a half-wave aerial radiates better than the ends and that the radiation is proportional to the current in any part of the aerial. If a relatively short wire (which normally would radiate only at a portion of the high voltage end of the aerial) could be moved to the centre portion of maximum current, the radiation should increase as shown in the table. It can also be assumed that, as the aerial picks up untuned interference in proportion to its length, the signal-to-noise ratio will be much improved.

Practical Experiments

Tests were first carried out on 1.7 Mc., because comparatively short aerials give better gain, as will be seen by reference to the Table. A wire

Fraction of Wave-length	Length in feet for 1.7 Mc.	Radiation		Times gain
		At end	At centre	
1/72	7	.19	4.4	23.0
1/36	15	.75	8.7	11.5
1/24	22	1.7	12.8	7.5
1/18	30	3.0	17.4	5.8
1/12	44	6.7	25.9	3.9
1/8	66	14.6	38.0	2.6
1/4	132	50.0	70.7	1.4
1/2	264	100.0	100.0	1.0

30 feet in length was erected in a room on the ground floor and coupled to the transmitter by means of a Collins Coupler. A flash lamp bulb was placed in series with the coupler and the aerial for the purpose of noting comparative radiation, while the other end of the aerial was terminated at a coil holder so that loading could be effected by means of plug-in coils.

Tests were then carried out using this aerial. No difference in the brightness of the lamp was noticed when various loading coils were added, and no increase in signal strength was reported by stations which co-operated in the tests. It was next decided to transfer the gear to a room situated two stories above ground level. Here a 15-ft. length of 14 s.w.g. enamelled wire was slung up inside the room and a receiver connected up on the assumption that improvement in reception would show improvement in transmission.

Loading was again added (this time non-inductive) consisting of 120 ft. of 18 s.w.g., d.c.c. wire, wound in a zig-zag fashion on nails spaced six inches apart, driven into two beams situated five feet apart. Provision was made for disconnecting the loading coil at will by means of a plug and socket; an arrangement which also permitted a lamp to be inserted when desired. Reception results were so good that the loaded aerial was joined to the transmitter by the Collins Coupler and tests commenced. The first station worked was G5TN—Weston-super-Mare, Somerset (a distance of 175 miles), using an input of 7 watts.

Some of the other stations worked are mentioned below with their distance in miles from the writer's station.

F8RJ (400), G5UM (158), G8ML (133), G8TR (45), G8NF (29), G5XF (20), G5UA (20), G8SJ (11), G2WSP (44), G2HWP (29), G6GX (29), G3HS (45), GW5TC (92), etc., etc. In addition over seventy others were received, including stations in GI, GM and GW, which points to the fact the aerial is not very directional. Tests carried out with the added loading in circuit gave increases in reports from 1½ to 3 S points. It will, of course, be understood that retuning was carried out on each occasion when the loading was added or removed. Using the receiver on this aerial, increases of from 3 to 5 S points were noted.

Two local stations G6KU and G8CB have carried out tests with similar aerials, and both have reported gains in signal strength on transmission and also greater increases in the strength of received signals. Tests have also been carried out with a field strength indicator. When the indicator was used end-on to the aerial the reading was not increased by loading, but when used broadside-on, the reading rose from .2 milli-amp unloaded to .5 milli-amp. when loaded as described. When the 100-ft. outside aerial was compared with the loaded aerial, the signal-to-noise ratio of the 15-ft. loaded indoor aerial was found to be so much better that it is now being used in preference to the outdoor one.

The loaded aerial was then tested on 3,750 kc., the loading being halved, 60 feet only being added, and as before, matched up with a Collins Coupler. Results on this band were found to be just as good, especially as regards reception.

Suggestions

The writer suggests as a field for further experimental work, that an aerial which is less than half wave should be used and loaded non-inductively with loading wound on a wooden frame, of sufficient length to make the distance from the centre of the aerial to the end of the loading a quarter-wave on the band in use, the wire to be spaced not less than four inches. The wire should be so arranged that a portion can easily be disconnected so that work on other bands may be carried out.

Our Polite Post Office

During Christmas week G2NJ, of Peterborough, received a listener's report from an ex-Naval telegraphist residing in London. The report was on a postcard addressed to W/T Station, Call-letters G2NJ, c/o G.P.O., London. In spite of this meagre information, the card reached the addressee promptly, being contained in an O.H.M.S. envelope which bore G2NJ's full address. This demonstrates once again the helpful spirit of the Post Office towards Amateur Radio.

Workshop Practice

PART 3.—ALUMINIUM CHASSIS WORK

By "Shack"

IN the good old days when wood baseboards and ebonite panels were the fashion, construction was a simple matter, but with the modern all-metal vogue many amateurs have been compelled either to buy their chassis ready-made or else make the best of wood. Now for a production job the manufacturer uses plated steel but this material is hardly suitable for home construction because all the holes are punched and the edges bent with big power presses. Fortunately, aluminium can be worked fairly easily and is by far the most suitable material for our use. As a conductor it ranks second to copper, it is relatively cheap and is not likely to crack when bent; further, it can be cut, drilled and bent easily.

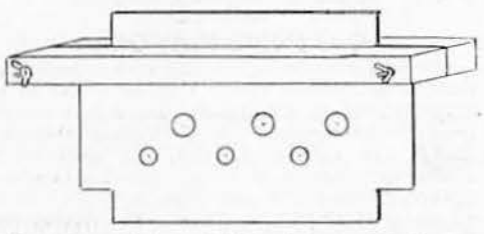
Box-type Construction

A box-type chassis can be cut out of one single sheet and bent, or the sides can be cut separate from the deck and joined with $\frac{3}{8}$-in. by $\frac{1}{16}$-in. angle brass and 6 B.A. screws. The former method is quicker, cheaper and easier, but it is not possible to get square edges where the metal is bent, not that this is any disadvantage. Fixing the sides with angle brass is a wearisome business but for a first-class job there is nothing to beat it.

For chassis up to 18 ins. square, which is large enough for most purposes, $\frac{1}{16}$-in. sheet aluminium is the best thickness to use. If there are any screening partitions these can be made from 20 S.W.G. sheet to save weight and expense, but if there are no screening partitions it is often advisable to fit a strengthening rib in a large chassis.

Front panels can also be cut from $\frac{1}{16}$-in. sheet, but they look much better if they are $\frac{1}{8}$ in. thick. Do not attempt to bend a long side in a vice, or the result will show all too plainly that it has been bent a bit at a time. Two pieces of hardwood (oak, beech, walnut or hard mahogany), 3 ins. by 2 ins. and 6 ins. longer than the total length of the unbent sheet make excellent clamps for bending. The wood should be planed straight and square on all edges and the panel clamped between them, using a $\frac{3}{8}$-in. Whitworth bolt at either end. Ordinary carriage bolts with wing nuts and washers are ideal since the square under the head prevents the heads from turning. Prior to drilling the holes for these bolts make sure that the top faces of the two pieces of wood are flush.

Before attempting to bend the chassis it should be marked out and all the larger holes drilled, as it is not always easy to cut large holes after bending; furthermore, it is frequently possible to fit an extra clamping bolt through one or more of the chassis holes. If this is not possible, then a stiff clamp must be fixed across the centre to keep the two hardwood battens up to the aluminium.



Aluminium Chassis, drilled and clamped for bending. Not to scale.

Bending the first two sides is easy, but considerable ingenuity has frequently to be exercised in order to bend the remaining two sides. Cut two more pieces of hardwood the length of the last two sides to be bent and clamp these through two holes in the chassis. If no holes, or only one are available then the hardwood pieces will have to be gripped in a stout vice. The best tool for bending is a rubber hammer, since it will leave no marks, although an ordinary steel hammer can be used, provided the face is not marked and great care is taken to see that all blows are struck true. The marks left by a steel hammer can be considerably reduced afterwards, but this demands some skill. Having clamped the aluminium sheet tightly at the line where it is to be bent, start by bending the flap all along through an angle of about 20°. Carry on bending it a little at a time until it is square with the deck, using light blows of the hammer. A little at a time and light blows are the golden rule for a good job.

Working Aluminium

When drilling, tapping, sawing or filing aluminium always use turpentine as a lubricant since, if any attempt is made to work it dry, the swarf will clog the tool, causing drills and taps to break in the work. Engineering text books suggest rubbing the file with a block of chalk to prevent the filings from adhering, but lubricating the file with turpentine works better. The filings can be brushed out of the teeth with ease, whilst if a dead smooth file is used the finish will be like glass. For small holes up to $\frac{3}{8}$-in. or even $\frac{1}{2}$-in. diameter, ordinary twist drills can be used but a small pilot hole of about $\frac{1}{8}$ in. should always be drilled first, otherwise the large drill is liable to wander. Holes from $\frac{3}{8}$ in. to $1\frac{1}{2}$ ins. can be cut with an ordinary old-fashioned type of joiner's centre bit. This is rather hard on the bit but as they only cost about 6d. or 9d. each and can be sharpened with a file, it is of little consequence.

Very large holes for meters and dials are best cut with a fretsaw and metal cutting blade; even an ordinary wood fret-saw blade will cut aluminium, but the teeth are rather too widely spaced. A tank cutter is another useful tool for cutting meter holes, but the $\frac{1}{4}$-in. twist drill centre should be replaced with a short length of steel rod, otherwise the flutes of the drill are liable to open out the centre hole, causing the cutter to wander.

Use a wood chisel to remove the spew from the underside of a drilled hole, taking care that the back of the tool is kept flat against the panel, otherwise the corner of the chisel will leave a deep, ugly scratch.

When cleaning a hole inside a chassis the bevel of the chisel will have to be kept flat against the chassis. This treatment is rather rough on a good tool but a cheap chisel costing about sixpence can be bought and kept for the job. Select a chisel with a flat back, otherwise it will have to be ground down on an oil stone and this is a long, tedious job. Small, inaccessible holes can be cleaned with a larger-sized drill, which is better than a countersink bit since it cuts the spew away instead of bending it down, as the countersink has a tendency to do. Never leave the spew in any hole through which a wire will pass. It is advisable to bush all such holes with an ebonite bush or rubber grommet.

Patching

Patching unnecessary holes in aluminium is somewhat of a problem. Recently, by accident, the writer cut a valveholder hole 2 ins. out of position and as it could not be covered by any components it had to be patched. A piece of scrap aluminium was cut and filed to fit tightly into the hole and the cracks were then filled with cold solder. The mistake was not discovered until most of the components were in position, otherwise hot aluminium solder would have been used to fill the cracks. The patch can be seen but it is not too prominent.

As a matter of interest some aluminium solder was made and tried on a piece of scrap. The formula suggested is 6 parts tin, 5 parts lead, 4 parts aluminium, 1 part zinc. Melt the tin and lead first, add the aluminium and follow with the zinc. Mix thoroughly and run into a mould. As tin is not an easy metal to obtain, it was decided to use ordinary resin-cored solder for the tin and lead since this solder usually contains about equal proportions of each. The solder was melted together in a tin lid over a gas flame and run onto a board to cool. A trial with this solder showed that it would have been suite suitable for filling up holes, although its mechanical strength could only be classed as poor. It is recommended that no flux be used with this solder. The melting point is relatively high, being near that of sheet aluminium, so that either a gas flame or blow lamp has to be used, an ordinary soldering iron not giving sufficient heat.

Finishing and Polishing

As supplied, sheet aluminium has a highly polished surface, but it is almost impossible to obtain it without scratches. Further, this polished surface is very easily marked so that it is hardly suitable for a finished panel. Matt finished aluminium has a beautiful appearance and it is nothing short of a crime to paint it. The commercial way of producing the matt surface is to dip the panel in a hot strong solution of caustic soda, but as this method necessitates a large vat or bath it is rarely possible for home use.

The wavy lines, or what is called " watering," often seen on an exhibition motor-car chassis, are produced with a flat scraper, but it requires considerable skill to attain the necessary wrist action. A mechanical method evolved by the writer for obtaining the matt appearance of the caustic soda treatment makes use of a stiff wire scratch brush revolving in a jeweller's polishing head. The panel is held up to the rotating brush and moved quickly backwards and forwards until the surface skin on the aluminium is scratched away. The brush must be kept rotating in the same direction and great care must be taken when working near the edges of the panel otherwise the brush will throw the panel across the room.

When the panel has been evenly scratched all over it should be painted with a thin coat of transparent cellulose lacquer and all the surplus lacquer wiped away with a cloth, well moistened with a mixture of amyl acetate and acetone. This apparently removes the lacquer but actually a very thin film is left which is quite sufficient to prevent the panel from marking. It also smooths down the roughness and washes away the aluminium dust.

The polishing head, which was bought complete with grinding wheel, 5-in. circular saw, saw bench, 0 to $\frac{3}{8}$-in. chuck, wire scratch brush, polishing mop and buff cost less than 20s. It is mounted on an old sewing machine treadle and has proved one of the most useful tools in the writer's workshop. The circular saw will cut $\frac{1}{16}$-in. sheet aluminium, ebonite, bakelite and wood up to $\frac{1}{2}$-in. thick quicker than they can be cut by hand, besides which the sawn edge is cleaner, requiring less filing. Some further attachments have been made, notably a disc grinder for finishing off small metal, wood and ebonite pieces. The disc is made from a piece of $\frac{1}{4}$-in. thick ply-wood 10 ins. diameter, with a sheet of coarse glasspaper glued on one side and a sheet of emery cloth on the other. The plywood disc was first cut out with a fret-saw and finally turned up on the polishing head. Metal bushes, spindles, etc., can be turned in the drill chuck, using the triangular scraper previously described, or a file, as the tool. With a little ingenuity much work can be accomplished with this simple tool, coil winding being easy.

The Wireless World Diary

An old friend comes once again to greet us at the commencement of a New Year. In its familiar red cloth cover " The Wireless World Diary " has become one of the " institutions " of the radio world.

From the point of view of the amateur the valve data information will be found of the greatest value, giving as it does the base and socket arrangements for British and American valves. Abacs and charts are included, together with several pages of useful formulæ. The amateur wave bands and a list of international prefixes are given as well as the RST Code, Q Code and Morse Code. We should prefer the British frequency allocations to be shown in future editions, as this information is often required to settle arguments at local meetings!

The comprehensive list of short wave stations of the world, an important feature of this diary, has been brought up to date and now occupies 11 pages. A wattage table and numerous wire tables are also included.

Practical hints and tips and a dozen typical receiver circuits will repay examination.

The diary section proper gives a week per double page.

This very useful pocket compendium, which costs but 1s. 6d., is obtainable from all stationers and booksellers.

F.O.C. Notes

By R. WEBSTER (G5BW)

We wish to draw the attention of readers to the misuse of what, for want of a better term, we shall describe as "dual call-signs." There are various circumstances under which these are heard, and most amateurs will be familiar with them. Perhaps the most common occurs when G1AA visits his friend G1BB, and the latter invites his visitor to take the key. The result is often a Test call something like this: "Test test test de G1AA/G1BB, etc." Another example is often noticed in three-way QSOs, when the following may be heard: "G1XX de G1YY/G1ZZ, etc." The two instances quoted will suffice to indicate what is meant, but no doubt readers will recall other examples. Actually, the use of such "dual call-signs" is regarded by the G.P.O. as a breach of regulations, and for the information of all concerned we quote their ruling on the matter: "In no circumstances must a call-sign other than that of the calling station be used after the word 'de.'"

There is a regrettable lack of uniformity in the matter of abbreviations, and we welcome any move to standardise those used in amateur procedure. Many amateurs apparently devise their own as they go along—often to the bewilderment of the man at the other end—while others use the same abbreviation for different meanings. As a first step it might be useful if everybody studied the list of official abbreviations published in the *Handbook for W/T Operators*, obtainable from H.M. Stationery Office. At present one frequently has to decide the meaning of an abbreviation from the context, and if a message is not being copied solid this is difficult—"WD" may be "word" or "would," "WL" may be "will" or "well," etc. Such abbreviations as TX and RX, in line with WX and DX, have apparently come to stay, but would the following take on as easily?:—CX for Conditions, AX for Aerial, RMX for Remarks, etc., TXN for Transmission and RXN for Reception. They strike us as both useful and logical, but we deprecate such horrors as BCINU.

From time to time Service operators write in asking for an explanation of Amateur Code procedure. Usually they want it explained "just briefly." It is the absence of any hard and fast official procedure for amateur operating that makes the work of F.O.C. so difficult. Too much is taken for granted instead of being based on an official manual on the subject. In our opinion the use of the *Handbook for W/T Operators* in this connection is strictly limited, for while the information contained therein is official, it must be remembered that it is intended primarily for Marine Operators. As things stand at present good amateur operating is largely a matter of good code work, commonsense, brevity, and the full and correct use of those official signals and abbreviations which are applicable to our work. For the information of prospective members, the foregoing are the points on which the F.O.C. Committee form their opinion of an applicant's ability.

New members elected during the month are: G5TR, G2FT, G5JI, G2QY, and G6HB, bringing up the total membership to 55.

Please address all correspondence to: Radio G5BW, Willingdon, Eastbourne.

A New Form of Radio Interference

By G. OPENSHAW (BRS3008).

A NEW source of interference has become evident as a result of progress in receiving technique and the common practice of grouping many high-power radio transmitters.

The phenomenon appears to be coincident with simultaneous emission from certain pairs of high-power transmitters whose geographical separation happens to be of a certain value.

Stations which have been observed to generate this interference are, for example, the two B.B.C. stations at Brookman's Park. Two Polish stations are also known to give rise to this effect, but it has been ascertained that these stations are separated by about 15 kilometres.

The above pairs of stations appear to give rise to radiation on frequencies according to the sum and difference of their respective frequencies, e.g., the London National and Regional stations have been found to react as follows:—

London National = 1,149 kc.
Regional = 877 kc.

1,149 + 877 = 2,026 kc.
1,149 − 877 = 272 kc.

It has been noticed that spurious emissions do occur on 2,026 kc. and 272 kc., thus it seems fairly certain that these two stations are the offenders.

In addition, if the field strength of the spurious emission is great enough, further cases of sum and difference (by interaction with a third station) produce another "family" of spurious emissions.

GBV (78 kc.) has been heard on frequencies of 2,104, 1,948 and 350 kc. when the two stations at Brookman's Park are operative.

2,104 = 78 + 2,026 kc.
1,948 = 2,026 − 78 kc.
350 = 78 + 272 kc.

The further frequencies on which emissions might be expected have not yet been noted.

Several other powerful long-wave stations have been observed to be modulated by spurious frequencies of 272 and 2,026 kc.

American operators have reported that reception of TYE (18,090 kc.) has been interfered with by GAW (18,200 kc.), and GAS (18,310 kc.), but the products in this case appear to be a straightforward case of inter-modulation of $2a - b$.

2(18,200) − 18,310 = 18,090 kc.

In the same category is the identification of GBR (16 kc.) from London Regional.

2(877) + 16 = 1,770 kc.

No doubt many listeners on the 160-metre band have noticed the presence of this signal.

With the high degree of selectivity which can be reached with modern receivers, evidence so far accumulated seems to point to the fact that the cause is external to the receiver.

It might be that cross-modulation takes place in their common earthing systems—several cases of cross-modulation effects due to rectification in imperfect conductors have been brought to light, but these have only occurred in localities *near* to powerful twin transmitters.

Thus this trouble may not be directly related to the phenomenon in question.

Soliloquies from the Shack

By Uncle Tom

(Our tame deep-sea angler, having caught quite a few of the lesser sprats on last month's hook, seems to be going out for the larger mackerel this time. All offers of chips will be gratefully accepted.)

HAPPY New Year, nephews and nieces! May your Sunday mornings on the air be even more pleasant in 1939—and how can they help it, with about 500 more G's on the air than there were at the beginning of 1938? Were this supposed to be a technical article I would give you details of some of my own patent devices for eliminating QRM, but they are a little highbrow for a mere collection of amateurs and I shall have to keep them for the next meeting of the Royal Society.

Who shall we shy at this month? There are so many tempting targets that I don't feel like taking a definite aim, but I can launch one or two stray darts that may come to rest in a few tender spots, and if you like 'em—well, keep 'em!

I had in my shack a few nights ago a very, very old timer with a beard nearly as long as my own. I remember him when he was a nice little lad of 16 who had just got his full licence and increased his height two inches in one night in consequence; but now he's just a bleary-eyed, disillusioned old codfish like myself. However, he let drop a few pearls and I'm going to cast them before you—er—gentlemen.

We listened to a few QSO's and then we went on the air ourselves. After listening to all the nobility doing their local dags about the arrival of QSL cards from the Solomon Islands, the Lesser Antilles and their proud boasts about being the first station to carry out experimental work with Lower Puddle-in-the-Marsh, we thought a few ordinary wet-nosed QSO's with the common or garden 10-watters would do us good, so we went ahead.

My friend has lost touch with those things and he said: "Why do you have to strain your ears through terrific QRM to hear the other chap send 'Well, QRU now O.M., so vy 73, hope cuagn, tnx for the QSO, cuagn, 73, QRU, GN, AR,' when you know all the time that he's going to send just that? And why do you have to start up by saying 'GE OM sure glad to QSO, tnx for rept,' when *he* knows that's exactly what you are going to say?"

At this I blushed. I said: "It would not be polite to QSO anyone without saying all of these things. It is not DONE." To which my friend replied that a lightning calculation had shown him that if all that collection of trimmings were cut out, the QRM would be lessened by some 12½ per cent. and there would be room for 165.3 more G4's on the band.

Seeing my horrified expression, he slunk quietly in a corner and evolved a masterful scheme which I now retail to you gratis. He produced a code by which all these things may be said by the use of one single figure. Knowing the amateur's liking for using codes which save much time, such as saying "Q R Madagascar" instead of "jamming," and "Q Esses Baltimore" instead of "fading," I joined up with him on the idea and we now present (proudly) the following Platitude Code, hereinafter known as the P Code.

P1: GM (or GA, GE, it doesn't matter) O.M., tnx for call, glad to QSO, your sigs RST 579.

P2: Gercher, you big stiff, what the heck do you want to call me for? I want a Yank or no one. Anyway, I don't like the colour of your card.

P3: (For phone only.) GM OM. your phone is fb, BBC quality, fully modulated, S9 but please repeat your call-sign as there was some slight Q R Madagascar on you that time.

P4: GM O.M. I suppose I've got to work you but you sound as if you're only using a 6L6 and a carbon mike. You know I only like to work 100-watt stations with Oxford accents, so cut it short and let me get on with it.

P5: Well, O.M., I have enjoyed this QSO (or what I've heard of it) and I hope to cuagn, so QRU 73 GN tnx vy much 73 QRU GN tnx —...— (thinking) QRU GN VA.

P6: (For the truthful only.) Well, thank goodness I've made enough small talk to say QRU to you now without seeming too rude. Don't bother to call me again, I shan't hear you, anyway. QSL if you like, but you'll be lucky if you get one back. Just come back with your final, but I shall have switched off, anyway, or else I'll be calling Test again.

P7: (Complete QSO for time-savers.) GM OM ur Rst 579 fb Pse QSL, QRU GB, cuagn (perhaps).

P8: Same as above, but report is 589.

P9: Same as above, but report is 599.

Let's see some intelligent use made of this new P Code and let's have a good batch of members of the P Club next month. Apply to Uncle Tom, c/o R.S.G.B., and you'll receive a nice certificate or something. Think of the advantage to yourself! When you get the knack of using P7, P8 and P9 nice and snappily, you'll be able to cram more and more QSO's into every hour.

I will publish supplementary lists from time to time, with such time-savers as "P 2147—I have just sent a New Zealand stamp to Pitcairn Island and I bet my card comes before yours does," and "P 3194—I had a card from W6XXX this morning giving me S8, and I bet you only got S7." But these, of course, are specialised numbers, needing a lot of skill in their use and applying only to those members who have done many years of experimental work with the QSL and Research Section.

For your own benefit I suggest "P 999—Why the Heck doesn't somebody put Uncle Tom out of his misery?" And if someone doesn't shoot that at me during a QSO this month I shall be surprised and disappointed.

Good-bye, readers—both of you, if you are still with me. See you (if I *can* see you) next month.

Fifteen Years Ago

By "REMINISCENCES"

A long time ago, at least it seems a long time in radio history, a journal known as *Experimental Wireless* was first published by *Messrs. Percival Marshall & Co.* Amongst the current periodicals of that time this magazine ranked high with every serious experimenter, afterwards finding a permanent place upon his bookshelves. In spite of the great advancement which has taken place in the science of radio since then, these early volumes contain much interesting data, and for many of us bring back happy recollections of past days.

Among the contributors, who will always be remembered, were: F. L. Hogg, E. H. Robinson, E. J. Simmonds, O. F. Brown, H. N. Ryan, W. E. F. Corsham, P. R. Coursey, G. L. Morrow, M. G. Scroggie, S. K. Lewer and Dr. R. L. Smith-Rose.

In Vol. 1, No. 1, Mr. Robinson describes the use of the "Osglim" Neon Lamp for various wireless purposes. This type of lamp is still in use at many transmitting stations as an R.F. indicating device. Mr. Hogg, G2SH, in the same number describes a new receiver circuit for 200 metres which is guaranteed to cut out interference from the local broadcasting station! This article would remind many amateurs of the early single-valve receivers using a bright emitter "R" valve, the latter costing £2 10s. apiece!

An article on "Efficient Transmission," also by Mr. Hogg, tells us how to obtain 1 amp. in the aerial with an input of 10 watts. No mention is made of current nodes or antinodes. In those days an aerial was looked upon as a pure resistance and anything over 5 ohms was considered excessive for 200 metre working.

In the next issue we read the first instalment of "The Month's DX," by Hugh N. Ryan, G5BV, a very active amateur of those days, who was at one time reputed to have blown-up the street transformer which supplied A.C. to his locality. Such calls as 2SZ, 5NN, 2JF, and 2KW are mentioned, as well as French stations 8AB, 8AE, 8AQ and 8AW, all of whom will be remembered as early participants in trans-Atlantic tests. Incidentally, there were no International Prefixes for amateurs in those days.

An interesting paragraph from "London's Experimental Ether," by "The Critic," read as follows:—

"Possibly the best example of what a real experimenter can do is 2OS. His signals are not overstrong, as he is 25 miles out, but I heard him say that his transmitter was putting 0.02 amp. into the aerial when he was not speaking, and 0.8 amp. on speech. This in itself is excellent 'quiescent aerial' work, and more especially when the fine speech quality is noticed, but his transmitting valves cost 3s. 6d. each—he uses ordinary 'Osglim' neon tubes throughout! This is surely an achievement. 2OD and 2OS some times work excellent duplex also; the speech of the former station is of marvellous quality and purity. His C.W. also seems to pierce a long way—he can be heard working 8AB of Nice, over 600 miles away, quite often."

The first radio station description, that of 2TA, is given in the same issue with two fine photographs showing the type of apparatus in use at that time. Two wires passing through the cork of a medicine bottle and dipping into a weakly acidulated water formed the conventional grid leak while a receiving condenser with its plates immersed in lubricating oil, was used for tuning the transmitter anode coil. Mr. H. Andrewes, the owner of this station, had achieved a high degree of efficiency with his apparatus, although not quite equal to Mr. Hogg, as he was only able to radiate 0.9 of an amp. with 10 watts input.

In the December, 1923, issue, Part 1 of an interesting article by Dr. R. L. Smith-Rose on "Directive Radio Telegraphy and Telephony" appeared, while Mr. E. H. Robinson described "H.T. Electrolytic Rectifiers." Rectifying valves were very expensive at this period and in many cases were not sufficiently robust to withstand amateur demands. The electrolytic rectifier, consisting of a strip of lead and another of aluminium, immersed in a solution of ammonium or sodium phosphate, was very popular and the writer used as many as 36 of these cells for the production of an H.T. supply. The sight of one of these banks of rectifiers operating in a darkened room was most fascinating; the myriads of bright scintillations on the surface of the aluminium, which also showed a faint phosphorescent background, will be ever remembered. These rectifiers, owing to their inherent capacity of several microfarads, needed little smoothing; this was a big advantage at a time when high voltage condensers were very expensive.

In the January, 1924, issue, appears the following interesting statement:—

"December, 1923, will always stand out as one of the stepping stones in the history not only of amateur experimental work, but of wireless progress in general. During the latter weeks some of the most remarkable transmissions ever recorded have been conducted. It is only within the last few years that the problem of long-distance transmission has been approached from an entirely different view-point. Formerly, the tendency has been to erect gigantic stations using power of the order of some 50 kilowatts or more, and to operate these stations on extremely long wavelengths. Recent events, however, seem to indicate that this system is now open to considerable rivalry, and its continuance will probably be a matter of some debate. Progress in short-wave transmission during the last few years has led up to a number of experiments on trans-Atlantic telegraphy using a directed beam with an input power of the order of one kilowatt. The success of these experiments has created considerable interest, but this accomplishment seems almost insignificant in light of the recent amateur performances.

"Mr. E. J. Simmonds, a regular contributor to *Experimental Wireless*, and one of the leading private experimenters in the country, has created what is surely a world's record in establishing

two-way communication with a Mr. Dodman, of Summit, U.S.A., using a power of approximately 30 watts. The communication was conducted without the slightest difficulty, and it is not regarded in any sense as a fresk performance. Previous to this accomplishment, we have news of Mr. Partridge and Mr. Hogg getting in touch with several American and Canadian stations on powers of approximately 100 watts. The workings were not confined to one or two short periods on one particular day, but were repeated on several occasions. There are two important deductions to be drawn from these events. It is clearly evident that the possibilities of short-wave low-power transmissions are not yet fully realised, and are not likely to be so, until further investigation has taken place, and, perhaps, it is not rash to suggest in the very near future, the shorter waves will be of greater use than the longer waves. What is more important, however, from the amateur point of view, is that these remarkable transmissions are *prima facie* evidence of the value of private experimental work, and should serve to strengthen materially the amateur's position and his relationship with the authorities. While we are strictly opposed to the issue of transmitting licences to all who may care to apply for them, it is sincerely to be hoped that the genuine experimenter will be given greater facilities for further investigations. It is very gratifying to learn that many transmitting licences are more than justifying their claims for a permit by doing such excellent work and the fact that each year's performance excels that of the previous year is a clear proof, not only of their capabilities, but of the value of their investigations."

How true the above statement has become regarding the rivalry between long and short waves! The frequency spectrum below 3 Mc. was as silent as the grave, prior to these first trans-Atlantic contacts. To-day, so valuable are these frequencies, that even the small allocations which the amateurs hold, are in danger of encroachment by commercial interests.

Poor Conditions and Why

By PHILIP MALVERN (G8DA). *

IN general there are three reasons for a depression in signal intensities. These are :—

(1) Atmospheric pressure.
(2) Bright eruptions on the sun.
(3) Eruptions on the sun causing magnetic storms and displays of aurora on the earth.

Naturally different agents are responsible for altering conditions on the various amateur bands. The frequencies on which signals are most constant are 56 Mc. and 1.7 and 3.5 Mc. Propagation on each of these bands is usually by ground wave, though transmission beyond the skip distance is possible on 1.7 and 3.5 Mc. by reflection from the Kennelly-Heaviside and possibly Appleton layers. Communication on 56 Mc. over long distances is brought about by reflection from certain atmospheric layers or a layer whose normal ionic density is greatly increased by intense solar radiation. The remaining amateur bands will be dealt with as each phenomena is studied.

Atmospheric Pressure

The atmospheric pressure gradient, *i.e.*, relative closeness of the isobars, has considerable effect on transmission over medium distances, particularly on 7 Mc. Changes of pressure along a certain path seem to cause variations in the height of the Appleton or F layers which bring about poor radio conditions or bad fading over this route, but not necessarily over any other. Thus reliable communication is not affected in all directions, but only over routes where there is a high atmospheric pressure gradient. As an example, it is frequently found that contacts on 7 Mc. with LA and SM are good when the isobars run along a line from the home station to Norway and Sweden.

Bright Eruptions

J. H. Dellinger, of the National Bureau of Standards at Washington, U.S.A., has explained that a complete wipe-out of radio conditions may occur after intense and sudden hydrogen eruptions on the sun, and attempts have been made to place a 54-day periodicity on this Dellinger effect.

Bright eruptions occur on all parts of the sun's disc and produce a fade-out within a few minutes, but every eruption does not cause a fade-out. A very great increase in the radiation of ultra-violet light occurs, and there is sudden and intense ionization in or below the E layer and the F2 layer rises rapidly.

Signals from 7 to 21 Mc. may be heard with normal audibility when they will suddenly fade and in a few seconds be completely inaudible. Sometimes there is an increase in the noise level or hissing just before the fade-out. The eruption is preceded by reflection of waves on very high frequencies up to 40 Mc., and also very short skip on 14 and 28 Mc., and owing to the great ionic density near the E layer there follows absorption of all but the very shortest waves. At the same time, owing to thermal agitation of the molecules, the F2 layer attains an enormous temperature which brings about a great expansion and subsequent rise to an abnormal height.

The drop in signal strength is sensibly simultaneous over all routes affected, but is only observed on those waves that traverse a daylight path. Thus if the fade occurs near mid-day all routes will be affected ; if near sunset there will be a fade on signals from the West, and if near sunrise on signals from the East. The highest frequency signals are usually less affected by the fade both as regards degree and time, so that 14 Mc. is less affected and recovers more quickly than 7 Mc. The excessive attenuation may last for as much as 45 minutes and is followed by gradual recovery.

Magnetic Storms and Aurora Displays

Magnetic storms and displays of aurora are closely related, as they are both caused by the same

* *Member Propagation (Magnetic) Group E.S.*

influence on the sun. There is some doubt as to the agent responsible, but corpuscular emission from the sun is probably the disturbing influence. Magnetic storms frequently follow the Central Meridian passage of a large sunspot by a time interval of one day, but they are not necessarily caused by sunspot activity, as the central transit of a large spot sometimes gives no noticeable magnetic disturbance.

Prominences on the sun will exist for months, and when they erupt, jets of gaseous matter leave the sun's surface. If a jet encounters the earth an aurora will be seen and a magnetic storm will occur. Sunspots occur only within about 35 degrees each side of the sun's equator, but prominences appear at any latitude. Magnetic storms do tend to recur in accordance with the rotation of the sun, but the number of recurrences is in inverse ratio to the size of the storm. Thus storms of low magnetic intensity are likely to recur after about 27 and 54 days, but great storms seldom recur.

These storms occur during both day and night, and are more frequent at times of sunspot maximum than minimum. They start with remarkable suddenness, and when they are accompanied by an aurora, the electric current in the auroral zone, 60 miles above the earth, may reach an intensity of 1 million amperes. Auroras are accompanied by rapid, high-speed fading and a wipe-out on 28 Mc. During magnetic storms signal intensities are depressed, and the vertical component of the earth's magnetic field is most changed at these times. Night conditions prevail so that there is increased virtual height of the reflecting layers, giving lower critical and usable frequencies.

South American signals are often very strong before and during magnetic storms, so that this is the time for a British station to look for PY or LU for his WAC! These storms are accompanied by very poor transatlantic conditions, with an absence of U.S.A. and other westerly signals on 14 Mc. in the evening hours. The Dellinger effect is more marked at noon and in low latitudes, but magnetic storms are greatest around higher latitudes with a probable maximum at 70 degrees.

VK, ZL and similar DX signals are reflected more than once from the upper layers so that the reasons for poor conditions from these areas are more complex. Contrary to the usual belief, K6 and K7 signals are often heard when there is a slight magnetic disturbance. However, it will be seen that work and confirmation is still necessary in this field, so that existing and prospective members of RES will find much to occupy their minds.

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Can We Predict Sunspots?

By S. W. Allcorn (2FIH). *

WHEN is the next sunspot maximum due? If the answer were as easy as adding eleven years (the average length of the solar cycle) to the date of the last maximum, all would be well. For on this basis the next sunspot maximum would be in 1939. There are good reasons, however, for believing that this is not the best prediction. If we examine the records for the last 180 years of sunspots, it will be found that there have been sixteen completed cycles since the well-determined minimum of 1755. The average length of time from one sunspot maximum to the next over this period is 11.13 years. It is a surprise, and a little disconcerting, to find that only four maxima of the last sixteen have fallen within eleven years of each other. Three have been spaced 13 years apart; three 10 years apart; and two at 12-year intervals. Two others were separated by eight years, and there was one instance of 16 years elapsing between two adjacent sunspot maxima.

On these grounds alone there would be a chance that the next sunspot maximum might follow anywhere from eight to sixteen years after the last maximum which occurred in July, 1928. There is only one chance in four that the 11-year interval will work for predicting the present coming maximum.

Somebody with a gambling instinct may like to put stakes on the year of the coming sunspot peak. Surely the exciting variations in spots from week to week as they surge up and down on the way to the top should give one all the thrills of watching a favourite horse go past the winning post!

If we attempt a prediction of the next sunspot peak on a really intelligent basis, we should take into consideration the behaviour of these sunspots during the last few races to maximum before making our wager, just as one might watch the past performances of the entries of any big race before picking an anticipated winner. If we do this, we should put our stake on Number 10—that is, a 10-year interval from the last maximum.

The Present Cycle

The race of sunspots from the last minimum of 1933 up to the present time has been by far the most speedy since the spectacular climb to the peak of 1870. There was one other sharp peak performance in 1778. In both of these earlier cases only three years elapsed between the previous minimum and the next maximum. On the basis of these behaviour patterns one might even reason that we could have passed the present sunspot peak in February, 1937. As the odds are, however, in favour of a 10- or 11-year interval, it is a good guess that the middle of the present maximum will fall due in the early part of 1939.

Forecast Difficulties

It is strange that there is still so much guesswork in predicting sunspots, when astronomers can predict an eclipse of the sun years in advance to within two seconds. Predicting eclipses and

* *G. C. Auroral Group, R.E.S.*

predicting sunspots, however, are hardly in the same category. We know perfectly well the laws of motion of the earth and moon that make possible the calculations of an eclipse, but we are still very ignorant of the fundamental laws of sunspot behaviour.

Before the days of the discovery of the laws of gravitation by Sir Isaac Newton, the predicting of the planets was in somewhat the same state as the predicting of sunspots to-day. The star gazers of the Middle Ages had no adequate conception of how planets revolved around the sun in obedience to a universal law. All they could do was to tabulate planetary movements, and, on the basis of what the planets had done in the past, attempt to forecast their future positions. Often they were sadly in error.

Is There a Law?

It seems reasonable to suppose that, however complicated the cycle of sunspots appears to be, there is some underlying law which will ultimately simplify predictions of coming sunspot maxima, as the universal law of gravitation simplified the prediction of planetary movements. Just as astronomers arrived at the laws of planetary motion from a careful study of all previous observations, so we can hope to arrive at the laws governing the appearance of sunspots from their characteristic behaviour. Thus, while we may feel confident of a recurrence of sunspot phenomena at intervals of a little over a decade, the matter of predicting the exact time of a sunspot maximum is far from solved.

Secondary Fluctuations

Years have been spent by numerous investigators in analysing the sunspot curve, to discover the various periodicities that may enter into it. When we examine the sunspot numbers month by month rather than year by year, it is important to note that there are secondary fluctuations that occur at more or less irregular intervals. These secondary or minor fluctuations have an important bearing on the prediction of the maxima. Some of these intervals of variation are much longer than the 11-year cycle. Others are shorter.

Studying the graphs of sunspot numbers for the past 300 years, various investigators have found, in addition to the 11- and 23-year periods, periods of 37, 77, 83, 252, and even possibly as long as 300 years. Not all authorities, however, will agree as to the reality of some of these intervals. We have hardly enough sunspot records to be sure of any intervals of more than 100 years.

Sunspot Numbers

Someone may ask what is meant by sunspot numbers? The astronomer Wolf, at Zurich, introduced the idea of a sunspot number as a sort of index tc keep trace of the prevalence of "spottedness" on the sun. Wolf actually counted the number of spots that he could see every day with his telescope. When he found a large number of spots grouping themselves together, he felt that such an aggregation of disturbances was of more consequence in judging solar behaviour than the appearance of small isolated spots scattered here and there over the sun's surface, so he added to his count of the sunspots ten times the number of the groups which he could see at any one time. This combined number, made up of both spots and groups, he called the "sunspot number" for the day. Wolf spent so much time adjusting all observations made by other observers in old records of sunspots and reducing them to the common system that this solar index has come to be known as the "Wolf number." Sunspot numbers have been averaged month by month and year by year, and have worked out remarkably well in tracing solar activity throughout the years.

The observatory at Zurich continues to receive records of day-by-day observations of the sun from all over the world. There they are reduced and officially published as Wolf numbers. Some difficulty is experienced by observers in estimating and deciding when a fairly large number of spots may be considered as forming a group, so that sunspot numbers made up in different places often differ considerably from each other. The monthly and yearly averages, however, are remarkably consistent.

More Recent Methods of Computation

More recently it has been agreed to measure the total disturbed areas of the sun every day. The size of a sunspot large enough to be seen with a telescope can easily be estimated. It is customary for observers of the sun to express the total area of all sunspots observed, in terms of a unit area one one-millionth of the sun's visible hemisphere. This is the method adopted by the leading observatories throughout the world. A good size sunspot may range from 700 to 1,000 millionths of the sun's hemisphere.

In comparison, if we think of a large tropical hurricane, raging over the West Indies, this may cover a disturbed area of 70,000 square miles. Since the area of the earth's surface is 98 million square miles, a typical West Indian hurricane would cover 700 millionths of the hemisphere of the earth. Thus, on the scale of the earth, a tropical hurricane would be comparable in size to a sunspot on the surface of the sun.

The areas of the sunspots on a given day, therefore, may serve as a reliable index of solar activity the use of areas eliminating the puzzling uncertainty of estimating the Wolf numbers. It is quite surprising, on the other hand, to see that if we make a chart of sunspot areas month by month and year by year, we find very little difference between this and one made from plotting the Wolf numbers. There is a great advantage in utilising the Wolf numbers in statistical studies of sunspots, for we have records of these numbers going back to the middle of the eighteenth century, whereas we have comparatively few years of records since the method of measuring the areas of sunspots has been adopted.

Other Solar Disturbances

It seems wholly possible that other changes are going on in the sun which do not always show up as sunspots, but which are quite as important in their effects on the earth as may be the spots themselves. The sun is also being watched for faculæ, those bright white patches which are seen from time to time, particularly in the vicinity of sunspots. A record is also kept of the hydrogen clouds and the calcium clouds, for often our radio fade-outs occur with sudden explosions of hydrogen gas on the sun. If we make a chart of the number of these phenomena observed every day, we find again that they correspond very closely to the Wolf sunspot numbers.

Frequently during a sunspot maximum, spots of such size and magnitude will occur as to be easily seen with the naked eye. It is, of course, possible that years of sunspot maxima often passed when no naked-eye spots were seen.

Predictions

Now, if we take as a basis the occurrence of the last minimum and the present rate of rise in sunspots, we may venture to predict that the next sunspot maximum will occur in the early part of 1939. If this prediction should prove correct, it would be one of the pleasantest and most unexpected turns of fate which the writer could hope for.

Sunspot Characteristics

There is an important variation in the characteristics of sunspots of which we should not lose sight. This is the apparent drift in the positions of the spots toward the solar equator as they continue to break out during the whole eleven-year interval. At the beginning of the sunspot cycle the spots first appear in the neighbourhood of 35° from the sun's equator. This was the case in the present sunspot cycle which started in 1934. It was also the case at the beginning of the previous cycle which started in 1923. As the cycle advances the spots increase in number, but they also appear at lower latitudes on the sun. While they fluctuate back and forth in latitude from day to day and month to month, the trend is always toward the equator, both for the spots which appear in the northern hemisphere and for the ones which appear in the southern hemisphere of the sun.

As the sunspots approach their maximum they occur most frequently in solar latitude 15° either side of the equator. After the maximum has passed the spots decrease in size and number, but they continue to break out at decreasing latitudes. Finally, a few scattered spots may be seen either side of the sun's equator at latitudes 2° to 5°. This represents the death of the cycle. Before the last of these small spots has disappeared close by the sun's equator the new series of spots begins to break out in high latitudes again, thus ushering in the new cycle. The fact that a sunspot maximum is not usually attained until the average latitude of the spots has reached about 15° from the equator leads one to believe, at the time of writing, that the maximum is not yet past, but may be expected early in 1939.

This peculiar trend of latitude in the sunspot period is so far without any adequate explanation. A knowledge of the latitude of spots, however, helps in diagnosing where we may be at present with respect to the sunspot cycle. Since the present average latitude of sunspots appears to be in the 18th zone, therefore, on this ground alone, it appears that we are fast approaching the next maximum. If we only knew what was the ultimate cause of sunspots, it would probably help very much in solving the mystery of the solar cycle and in predicting the future behaviour of the sun.

Book Reviews

THE RADIO AMATEUR'S HANDBOOK. (Sixteenth Edition.) By the H.Q. Staff of the A.R.R.L. 560 pages, 815 illustrations, 50 charts and tables. Obtainable from the Sales Department, R.S.G.B. Price 5s. 6d. to members.

The new " Handbook " has arrived and is a little larger than the last edition. Some thirty pieces of new and tested equipment are described, these being mainly additions to the receiver, transmitter and radiotelephony sections.

The introductory chapter on fundamentals has been rewritten and greatly improved and now starts with the electron theory. The valve tables, already large, have been expanded and give information about some 400 different types. Tables for control, regulator and cathode-ray types have been added.

Perhaps no part of the Handbook is so consulted as the aerial section, and this has been considerably revised. Particularly commendable are the new radiation patterns, which are clear and easily understood.

New material has been added to the chapters on power supplies, emergency and portable equipment, instruments and measurements.

As always, the Handbook deals with the latest and best practice and it is well and pleasantly presented.

The late Ross A. Hull, who was editor of the volume for ten years, was accidentally electrocuted during the preparatory work on the present edition. The remaining collaborating members of the H.Q. staff carried the work on to its conclusion and now dedicate this edition to his memory.

The writer would like here to pay a humble tribute to the memory of a great amateur whose work was admired and respected throughout the world and to whom we amateurs owe such a lot.

T. P. A.

TESTING TELEVISION SETS. By J. H. Reyner, B.Sc., A.C.G.I., D.I.C., A.M.I.E.E., M.I.R.E. 128 pages, 49 illustrations and 16 plates. Published by Chapman & Hall, London. Price 9s. 6d. net.

This is the first book on this subject to come to the notice of the writer and it must be welcome indeed. The author's books on television and testing radio sets are familiar and in this book he tackles the job of tracing troubles in such a complicated piece of apparatus as a television receiver in the same logical and methodical manner which made his other testing book so useful.

The book opens with a survey of the meters and apparatus required for testing purposes and then lists 16 faults with 58 possible causes. This will probably enable the tester to trace the trouble to a particular part of the apparatus, such as the receiver or the CR tube.

Faults in the various sections are then dealt with in detail, starting with the CR tube, and many practical hints are given along with sound advice regarding the testing of high-voltage circuits.

Faults in the time-base section are necessarily given much space and the diagrams and photographs of the effects of various faults are helpful. Synchronising faults are treated separately and at considerable length; this section is also very helpfully illustrated. Sections are then allotted to receiver faults and interference.

The book concludes with a chapter on laboratory technique and here are explained methods of measuring stage gain, response, oscillator voltage, etc., and the use of a pulse-generator; the valve-voltmeter and CR tube technique are also covered.

The book is strongly recommended as presenting a sound and admirable method of trouble-hunting and being a helpful guide in diagnosing and curing television "complaints." T. P. A.

WIRELESS TRANSMISSION FOR AMATEURS. Edited by F. J. Camm. 143 pages and 120 illustrations. Published by George Newnes, Ltd., London. Price 2s. 6d.

The editor of this introductory book is well known as a writer of elementary wireless, cycling and model aeroplane books and in this book he presents material which has appeared as articles in *Practical and Amateur Wireless*.

The reader, before proceeding to a description of the construction and adjustment of two small transmitters, is given a brief and "one-syllable" outline of the underlying principles of valves, oscillators, circuits, modulation and propagation. The first transmitter described is a double triode, one side being a C.O. and the other a modulator. The second transmitter is a C.O.P.A., suppressor-grid modulated by a two-stage amplifier.

Keying filters are described, but the transmitter descriptions cover only telephony. However, the book stresses the necessity for good operating when C.W. is used; a section dealing with good telephony operating would have been helpful.

There is always the danger when writing introductory technical texts that simplification will introduce ambiguity and this has occurred in a number of places. The section on "Anode Current Swing" should be rewritten and on page 50 one reads that the "efficiency" of a triode is "in the region of a power ratio of 8 : 1"; presumably this refers to the power input to the amplifier as compared with the grid driving power.

The formula for percentage modulation is given as

$$\frac{\text{Maximum modulated amplitude-carrier}}{\text{carrier amplitude}} \times 100\%$$

This appears to give 150 per cent. modulation with what is known to be 50 per cent., but the numerator meaning is obscure.

The major part of the book is explicit, simple and practical, but the advisability of starting a beginner with a speech-modulated crystal-oscillator is doubtful. T. P. A.

Calls Heard

ZD2H-G2QN.—A. Tomlinson, Posts and Telegraphs, Lagos, Nigeria. 14 *Mc. November* 9-*December* 11, 1938.

The figure in brackets denotes QRK.

Ei4j (6), g2am (5), 2ig (7), 2im (5), 2ku (4), 2lb (6), 2lu (6), 2ma (6), 2qb (6), 2sy (5), 2yl (7), 3bj (4), 3bs (3), 3nw (5), 3pp (5), 3qv (5), 5dj (5), 5my (5), 5hh (4), 5pc (5), 5pj (5), 6gb (5), 6gh (5), 6gl (5), 6hl (4), 6jf (5), 6mk (6), 6ob (6), 6os (4), 6pr (4), 6rh (5), 6td (6), 6wo (7), 6wb (5), 6wy (8), 6yr (6), 8mf (4), 8pu (4).

VP4TO (D. G. Bagg, ex G6BD), Pointe à Pierre, Trinidad, B.W.I., from November 1 *to November* 27, 1938, *inclusive, on* 14 *Mc.*

G2: dk, dv, gc, lb. G3: gm3gx, qk. G5: dd, lp, gm5sc, ug, xn. G6: bd, gm6fn, gm6hz, li.ro, G8: ip. In addition 12 G stations were worked.

Tungsram Transmitting Valves

COMPARISON CHART

Tungsram Electric Lamp Works, 82-84, Theobalds Road, London, W.C.1, have published an invaluable comparison chart of Transmitting Valves. The equivalent codes of 42 Tungsram Valves are given together with the selling prices of their own valves. The chart is well printed, and a copy will be sent on request to any interested reader.

In view of the somewhat unusual method of coding Tungsram valves we have obtained from the Technical Dept. of that company a list of the abbreviations used, together with their accepting meanings.

In general, initial code letters signify the purpose of the valve, viz. :—

O = Oscillator.
P = Power.
OP = Either purpose.
OS = Oscillator (screen grid or pentode).
OQ = Oscillator suitable for short-wave purposes.
OQQ = Oscillator suitable for ultra-short-wave purposes.

The types evolved from receiving valves have a somewhat different coding, the only two of this nature in the transmitting series being APP4G and APP4E. In this case the code letters denote :—

A = Indirectly heated.
PP = Power pentode.
4 = 4-v. filament.
G = Grid on top cap.
E = Largest of the series.

Code letters for the rectifiers are as follows :—

V = Half-wave.
PV = Full-wave.
AG = Rectifier, gas; meaning mercury vapour or Argon mixture type.

In all cases the first numeral refers to the standard anode dissipation of the valve, and the second numeral refers to the normal maximum high-tension voltage with which the valve may be operated.

In the case of rectifiers the first numeral refers to the current which the rectifier will pass, and the second to the maximum voltage at which this current may be delivered.

Elevens !

At 11 p.m. on Christmas Day in 1927 J. W. Mathews (G6LL) worked the Danish station ED4HF on 3.5 Mc.

At 11 p.m. on Christmas Day in 1938 G6LL again worked OZ4HF on 3.5 Mc.

During the intervening 11 years the stations had not contacted one another. This, surely, is the first real example of an 11-year cycle working out exactly !

Rotating Aerials

Mr. R. Jardine, G6QX, draws attention to the fact that in *Machinery*, dated December 8, 1938, there appeared an interesting article entitled "Power required for Driving a Rotating Aerial." The calculations are worked out for a 20 ft. structure supported on a tower 75 ft. high.

THE HELPING HAND

By J. N. WALKER (G5JU)

Part XVII.—AN OUTPUT METER AND ITS USES

AS is well known, the ear is not sufficiently sensitive to be able to detect readily small variations of sound, in fact the sensitivity of the average ear is such that a difference of 3 dB. is just distinguishable, when the tone of the sound is steadily maintained. When the tone is cut off for the purpose of making an adjustment, much greater variations than this are difficult to detect, whilst over periods of time, a definite increase or decrease of loudness is likely to pass unnoticed.

The moral is clear : when adjusting a receiver to obtain maximum performance, or when giving reports on received signals, it is not possible to obtain or give accurate indications if the ear alone is relied upon. Further, one has no means of judging, as the valves age, whether the receiver performance is falling off and to what extent.

Visual Indicators

What, then, are the alternatives ? One method is to place a low reading milliammeter in the anode circuit of a variable-mu valve, but this pre-supposes that the receiver possesses an R.F. stage, which is not always the case. This system is satisfactory when applied to an I.F. stage in a superhet but is not sufficiently comprehensive for all round work. Such a meter would only indicate mean carrier level and alterations in the depth of modulation (providing this did not exceed 100 per cent.) would have no effect. For receiver adjustment, it would not be possible to carry out tests on the detector and L.F. stages.

An alternative is to use an output meter. This instrument can be put to very many uses in an amateur station and the acquisition of one is to be recommended.

What is an output meter ? Briefly, it is an instrument which renders visible—and therefore directly measurable—the audio output from a receiver or amplifier. The input to a receiver consists of high frequency oscillations which, possibly after amplification, have to be rectified in order to make the signal audible. The useful output from the rectifying valve, usually termed the "detector," also consists of oscillations but this time of a comparatively low frequency, ranging perhaps from 50 to 5000 cycles per second. Although the ear is responsive to such frequencies, the ordinary type of magnetically operated meter is not. It therefore becomes necessary to insert a second rectifier to change the alternating current into a pulsating but uni-directional current, the mean value of which can be read on the meter.

In order that the overall sensitivity may be high, the power required to actuate the meter must be low, and for this reason it is usual to employ one which gives a full scale reading with one milliampere. If a powerful signal was inadvertently applied to the combination of rectifier and instrument meter, the excessive flow of current would cause damage. The design must therefore include a series resistance of a value regulated by the type of receiver and the maximum output which it is capable of furnishing. This point receives further attention later.

Applications of an Output Meter

We are, at the moment, concerned with the provision of apparatus to indicate when a receiver is giving of its best, and this can be taken as the chief function of an output meter. This particular use therefore calls for elaboration and will be treated separately.

The other possible uses include the measurement of actual audio power output, measurement of optimum load resistance under different operating conditions of the output valve or valves, and comparative efficiency of different types of aerials and feeders including variations in directional effects.

Direct comparison of one receiver against another —or of one valve to another—can be made by adjusting the noise level until it is equal with both and noting any difference in the level of signal strength. If it is not practicable to equalise the noise level, proportional readings can be taken, bearing in mind that the power output increases according to the square of the meter reading, which means that four times the power is being given when the meter reading is doubled.

If a portable receiver is available, field strength measurements can be undertaken, the sensitivity of the combination and the accuracy of the results obtained being much greater than is possible with the simple single valve arrangement generally employed for this purpose. The radiation characteristics of particular aerial systems may be studied and the effects of transmitter, aerial, and feeder

adjustments directly tabulated, thereby eliminating guesswork.

It still remains to mention the measurement of selectivity, the adjustment of band pass filters and of audio frequency peaking devices; even then the possible applications of an output meter are by no means exhausted.

All the foregoing applications concern adjustments to equipment at the home station but it must not be overlooked that reports to distant stations will be much more reliable when an indicator, other than the ear, is employed. Any slight improvement of a signal resulting from the adjustment of a distant transmitter becomes instantly observable and data collected from experiments conducted over a period of time will, of course, be much more accurate.

To deal with all the uses of an output meter outlined above will naturally occupy much space. In this article therefore we shall consider the design and construction of a suitable meter and its application to receiver adjustment and improvement, leaving the other applications until a later date.

Output Meter Design

The absolute essentials are a rectifier, a sensitive deadbeat moving-coil milliammeter and a few resistances, the value of which will depend upon the type of receiver with which the meter is to be used.

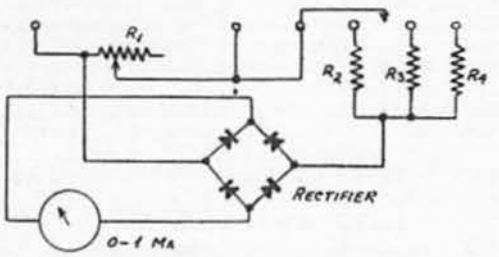


Fig. 1. The circuit of the Output Meter described in the text.
R1. 10,000 ohms variable type CP63, Varley.
R2. 8,250 ohms (8,000 and 250), ½ watt "F," Dubilier.
R3. 90,000 ohms, ½ watt "F," Dubilier.
R4. 450,000 ohms, ½ watt "F," Dubilier.
Rectifier. 1 mA type, Westinghouse.
Meter. Moving Coil 0-1 mA 3½ ins., Ferranti.
Terminals. "All-in" type, Clix.

The rectifier is an important component. The desirable characteristics are (1) small physical size, to enable the meter, as a whole, to be compact; (2) low power consumption; (3) low frequency error over a wide range audio frequency, and (4) reliability over long periods. These requirements are admirably fulfilled in the *Westinghouse* Instrument type Metal Rectifier, the 1 mA model in this range being selected for incorporation in the practical meter to be described.

Recent improvements have resulted in a considerable reduction in the electrostatic capacity of this type of rectifier and the frequency range has been greatly increased, making it satisfactory for use even up to frequencies exceeding 100 kilocycles. The frequency error over the whole of the audio frequency band can therefore be completely neglected in so far as the rectifier itself is concerned. This leads to yet another use of the instrument, that of measuring the frequency characteristics of a whole receiver and amplifier, provided a suitable variable frequency modulated signal generator is available.

The milliammeter must possess a high quality moving-coil movement, with a voltage drop at full scale of less than 500 millivolts, this value being the maximum allowable across the output terminals of the rectifier. The *Ferranti* meter chosen has a full scale drop of only 150 millivolts and ensures that the rectifier is being operated well within its safe limit. By reason of its wide, easily read scale and deadbeat movement, this particular meter is very suitable for our present purpose. Under no circumstances should a cheap moving-iron instrument be used.

A resistance is required to act as a load on the output valve. As it may at times be called upon to dissipate several watts and as a very reliable type is essential, a *Varley* variable wire-wound resistance, type CP63, is recommended.

The output impedance of most valves falls between 5000 and 10,000 ohms. For the purpose, of lining up a receiver, the actual value is immaterial and the resistance may, as a rule, be used at its maximum value of 10,000 ohms, although, as explained later, its variable characteristic is made use of in a special way.

To enable the meter to cope with the output from any type of receiver, several ranges will be necessary. The lowest included, measures an A.C. voltage up to 10 volts but care is necessary when using it to ensure that a voltage in excess of this value is not inadvertently applied. Using the whole of the load resistance, this range will measure up to 10 milliwatts maximum and it will therefore only be necessary to use it with battery receivers employing a high impedance triode as an output valve. This range is included chiefly because of its value for the measurement of low A.C. potentials. The second range measures up to 1,000 milliwatts (1 watt) of audio frequency power and is suitable for general all-round use with the majority of receivers.

To enable receivers giving a greater output than 1 watt to be fully adjusted, and to measure the output from large mains equipment, the reading of the meter must be further increased. A third range is therefore included which enables outputs of up to 25 watts to be measured.

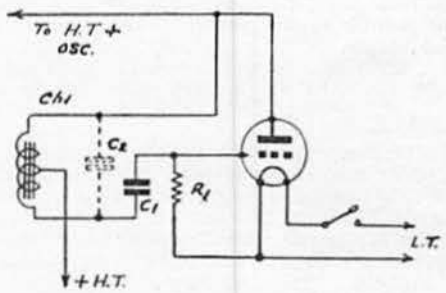


Fig. 2. Circuit of a suitable audio-frequency tone generator with which to modulate an R.F. signal generator.
C1. .01 μF. Paper type, 4601/S, Dubilier.
C2. See text. Paper type 4601/S, Dubilier.
Choke. 3 henry centre tapped, type DP18, Varley.
R1. 100,000 ohms, ½ watt "F," Dubilier.

It will be realised that the output meter has applications to the measurement of A.C. voltages, details of which will be included in a future article.

Construction of the Meter

When building the meter, allowance should be made for the fact that additional uses will be found for it at a later date; room must therefore be left for extra components, which will be chiefly resistances.

The actual construction may be left to the individual, but the following suggestions, based on the writer's own instrument, may prove helpful.

The basis is a sheet metal cabinet, painted grey, the base of which measures 5 in. square. The front panel slopes so that the depth of the cabinet at the top is reduced to 3 ins. The overall height is 7 ins. The *Ferranti* meter is mounted with its

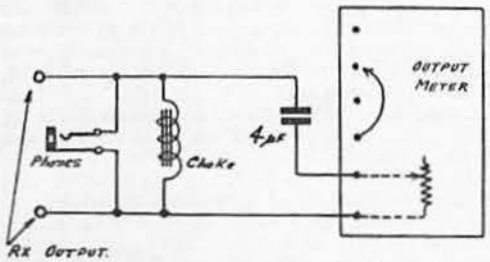


Fig. 3. The meter is connected to the receiver as shown above.

centre 3 ins. from the top edge; the *Varley* resistance 2½ ins. from the lower edge. Across the top, at even distances, are fitted six *Clix* "All-in" terminals.

On one side of the cabinet is mounted an *Eddystone* midget insulator. A fixing hole for the *Westinghouse* rectifier is tapped 6BA, so that it may be screwed directly on to the centre screw of the insulator. The resistances are held in the wiring, which, although comparatively simple, should be carefully carried out and checked before the instrument is put into use. In particular, the variable resistance should be so connected that the resistance in circuit *increases* as the knob is rotated in a clockwise direction.

Naturally, to allow of the insertion of the components and to permit wiring up, the back of the cabinet must be open. Actually, it is constructed so that the top and back form one piece which may be screwed on to the major portion when construction is completed.

A Modulated Oscillator

The output meter proper is now ready for use but it will be appreciated that to line up a receiver, a perfectly steady signal is highly desirable; further, such a signal should be capable of being modulated or unmodulated at will. To find such a signal on the amateur bands, or in the territory in between for that matter, is difficult, unless it is specially provided by a nearby amateur transmitter. Even then, mutually convenient times may not coincide and unnecessary interference will be caused. From every point of view, therefore, except in the special case when different aerials are being tested, it is better to arrange to generate the necessary signal locally.

The reader is here referred to an article by the present writer published in the June, 1938, issue, dealing with aerial adjustment. In that article is described a simple type of oscillator which, without alteration, other than removing the aerial shown in the circuit diagram, is quite suitable for providing an unmodulated signal on a frequency within any amateur band.

To suitably modulate this piece of equipment, another valve and a few extra components are necessary. These may be made up as part of the oscillator or as a separate unit, the connections being as in Fig. 2. The valve may be any medium or low impedance triode on hand.

The tapped choke, a *Varley* type DP18, is a very useful component. By varying the capacity of the shunt condenser, C_2—values between .001 and .02 μF. (the ordinary paper type are suitable) should be tried—a pleasing note will be obtained. The value of the grid leak may also be varied, the effect of such variation being to alter the amplitude of the audio frequency oscillations generated, and hence the depth of modulation of the R.F. oscillator. A separate filament switch is fitted to enable the modulation to be cut out when not required.

The H.T. + connection shown in the diagram of the R.F. oscillator will not, of course, go directly to the high tension supply, but will be made *via* the choke shown in Fig. 2.

Precautions to be Observed

Before discussing details of the experiments that may be carried out, a few words are necessary regarding certain precautions which must be observed.

In the first place, high D.C. potentials must not be applied to the rectifier, therefore it is necessary to isolate the instrument from the receiver output. This can conveniently be accomplished by means of a choke/condenser filter, as illustrated in Fig. 3. The choke should be of high inductance and the 4 μF. condenser be rated at least 250 volts working. *Varley* type DP23 and *Dubilier* type BB components respectively, are recommended. An output transformer, preferably of 1/1 ratio, may be employed in lieu of the choke/condenser combination, if desired.

The next point to remember is that it is essential to prevent high voltage surges being communicated to the rectifier, in order to avoid the possibility of damaging it. Under normal working conditions the output meter will only be called upon to handle voltages of a comparatively small order but if a circuit is made or broken suddenly (especially the H.T. supply to the output valve) a high voltage surge is likely to occur. Adjustments to earlier stages, if made with the receiver energised, may also give rise to undesirable kicks. The meter should not be connected to the receiver with the latter switched on, because the isolating condenser will receive a sudden charge. Disconnection is allowable, providing it is made on the meter side of the output choke.

The use of the variable resistance (R_1) will now be clear. All that is necessary during switching-on and adjustment periods is to turn the knob fully to the *left*, when, in effect, the instrument is short-circuited and no surge can reach the delicate parts. To enable a quick return to the correct position,

assuming a lower load resistance than 10,000 ohms is found to give higher readings, some type of scale should be fitted beneath the knob of the variable resistance.

Preliminary Considerations

A signal may reach a receiver in two ways. The proper way, of course, is *via* the aerial and first input circuit, but often a certain amount of direct pick-up occurs *via* the coils and wiring of the receiver. When this is allowed to happen, misleading results are likely. Amateurs are sometimes heard reporting signals as S6, etc., " with no aerial on the receiver." If this is literally the case (although very often several feet of wire are actually still connected to the aerial terminal !) it simply proves that that particular receiver is not functioning properly. No signal at all should be audible with the aerial disconnected. with the possible exception of the 0-v-1 type of receiver, wherein screening is usually omitted. To begin with, therefore, it is well to carry out some tests to find out if signals can be picked up other than in the proper way.

The connections between the receiver and the output meter will be as shown in Fig. 3. To the centre terminal of the output meter is connected a short length of flex, terminated in a wander plug, and this is inserted in one of the three terminals connected to the series resistances, to enable the appropriate range to be selected. As indicated, telephones may be inserted on the receiver side of the output choke, thus rendering signals both audible and visible.

The oscillator (unmodulated) should be set up some distance away—10 to 12 feet—and the R.F. stages of the receiver rendered unresponsive by detuning. The aerial should remain connected, because besides stray pick-up, unwanted coupling may be taking place between the aerial and detector stage. This is bad, as it means, in effect, that the anode and grid circuits of the R.F. valve, assuming a single R.F. stage, are being coupled by a capacity which may amount to several micro-microfarads. This will tend to nullify the internal screening of the valve and will give rise to interaction and instability when the R.F. grid circuit is tuned to the same frequency as the detector stage.

The signal, tuned in on its fundamental frequency, should be quite weak in the telephones and should give no reading on the output meter. If this is not the case, the screening of the receiver is defective and steps should be taken to improve it.

Another point arises—the receiver adjustments which give greatest output with a strong signal will not necessarily be correct when a weak signal is being dealt with. As the latter is relatively the more important, the input from the local oscillator should be kept low, consistent with easily read meter indications, whilst tests are being conducted.

The local signal generator must be run in an unmodulated condition when the receiver is being tested in an oscillating condition or, in the case of a superhet, with the B.F.O. in operation. The same condition applies when adjusting regeneration and the detector portion of a receiver generally. In other cases, the local oscillator should be modulated and the receiver, if of the T.R.F. type, operated with the detector valve just off oscillation, which condition will usually apply when, in normal use, weak telephony is being received.

Space does not permit of the inclusion of information regarding the procedure to adopt when lining up a receiver ; this will therefore follow in the next article.

Inter-Band Relationship

By J. M. R. SUTTON, B.Sc. (GW2NG)

THE following is an amplification of data supplied by Mr. W. Conklin, W9FM, and received *via* Miss N. Corry, G2YL.

Attempts have been made to discover the relationship between conditions on several of the high-frequency bands, and calculations worked out to discover the theoretical skip-distance necessary at one frequency for a signal twice that frequency to be returned to earth. It is obvious that if this relationship were established, an examination of the 14 Mc. band should enable a forecast of conditions on the 28 Mc. band to be made. Similar reasoning should apply to the 28 and 56 Mc. bands.

The winter F_2 layer, which peaks up shortly after noon at the point of reflection, was assumed to have an average height of 250 km. From this figure a skip-distance of 485 miles was obtained, giving a first-skip distance of approximately 1,900 miles on the next higher-frequency band. Thus, a skip-distance of 485 miles on 14 Mc. should indicate that 28 Mc. was beginning to open at a distance of some 1,900 miles, in the same direction. If 28 Mc. was open at 485 miles, then 56 Mc. should also be open. These distances apply to winter conditions.

For the summer sporadic E-layer an average normal height of 110 km. was assumed. This will give a skip-distance of 320 miles, and a figure of approximately 1,200 miles for the next higher frequency band. There are, however, several difficulties connected with forecasts based on the sporadic E-layer. For this layer there may not be a large enough cloud of electrons to reflect to the same receiving point both the short-skip lower-frequency signal, which is reflected from the layer 160 miles away, and the long-skip higher-frequency signal, which must be reflected from the layer 600 miles away in order to come to earth at the maximum 1,200 miles E-layer first-skip distance.

With summer conditions, therefore, 28 Mc. signals which cannot be heard at distances nearer than 700 miles may not indicate that the 56 Mc. band is closed. This is because the layer may not extend close enough to reflect nearer 28 Mc. signals. In any case, the next lower-frequency band should always bring in signals from the same distance and direction.

It is hoped that these brief notes will be of help to workers on the 28 and 56 Mc. bands, although we are handicapped in this country by lack of activity on the 56 Mc. band at criticial distances such as these which lie on the Continent. In a large land-mass there are nearly always stations active at the necessary distances and this probably accounts for the 56 Mc. DX results obtained in the U.S.A.

Experimental Section

Manager: A. M. H. FERGUS (G2ZC).

IN starting a New Year, let us briefly consider what the Experimental Section accomplished during 1938. Under its revised organisation a full year's work has not been completed, in fact we cannot yet claim to be in working order, but we *can* publish a list of articles which have appeared in THE BULLETIN which stand to the credit of the section. These should form a useful reference, as well as showing that the Section has been active in many spheres. Owing to two changes in Group Managership, the Aerial Group has not yet become fully active, but as we now have news of the formation of definite sub-groups, we trust the future will bring more settled conditions.

In the Propagation, Receiver, and Transmitter Groups several sub-groups are very active. Results obtained, frequently do not warrant publication until something definite is forthcoming. To give one small example of activity, the monthly magazine of the Auroral Group has filled seven foolscap pages over the last two months, quite apart from the normal letter budgets that circulate.

As every reader already knows, the old R.E.S. rules proved too cumbersome for the Experimental Section. Therefore in the December issue we published new bye-laws, which were drawn up after a most careful consideration of the practical running of the Section. A number of members have already notified their G.C. or G.M. regarding their transfer from Individual to Group members, and have specified which *one* group they wish to join, but as a number have failed to do so, an appeal is now made for early application to the G.M. concerned. We can only take silence (especially from ex-home Individual members) to mean that they do not wish to transfer, and therefore do not wish to retain membership of the Section.

To clarify this point, any home member who is an Individual member *must* either join as a Group member (i.e. transfer), or resign his membership, further all those who are now members of more than one group, *must* belong to one group only. We do not wish to lose any member through misunderstanding, hence the matter being brought up again.

Articles Contributed by Experimental Section Members During 1938

(Note.—Figures after title denote page of issue in which the article appeared.)

March. "A Speech Amplifier for Suppressor Grid Modulation" (466), by G5QF and G6CL.

April. "An Ultra-modern 56 Mc. Transmitter (526), by G5JU.

May. "Revolving 56 Mc. Aerial (598), by G5JU. "Aurora Borealis" (622), by G2ZC.

June. "Review of Multi-valve Amateur T.R.F. Receivers" (662), by 2BIB. "100 per cent. Aerial System" (666), by G5JU. "Simple R.F. Output Meter" (670), by 2DGB. "Cheap Adjustable Overload Relay" (670), by ZB1E. "Forecasting Static" (697), by BRS 3227. "Aurora Borealis" (680), by G2ZC. "Seasonal Variations" (680), by G8AA. "Magnetic Storms" (683), by G2XC.

July. "A Modern A.A. Station" (25), by 2DGB. "Sunspots, Magnetic Storms and Radio Conditions" (28), by G2XC. "Magnetic Storms" (39), by G2XC.

August. "Utility Two Valve Transmitter, Part 1" (70), by G5JU. "Cosmic Notes" (93), by G2XC. "Barometric Observations of 7 Mc. Signals" (93), by G6FU.

September. "Concerning Reception of U.H.F. Signals Within the First Skip" (136), by G2DH. "Utility Two-Valve Transmitter, Part 2" (138), by G5JU. "Modern W8JK Beam Aerial" (142), by G5JU. "Economy C.C. 56 Mc. Transmitter" (144), by G6FU. "September and Sunspots" (152), by BRS 3379.

October. "Cosmic Notes" (224), by G2XC. (Forecast fulfilled—229).

November. "A Useful Three Circuit Oscillator" (260), by GM8RJ. "A 56/28 Mc. A.C. T.R.F. Receiver" (261), by G5JU. "A 56 Mc. Driver Panel" (271), by G5NG. "The 1938 'C.W. 56 Mc. Trophy' Contest" (274), by G5JU. "Cosmic Notes" (286), by G2XC.

December. "A 56/28 Mc. A.C. T.R.F. Receiver" (322), by G5JU. "Reception Conditions on Short Waves" (324), by 2DGB. "Lunar Eclipse" (344), by BRS 3379. "Something New in Exciter Units" (347), by G2UJ. "Cosmic Notes" (354), by G2XC. "Photographing Amateur Radio Apparatus" (355), by BRS 3379.

Lunar Eclipse

The general inference to be drawn from reports sent to the Moon Sub-group is that the Eclipse had little or no effect on radio reception. There are a few isolated cases of peculiar conditions being noted, but these tend to confirm that similar conditions would occur at times when no lunar eclipse is in evidence. Numerous flutter fades were noted and from one district a gale was reported which dropped and again restarted after totality. This seems to show how "probabilities" can be assigned to certain "possibilities," if they happen to coincide with some known but unusual feature. If such things occurred generally, then we might be encouraged to investigate the matter further, but we must always be careful to avoid stressing individual local effects, especially when they can be attributed to perfectly natural causes such as, for example, barometric conditions.

Aerial Group

Three Groups have now been formed, one dealing with 14 and 28 Mc., and the other two with 56 Mc. and higher frequencies. Will those members who have not yet replied to a circular letter from G2IM please do so at their early convenience, so that they may be allocated to suitable groups.

G2IM.

Propagation Group

The fact that there is no outstanding development to report this month in no way reflects the activity of the Propagation Group. It must be

remembered that research results cannot be turned out to order, and that until some definite conclusion is arrived at, publication is of little value.

It is felt that our knowledge of Cosmic Data is far in advance of our information regarding the daily variation of radio conditions on the most popular amateur bands. All members, especially those few who have not yet been allotted to one of the sub-groups are requested to send monthly "conditions" reports to the G.M.

GM6JJ.

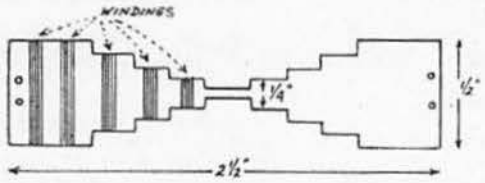


Fig. 1.

Receiver Group

Two items of interest this month come from J. A. Willdridge (2AZQ); first, a U.H.F. choke, made from good quality white bakelite (⅛ in. or ¼ in.), cut as in Fig. 1. This is soaked in alum after drilling and wound with 50 turns 28 S.W.G. D.S.C. wire in sections of ten turns each. Secondly, he describes an arrangement of wire meshes to replace a metal panel in order to overcome hand capacity

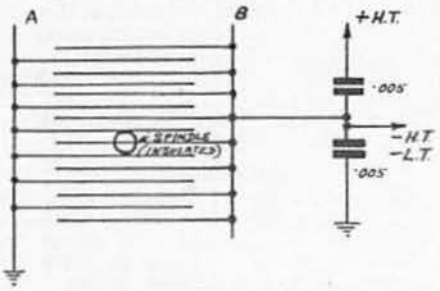


Fig. 2.

troubles. Two meshes of 1/044 wire, spaced ⅛ in. between mesh are arranged as shown in Fig. 2. "A" is connected to earth and "B" to the capacitive centre of H.T. positive, earth, and the spindle of the tuning condenser. When completed the whole can be coated with french polish or copal varnish.

The T.R.F. Sub-group is proceeding with work in connection with constant reaction, but it is too early to predict results. Band switching is also receiving attention.

G5HF.

Mr. Stephen de Laszlo

It is with profound regret we record the death on January 7 of Mr. Stephen de Laszlo, son of the late Mr. Philip de Laszlo, the famous artist.

Mr. de Laszlo, who was a director of the *High Vacuum Valve Co.* (Hivac) and a member of the Society, died from injuries received a week earlier when his car collided with a lorry on the Cambridge-Newmarket Road. Mrs. Stephen de Laszlo was killed instantly.

We extend our sympathies to the de Laszlo family and to the directors of the Hivac Co.

Cosmic Notes

Sunspots

Only a few observations of the sun's disc could be made during December. A small spot crossed the central meridian on December 4, followed by a larger group on December 8. An average-sized spot was recorded with C.M.P. December 16, while two average groups crossed the meridian on December 20 to 21. Observations made towards the end of the month showed that two groups had crossed the central meridian on December 25 and 26, an average spot on December 30, and a rather large spot on the eastern limb was calculated to have C.M.P. on January 4.

Magnetic Elements

Poor radio conditions existing in the late evening have caused some difficulty in the reception of cosmic data from U.S. sources. A moderate disturbance began on December 2 and continued during December 3. Conditions were also moderately disturbed on December 10 and again on the morning of December 22. Data is at present lacking for the dates December 4 to 9.

The National Bureau of Standards at Washington reported ionosphere storms occurring on December 19 and 20.

Critical Frequencies

Critical frequencies at Washington, U.S.A. (noon local time) were 12,400 kc. on November 30 and 14,000 kc. on December 21, these measurements being for the F2 extraordinary ray.

G2XC.

News from New Guinea

Mr. V. H. Gilchrist (VK9VG), of Bulolo, becomes our first member in New Guinea, and in an interesting letter gives us details of activity in his country.

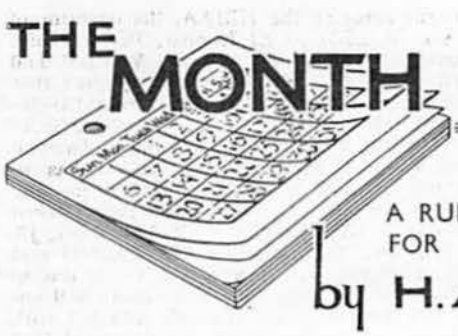
There are at present about nine licensed stations in the Territory. VK9BW (an ex-VK3 amateur) is very interested in DX, and uses about 50 watts input. 9GW, a comparatively newcomer, runs 2A5's in the final with an input of 25 watts. 9WL, a phone enthusiast, operates a 15-watt Harvey transmitter. 9DM has an A.W.A. Teleradio, but is at present inactive. 9VG operates a 6V6, 802 and 804 line-up, with 70 watts input on C.W. Suppressor grid modulation is also used. His receiver is a NC101X.

Mr. Gilchrist states that conditions in the tropics are very irregular and reception of DX changeable. For one week only during 1938 were Europeans audible, and in that period he contacted two G's, SM and F. The best months for DX are between February and August. KA, VU, SU and ZS stations came in well during November, but U.S. signals were absent. The wet season occurs in our autumn, and at that time static is troublesome.

VK9VG is erecting a V Beam directed on G, and hopes for contacts during B.E.R.U.

Congratulations

To Mr. Cecil Graves, Deputy Director of the B.B.C., and to Miss Cecil Dixon, the celebrated B.B.C. pianist. Mr. Graves received a K.C.M.G. and Miss Dixon the M.B.E., in the New Year's Honours List.



THE MONTH ON THE AIR

A RUNNING COMMENTARY OF RADIO CONDITIONS FOR THE MONTH OF . . . . . DECEMBER, 1938

by H. A. M. WHYTE (G6WY.)

TYPICAL winter conditions prevailed during December, with good DX signals on 14 and 28 Mc. during daylight periods, and a definite sign of improvement on 7 Mc. 3.5 Mc. produced many signals from the North American continent, throughout the night up to 0730 G.M.T. G2PL reports reception of W1AW on 1.7 Mc. at the beginning of the month, while the best periods for 3.5 Mc. appeared to be the first week and last few days of the month. The schedule with VU2AN on 3620 kc. has been maintained by G6WY on Saturday nights at 2300 G.M.T., and some satisfactory contacts have been made. Other British stations who worked VU2AN on this frequency include G2ZQ, G6RB, G5BD, and G2PL. Another schedule between G6WY and W5EHM was successful at the end of the month on 3.5 Mc. ZL4BR and ZL4GY are proposing to run a regular listening schedule for British stations each day on 3.5 between 0630 and 0830 G.M.T. during February.

Asia has been particularly good on 14 Mc. between 1200 and 1500 G.M.T., and many countries are reported. G8JR worked XU2RF (T6 14090), XU5XU (14150), XU6D, VP6LN (14080 10.40), OX7ZL (14050 T7), VQ5ELD (LF T8), and OY3X (14370 T7). The latter station requested that a card should be sent *via* the E.D.R. We wonder when one of these " Faroe " stations will prove genuine! G8JR only uses a 6L6g in a tri-tet circuit with a 67 ft. aerial fed by a 33 ft. feeder 11 ft. from the centre.

G2DH is still very active and reports some interesting contacts, CR6AI and PK4KO brought his total to 120 worked, and the necessary cards have been sent to the A.R.R.L. for the DX C.C. XU9WS was the call of a 50-watt naval emergency transmitter situated ten miles from Canton, and confirmation arrived in the form of a calendar with a photo of the cruiser, of which 9WS is operator. Other stations worked include, XU's 4XA, 6AL, 7CW, CR7AF, HH4AS, PK4KS, PK3AA, PK1AI, and heard : XU's 7TH, 7CK, 8NR, U8IB, VS9AQ (?), the latter was heard on 14380 at 1430 G.M.T. on December 11. GM8FB found that conditions were very good on 14 Mc., despite the many grumbles heard over the air about the lack of signals! He reports contacts with XU2AW (11.30), CT3AB (14.15), and ST2KT on October 31, but this station is a pirate. G3AH started with his 25-watt ticket in very good style, as he added 14 new countries during the month, to make a total of 55 in 20 zones. Contacts were made with K7FNE (HF14, 08.15), HH3L (14315, 10.00), CT3AB (14300, 10.30), LZ1ID (HF14 T6 16.30), J2NF (14395 08.15), XU4XA (14350 13.00), U9WR (HF14 T6 10.30), CM2AZ (14410 11.00).

Eric Trebilcock, BERS195, is with us again, and we take this opportunity of wishing him a happy New Year, and thanks for all the valuable contributions to this page during the past year. He heard VK2DG working LX1AX, who said he was operating under cover, and no card should be sent until the LX card reached VK. We are somewhat sceptical, however, as it does not appear difficult to obtain a licence in Luxembourg, and there is therefore no justification in using a bogus call ; we are inclined to believe that he is not, therefore, in LX. Another problem that worries most of us is the question of PX calls ; they have all requested that cards should be sent *via* R.E.F., but the French organisation is returning cards for PX2A, etc., to the senders, stating that all PX stations are unlicensed. Eric tries to see how many countries he can log in a month's listening, 82, 84, and 81 represent the total for September, October, and November respectively, and his grand total has now reached 167—VQ5ELD giving him his last new one. Cards from TF3C and K6BAZ (Howland I.) now bring his total of confirmed countries to 134. The most unusual calls heard were VR1SS, MX4AH (Point Arthur, Manchuria, believed to be an ex-VE5), XSV1SM, PJ1BV, HR1AP, ZE2JB, XU0A (Box 15, Kweiling, Kwangsi, China), ZZ2A (American ship), OQ5HR, PK4KS (Tan Koon San, Pangalpinang, Banka I., D.E.I.).

Some interesting news of Pacific Island activity is given by BERS195. KF6DHW, KF6ODC, KF6HCO are on Canton I., KF6DSF is now on Howland I., after removing from Baker I., KG6NVJ was on Jarvis I., but has returned to Honolulu, and VR2FF is now on Canton Is., but is not active. KD6 is the new prefix for Wake I., and for country counting purposes, the prefix only is taken into consideration. VR4AD has returned to Australia, and won't be heard again until July, 1939. G3IG supplies us with the full QTH of ZE2JB—D. M. Jamieson, Box 796, Salisbury, Southern Rhodesia, therefore it is *not* a new country prefix !

Martin Bourke, 2AOU, of Jersey, asks BERS195 to mention *always* the time (G.M.T.) and frequency of all received signals. He quite agrees that he does count suspicious countries heard until some proof arrives, but argues that as all stations do this anyway, it is quite fair. We suggest that all stations should *not* count a new country until they know that he is genuine, either by actual confirmation, or the knowledge that others have received some definite news as to his authenticity. This will wipe

out such prefixes as TA, ZC4, ZU9, ZA, OY, etc. Martin only QSL's Empire stations, and has received 93 per cent. return—the only missing ones being VP8AD, ZS3F, and VS8AA, this therefore beats BERS195's total percentage. Without sending prepaid postage, 2AOU has received 98 per cent. acknowledgement of reports sent to newly licensed British stations on 7 Mc. Finally, 2AOU reports reception of VP4TK (14070 20.10), J2JJ (14390 (08.00), PK4KS (14320 16.30), VP6TR (14020 23.00), XU2JH (14120 16.50), VQ8AF (14280 16.00), and ON4RL (14250 T4 19.30, the Yacht *Vuletta*).

2DQS of Thurnby, Leics., reports PJ1BV (14400 T5), J2NF, J5BF, and TI1N, and he asks if others have heard this CW station. His friend, BRS3319, of the same village, heard phone from CE3AT (22.10), LX1SI (13.50), LX1RB (14.00), LX1TW (14.15), on 14 Mc. G3ZJ is to be congratulated in working four continents within a fortnight of receiving his call, U9ML, W1, SU1GP, and Europe were raised with 10 watts. G3IG is rapidly mounting his country total, and reports a contact with K7FNE (14335 09.00), he also heard K7ETS (14335 10.00). GM3BA has become G3BA owing to his transference to Daventry, but before he left Edinburgh he had the unusual experience of working five continents after five consecutive test calls. They were in order: SP1MD, VU2BG, VK5LD, ZS1AL, and VE5HR. A sixth call was then sent in the hope that a South American would oblige, but M1SS replied in the South Atlantic. The information obtained was that this call was used by a British amateur on board a British ship, a 6L6 tri-tet is used with 10 watts input, and either the ship's aerial or a 14 Mc. doublet for radiating.

G2SO raised another suspicious one—ZA2X at 14.00 on HF 14. QTH supplied was—Skutari, QSL *via* A.R.I., OY4C was worked at 11.00 on HF 14, but G6ZO had his card returned from the address given. SU5KW admitted to 2SO that he was unlicensed in Cairo, and CT3KM in 7 Mc. was a little *too* suspicious to believe. On 14 Mc. he heard XE1AM (HF 14 13.30), VQ2JS (HF 14.00), CR7AF and 7AU. ZC6EC has been very active lately in Palestine, and is our old friend SU1EC " out East " again. G3CY has now reached 50 countries with VO1B (LF 14 17.00) and ZE1JT (HF 19.00). We wonder which G4 will be the first to W.B.E./W.A.C.? G2NJ worked SM5WC aboard a ship bound from Buenos Aires to Gothenburg off Cape Finisterre.

28 Mc. phone enthusiasts will, no doubt, be interested to hear of some of the recent activities of G6BW (" Ben," to all on 28 Mc. phone). Contacts with W7BJS (Wyo.28960), W7ACD (Idaho 28540), and W7FL (Mont.), were made, but the usual skip was to the East Coast and Middle West of the U.S.A. CO7VP is now on 28168 and PK2WL on 28220 was received well enough to record his transmission. K7's reported active on this frequency include K7GSC (28736), 7GTD (28540), 7PQ (28510), 7GZH (28692) all of whom have been heard by G6BW, but they are not hearing Europeans. Unusual short skip conditions prevailed during the month, and signals from G's up to 150 miles were heard. PA0FB was worked and GM6RG is received daily (round the world.—Ed. ?)

G6YL tells us that the QTH given by ZC4EB (already reported on this page) is: Radio Station, Nicosia. 6YL wonders if HZ1A recently worked by 11IR is the same as the HZ1AA, the operator of which was W6LBM at El Khobar, Persian Gulf. We don't know, but we thought W6LBM had returned to U.S.A. G5BQ denies the report that he worked BNI-1 in Bahrein, and we would therefore be interested to learn from any G who actually contacted this station on 7 Mc. (We now understand the contact was with G5GQ.) G8VG has to be content with 220 v. D.C. mains, but pushing his transmitter to 25 watts, he has worked all W (except W5), VE3, 4, 5, ZS1, 3, PK1, J5, XU8, U9, VK, ZL, PY, and K7. K7ND and VE5QB in Yukon were the best contacts during December, and we hope that this report will encourage all those who are similarly situated with D.C. mains. It is also of interest to record that VU2AN only uses 220 v. D.C. mains for his 3620 kc. work. Both G2PL and G6WY have now worked VU2AN on four bands, and an endeavour is being made to work him on 1.7 Mc. !· On 7 Mc., 2PL had contacts with K7FKK and VE4AAM.

From Antigua VP2AT reports working FA8BG, 14410, PJ1BV, 14410, CX1CX, and ZS6EU, while XSV1SM, J2JJ, J2TF have been heard. From South Africa a letter arrived from ZS1BY (ex-ZT1Q), he is still interested in DX at 72 years young ! Some of his treasured cards include AC4YN, OB2SK (now VS5AA), W6HJZ (Nevada), EA7AO, and ZD2H. He also heard VP8AG in South Georgia, and asks what are the " Empire Zones " mentioned by 2AOU. These are the Zones for the H.B.E. certificate, details of which can be obtained from the R.S.G.B. G6GS worked K6OQM on 28 Mc. and VK2GU to give him 28 Mc. W.A.C. phone. Mississippi, N. Mexico, Utah, Oregon and Nevada are now holding him back from WAS. Other 28 Mc. signals reported by G6GS as having been heard are VP3AA, TG9BA, VP6YB, and TF3C. W7EOI and W7BVI are active in Montana on 28580 kc. phone.

It will be noted that we have mentioned both the times and frequencies where such were known. The tone report also appears where the signal was other than T9, and we ask all contributors to make *specific mention* of these important details.

Before concluding we would again remind readers that DX conditions prevail on 7 Mc. up to 0930 G.M.T., and sometimes later. It would be in the best interests if telephony operation could be restricted while the band is open for long distance working.

We wish to thank all who so kindly wished us prosperity in 1939, and heartily reciprocate this wish, together with the hope that the New Year will produce more DX than ever before.

Late News

G6MK reports contacts with W6QQL, 14363, Box 441, Boulder City, Nevada, who is looking for DX QSO's. During a QSO with K6MV, 6MK learnt that he was to start operation during February in Midway Island with the call KD6MV and would be looking for DX on 14 Mc. VU2AN tells us that the new call of ex-G5TB in Bahrein is VU7BR on 14350. Cards should be sent to T. J. Brown, The Bahrein Petroleum Co., Ltd., Bahrein.

Reports Wanted

G3ZJ (London, S.E.) on his 1·7, 7 and 14 Mc C.W. and telephony transmissions. All reports will be acknowledged.

THE 28 Mc. BAND

By NELLY CORRY (G2YL)

HEARTIEST congratulations to Mr. E. J. Williams (G2XC) on his well-deserved award of the 28 Mc. Transmitting Trophy. He has been regularly active on the band for a number of years and his work in connection with solar and magnetic activity has been invaluable to the Propagation Groups of the Experimental Section. G2XC was the first to demonstrate clearly the remarkable correlation between magnetic disturbances and poor conditions on this band. It is noted in last month's Experimental Section Report that " the Magnetic Group is discussing the *good* conditions which are alleged to occur during magnetic storms." They will certainly find no support for the theory from regular workers on 28 Mc.

Conditions last month were normal for the time of year, and December 3 was the only day when the band was almost dead. The " Hiss " was heard by G6YL at 15.20 G.M.T. on November 30 and by G6DH at 10.33 G.M.T. on December 11.

Oceanic signals reported included 15 VKs, three ZLs, and PK2WL. On December 18, 11.00-13.00 G.M.T., BRS3179 logged nine VKs, VS6, ZL4CM and ZL4DQ. The same morning he heard all continents between 11.00 and 12.00 G.M.T., and ZE1JN, ZE1JU and ZS6DW before 10.20 G.M.T. On December 9, VK5KO, still one of the outstanding Australian signals, reported in a contact with G6YL that conditions there for the period September to December had been greatly inferior to those of the previous year. BERS195 heard more G signals on November 27, 10.00-10.30 G.M.T. than ever before, and remarks on their comparative scarcity on 14 Mc.!

VU2AN is still a regular signal, and the daily sked at 09.00 G.M.T. with G6DH is being continued successfully. Other Asiatic signals heard during the month by BRS3003 and 3179 were VS6AF, VS6AO, VU2EU and XZ2EX. About 30 different African stations were heard active in FA, FB, CN, SU, VQ2, ZE, ZS1, 4, 5 and 6. G6DH worked FB8AA 14 times on sked at 09.45 G.M.T., and there were very few days when no African signals were audible. I must apologise for an error in last month's Notes, in overlooking the fact that G6DH had made First Contact with VQ4KSL as long ago as February 7, 1937.

Signals from South America were rather less numerous than in previous months, and apart from a few of the regular LUs and PYs, the only stations reported were CE2BX, HK1GK and VP3AA. From Central America and the West Indies the usual 'phones were hard active in CM, HI, K4, K5, NY, TI and XE.

All districts of U.S.A. and Canada, except VE5, were worked from Great Britain during the month, but contacts with the West Coast were not so frequent as in previous months. Ship portables heard active included W3EHO/O, a tanker in the Gulf of Mexico; W6NWK, leaving Boston on December 20; and W9BHP, s.s. *Steelmaker* in the North Atlantic bound for London. Conditions for the reception of European signals were much as usual, and about 24 countries were heard.

Reports from G2CR, G2XC, G6DH, G6YL, BRS 3003, 3179 and BERS195 are acknowledged with thanks.

THE 56 Mc. BAND

By J. M. R. SUTTON (GW2NG).

REPORTS this month are as scarce as DX contacts on the band, although conditions appear to have been about normal for the time of the year. Perhaps stations have been looking over their gear and wondering how to get the last ounce of energy into the aerial in preparation for spring activity! We must, however, record our complete admiration of stations that keep plugging away, day in, day out, with little or no result. In wishing them successes worthy of their endeavours, we can only say that this is the true amateur spirit.

The hoped-for trans-Atlantic contact did not materialise during 1938 nor were signals heard from either side. It appears that W9NY will not be rewarded with a European contact despite his intense activity because only one more monthly report in the R.S.G.B. 1938 International Contest has to be received from him. With the true optimism of the amateur worker, however, he is still hoping, and we wish him " all the best."

British Activity

G6FO is still keeping a reliable schedule with 5BY, of Croydon. They usually make contact at 22.15 nightly, and at 15.45 on Saturdays and Sundays. 6FO found conditions good from December 10 onwards, although the weather was very variable. Six out of eight schedules were 100 per cent., and on the remaining two both stations heard one another but did not make contact. QSB is present in these contacts and conditions have to be good enough to lift the signal above zero before the QSO is a solid one. On December 17 6FO received 5BY on 'phone, for the first time (Report S5) and at 23.00 made a new contact with 2MC, of Pinner, Middlesex (112 miles). 6FO was 559 and 2MC was 329, with QSB to zero, but was practically solid on sending double. The best reception recorded at 6FO, who uses a straight O-v-1 receiver, was 6DH (180 miles) at S2, on December 12 at 22.35. 6DH only came in for an instant, but his signals were undeniably there.

6FO does not agree with the theory that warmer weather (as in November) coincides with good conditions. One of his best contacts with 5BY was made when it was snowing in Croydon and freezing hard in Newport! He inclines to the theory that consistent contacts with 5BY are due not so much to " bending " but to reflected-wave action. There is often a pronounced DX characteristic on the signals, almost as if they were travelling around the world, while the variable nature and degree of the QSB points to reflected-wave action.

G6YL sends in an interesting log for November. This includes observations made during the 56 Mc. tests with the U.S.A. On November 5 conditions on 28 Mc. were poor and no U.S.A. signals were heard. The listening and transmitting periods in the 56 Mc. tests produced no results. On November 12, 28 Mc. was very much alive with W4, 6, 7, 9 signals at S6/8 but 56 Mc. produced nothing. 28 Mc. conditions were again good on November 13 with LU, W7, and W5 signals at S5, 6 and 7 respectively but the only result on 56 Mc. was a local QSO with 5QY. November 19 was again productive of no results on 56 Mc. although 28 Mc. signals were received from all districts of the U.S.A.

except the 7th. Thus the tale goes on to the end of the month—28 Mc. giving good DX signals but 56 Mc. yielding only stony silence.

On November 16, from 11.06 to 11.23, conditions were so good on 28 Mc. between G and CN that 6YL and CN8AV exchanged reports of S8/9. CN8AV was convinced that under such conditions a 56 Mc. contact was possible. 6YL transmitted on 56 Mc. for five minutes at 11.24 and CN8AV did the same at 12.00, but the band did not respond! CN8AV is on 56352 kc. most days at 11.00 G.M.T., whilst W5EHM is on 56210 kc. daily, but he has not yet been heard by 6YL.

The rest of the log records contacts with 5QY, the 96th 56 Mc. contact being made on November 25. Some interesting tests were made with various receiving aerials at 5QY, including a long-wire 1.7 Mc. counterpoise, eight feet high. 6YL also records a continuous A.C.50 cycle carrier on approximately 58.4 Mc. This signal has been heard daily for many months on the 3.5, 14 and 28 Mc. bands. The wavelength is changed frequently and it is believed to originate from the Cambridge Laboratories, and to be connected with Ionosphere experiments.

The November report from G8LY shows reports and tests with four types of aerials. (*a*) 75 feet high vertical. (*b*) 33 ft. 2 ins. horizontal, 10 degrees north of east, fed 12 ft. 5½ ins. from east end with 72 ohm line. (*c*) half-wave rotatable with reflector. (*d*) W3EDP. The usual stations were heard and worked, among them being G2OD, 8MG, 5RD, and 5NF. A station using the call G5XY and calling "56 Mc. DX" proved to be a pirate, although the note was T9! Conditions improved during the eclipse of the moon on November 7 and they also peaked again on November 28. On November 7 BRS2601, of Ewell (45 miles) reported 8LY's signals for the first time in many months. Subsequent tests with him from November 7 to 30 proved negative, so it appears that a distinct change in conditions took place during the eclipse. 8LY complains of stations using 'phone who do not give their call-sign. Perhaps they can't!

American Notes

W9NY again reports no addition to his total of points during the month of November although he operated every day. He is getting lonely for a contact as he has only worked locals since July. He is to transmit on the QPO (Police operators) network (3715 kc.) when the contest is over. He intends, however, to use a simple transmitter for this frequency as he would like to WAC on 56 Mc.! When he begins to operate on 3715 kc. it will be the first time since 1925 that he has transmitted on a frequency lower than 28 Mc. and it will also be the first time he has been equipped to operate on more than one band! He says that the F.C.C. have now passed regulations to clean up the bad 56 Mc. interference problem in metropolitan areas. But, since the regulations abolishing the use of modulated oscillators have come into force, he has heard more modulated oscillator QRM than ever before! Everyone seems to have suddenly remembered that they had some five metre junk knocking around the shack! He remarks that a large number of the 56 Mc. stations in the States are what are politely called "Bootleggers."

General Comments

From logs and reports received it appears that the November attempt to bridge the Atlantic was made when the sun-spot cycle maximum had been passed. This is a pity, for, at the moment, more stations, both in this country and the U.S.A. are equipped with C.C. apparatus and straight receivers. On the other hand it seems that contacts up to 200 miles will continue to be made, if stations are suitably equipped. We would make a really earnest plea for more keyed carriers and less 'phone and also for the use of a code-group known only to the operator. There have been several instances of "faked" listener reports when the schedule of a station has been published. The opinion of all true amateurs on such reports is too well known to be published.

Finally, photographs of 56 Mc. interest, *please!*

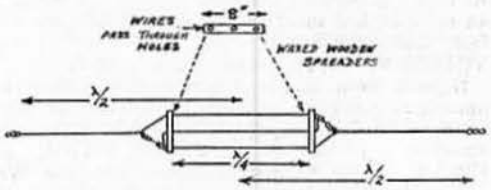
LETTERS TO THE EDITOR

The Editor does not hold himself responsible for opinions expressed by correspondents

Uniform Aerials

To the Editor, T. & R. BULLETIN.

DEAR SIR,—I read with great interest the article by Mr. Moores on his beam using uniform aerials. Some time ago I conducted experiments with a three-element uniform aerial which was end-fed and rose straight up at a few degrees from vertical. The results were not startling, although the aerial was quite satisfactory. I feel, however, that amateurs might give more attention to this type of aerial, which is employed so successfully by commercial concerns. Limitations of height make a vertical aerial impracticable at most amateur stations, but horizontal uniform aerials have great possibilities for compact arrays. For example, a three-element aerial on 14 Mc. takes up 65 ft., or a five-element aerial, 98 ft. In constructing an array, this type of aerial has a considerable advantage over



the usual collection of phased dipoles. So much for the advantages; but some amateurs who are unfamiliar with uniform aerials may be rather dubious about the construction. Mr. Moores' system seems a little complicated, so readers may find the method I used of interest, which needs no further description than the diagram. The length folded back does not seem very critical, and if the aerial is not quite in tune when constructed, its length can be altered slightly at one end in the same manner as an ordinary end-fed aerial. Like Mr. Moores, I should like to hear more about this aerial.

Yours faithfully,

P. HALLIGEY (G8PI).

Contemporary Literature

BY L. FRYER (GM2FR).

PRACTICAL ANTENNA THEORY AND APPLICATION. Ralph L. Tedesco. *Short Wave and Television* (Amer.), September, 1938.

A brief discussion of the different types of aerials used for amateur transmitting stations, together with their feeder systems. The article is illustrated by diagrams and a table of characteristic impedance values for various feeders is given.

* * *

DX RECEIVING AERIALS. *Short Wave and Television* (Amer.), September, 1938.

A short article by courtesy of the *Australasian Radio World* dealing with the principal types of effective "DX" aerials for short-wave reception. The various aerials are illustrated and data given for aerials, feeders and layout for the various types described.

* * *

"5 IN 4" ALL-WAVE T.R.F. RECEIVER. Harry D. Hooton (W8KPX). *Short Wave and Television* (Amer.), September, 1938.

A description of a four-valve T.R.F. receiver using a 6S7g as tuned-radio-frequency stage, a 6F8g as a combination regenerative detector and first audio and a 6F6g as pentode output, the rectifier being a 5U4g. The set is built on a steel chassis measuring 12 ins. × 7 ins. × 1¾ ins. with a 7 ins. × 14 ins. steel panel, and uses plug-in coils.

* * *

A BEAT-FREQUENCY OSCILLATOR. H. Yellin (W2AJL). *Short Wave and Television* (Amer.), September, 1938.

A constructional article describing a neat self-contained beat-frequency oscillator using a 25A7g, the complete unit is built up on a metal chassis 6 ins. × 3 ins. × 1½ ins.

* * *

PORTABLE 30-WATT TRANSMITTER. J. E. Striker (W6MOV, W6OPG). *Short Wave and Television* (Amer.), September, 1938.

The author describes a telephony transmitter with a power output of between 25 and 30 watts on all bands. Band-changing can be accomplished in about 30 seconds. The outfit is built into a metal cabinet measuring 14 ins. × 10 ins. × 8 ins., and uses a 6A6 as crystal oscillator and doubler when necessary, followed by an RK39 or an 807 as final amplifier on the R.F. side. On the audio side the valves used are a 79 followed by another RK39 or 807, the power supply rectifier being a 5Z3. Coil-winding data for the 1.7, 3.5 and 7 Mc. bands is given.

* * *

A LOW-COST SINGLE-SIGNAL RECEIVER. George Grammer (W1DF). *QST*, September, 1938.

The author describes a six-valve superhet with the following layout. 6L7 mixer, 6J7 oscillator, 6K7 I.F. with iron-core transformers, 6C5 operating as an anode rectifier for sound detector, 6F6 audio output and a 6C5 as beat oscillator. The receiver incorporates double regeneration for I.F. selectivity and image rejection and can be built for approximately twenty-five dollars, including valves.

BUILDING TELEVISION RECEIVERS WITH STANDARD CATHODE-RAY TUBES. J. B. Sherman. *QST*, October, 1938.

This is the first instalment of a two-part article and deals with the scanning, synchronising and power supply circuits for one-inch, two-inch and three-inch tubes. It is designed to fill the demand expressed by amateurs for simple equipment with which they can begin experimental work with an absolute minimum of expense.

* * *

A SIX-BAND ONE-KILOWATT TRANSMITTER. J. E. Jennings (W6EI). *QST*, October, 1938.

The author describes a compact four-stage outfit for C.W. or 'phone.

The following layout is used: 35T crystal oscillator followed by another 35T frequency multiplying stage designed to operate either as a doubler or quadrupler. A second 35T multiplying stage is used for operation on 56 and 28 Mc. quadrupling or doubling respectively, the output stage being a pair of 100 TH's. In addition to fully describing the transmitter, which uses vacuum condensers for the final tank circuit, the author discusses some aspects of circuit operation which are not so generally appreciated. The article contains some good pointers for all amateurs.

* * *

CHARACTERISTICS OF SKY-WAVE TRANSMISSION. Harner Selvidge (W9BOE). *QST*, October, 1938.

The article discusses some high-frequency transmission effects of practical interest to the amateur, dealing with the reflecting layers, skip distance, skip distance and transmission conditions, magneto storms, multiple layers and abnormal ionisation, seasonal changes, critical frequencies and ultra-high-frequency transmission, ionosphere and atmosphere bending.

A table of sky-wave transmission characteristics and a bibliography of recent articles on the subject are included.

* * *

SOME THOUGHTS ON ROTARY BEAM ANTENNAS. Arthur H. Lynch (W2DKJ). *QST*, October, 1938.

The author gives some results obtained with the type of rotary beam suggested by John Krauss (W8JK) and, in particular, describes an original design for a supporting framework which is cheap to construct and weighs twenty-eight pounds when assembled.

* * *

REFINEMENTS IN COMBINATION EXCITERS. T. M. Ferrill, Jun. (W1LJI). *QST*, October, 1938.

The transmitter or exciter used to illustrate this article is as compact as a modern superhet receiver, is designed for operation in a small cabinet or rack on the operating table, is equipped for E.C. oscillator as well as crystal frequency control and is capable of being used on five bands with the utmost convenience.

Any of the bands (1.7-28 Mc.) is selected by turning one switch, any frequency on these bands

(*Continued on page* 432)

Annual General Meeting

Minutes of the Annual General Meeting, held at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2, at 6 p.m., on Friday, December 30, 1938.

Present: Mr. A. E. Watts (President), Mr. A. D. Gay (Executive Vice-President), Mr. A. O. Milne (Hon. Treasurer-Hon. Secretary), Mr. H. B. Swift (Hon. Editor), Messrs. J. D. Chisholm, H. A. M. Whyte, J. W. Mathews (members of Council), J. Clarricoats (Secretary-Editor) and about 45 members.

* * *

The President called upon the Secretary-Editor to read the notice convening the meeting.

It was proposed and seconded that the Minutes of the previous Annual General Meeting, as published in the Society's *Journal*, dated January, 1938, be taken as read and approved. The motion was carried unanimously.

Mr. A. O. Milne proposed, and Mr. H. V. Wilkins seconded, that the Hon. Treasurer's Report and Balance Sheet be accepted, approved and adopted. Carried unanimously.

The Secretary-Editor read Council's report for the year 1938. (The report appears elsewhere in this issue.—ED.) At the conclusion of the Report, the President paid a warm tribute to the services rendered to the Society over many years by the retiring Hon. Editor, Mr. Bevan Swift. He spoke of the many difficulties which Mr. Swift had been faced with at different times in the past, and on behalf of all members proposed that a very hearty vote of thanks be recorded to Mr. Swift.

The motion was carried with acclamation.

Mr. H. B. Swift then proposed, and Mr. Brabrook seconded, the adoption of the Report. Carried unanimously.

The President declared the following Officers duly elected for the year 1939:—

President	...	Mr. A. E. Watts (G6UN).
Executive Vice-President	...	Mr. A. D. Gay (G6NF).
Hon. Treasurer and Hon. Secretary	...	Viscount Carlow (G6XX).
Hon. Editor	...	Mr. A. O. Milne (G2MI).

The President announced that the ballot for the seven members of Council must be declared void, for the reason that in one District members had been advised by a circular to delete all other names from the ballot except the person for whom the circular asked them to vote. The President explained that this procedure is in contravention to Article 46 which reads:—

"Each Corporate Member voting shall erase sufficient names to reduce the number of names on the ballot paper, after such erasure, to the number to be elected to the respective offices. The ballot papers shall be returned so as to reach the Secretary not later than three days before the date fixed for the Annual General Meeting, and they shall be so marked and returned as may be from time to time determined by the Council."

The mistake had perhaps arisen through the inclusion of the words "not less than" at the foot of the Ballot Form. Mr. Watts stated that he had been advised that the ballot must be held again. Accordingly he had instructed the Secretary-Editor to prepare to conduct another Ballot during January. At the conclusion of the agenda business the President intimated that he would adjourn the Annual General Meeting until 6.40 p.m. on Friday, January 27, 1939, when the result of the fresh ballot would be declared.

Mr. Watts thanked the four scrutineers who had assisted at the first ballot and invited them to serve again. The scrutineers, Messrs. P. Bradley, W. G. Irwin, P. Solder, and E. C. Ilott, accepted the duty.

Mr. Watts proposed from the Chair that Mr. J. Ockleshaw be invited to again serve as Hon. Auditor for 1939. Carried unanimously.

Mr. H. B. Swift, proposed and Mr. Inman seconded, that a very cordial vote of thanks be accorded to the President and Council of the Institution of Electrical Engineers, for allowing the Society to continue to hold meetings in their building. The motion was carried with acclamation.

The meeting was then adjourned until 6.40 p.m. Friday, January 27, 1939.

* * *

Following the Annual General Meeting, Mr. R. H. Hammans (G2IG), delivered a lecture on "New Developments in Receiver Design." Messrs. Milne, Corfield and Watson contributed to the discussion.

The meeting terminated at 8.10 p.m.

Kingston Society's First Dinner

The keys of the Kingston amateurs were silent on Wednesday evening, December 14, firstly because the Kingston power station was a smouldering ruin, and secondly, because this was the night fixed for the first annual dinner of the Kingston and District Amateur Radio Society.

The company of 38 who sat down to dine, found the candles lent a touch of intimacy which would have been lacking in the cold light of electricity!

Among those present were G6BI (Club President), G2YL, 6NF, 5LA, 2NH, 8IP, 8IX, 8HY, 8RG, 3BQ, 3BF, 8LX and 3HQ.

Mr. A. D. Gay (G6NF) in his reply to the toast to the R.S.G.B., proposed by G8RG, spoke of the future of amateur radio. His remarks were received with much interest as they anticipated a discussion held by the Society on December 18, to consider ways and means of making the amateurs' position more secure.

G5LA replied to a toast to "The Visitors," proposed by G8LX, whilst an account of the Society's history and activities was given by G6BI in response to G2NH's toast to the Society. G8IP's mother, Mrs. Barrett, replied to Mr. Woollatt on behalf of the ladies (were we proud of them!)

This very much enjoyed evening was terminated by a dance.

I.E.E. Meeting

A discussion on Beam Aerials will take place at the I.E.E. on Friday, January 27, when the opening speaker will be Mr. F. Charman (G6CJ). It is hoped that all London members interested in aerial problems will make a special point of attending. The discussion will commence at 6.45 p.m., preceded by tea served free of charge from 6 p.m.

Mr. Charman particularly requests members to bring with them a copy of *The Amateur Radio Handbook* as he proposes making reference to material contained therein.

Appreciations

The Secretary-Editor wishes to record his thanks to all members who sent Christmas and New Year greetings to the staff at Headquarters. These expressions of goodwill were much appreciated.

New British Call Signs

We have been informed by the G.P.O. that call signs in the series G4 are now being issued.

Powditch Trophy

Council has been pleased to award the Powditch Transmitting Trophy for the current year to Mr. E. J. Williams, G2XC, of Portsmouth, in recognition of his outstanding experimental work on the 28 Mc. band.

N.Z.A.R.T.

We have been informed that the Headquarters address of this Association is now Box 691, Christchurch, New Zealand, and that the new General Secretary of the Association is Mr. J. H. Freeman, ZL3FB. Our Representative in New Zealand, Mr. Bob Stanton, ZL3AZ, is a member of the new staff at N.Z.A.R.T. Headquarters.

We offer on behalf of all members at home and abroad our best wishes for the future progress of our very virile sister Society.

Conversion Tables

We are now in a position to supply Kilocycles to Metres Conversion Tables printed in vest pocket book form at 10½d. each, post free.

The tables which convert metres to kilocycles from 1 to 30,000 in steps of 10 (and *vice versa*) are printed in clear type, on pages measuring 4¼ ins. by 3 ins., bound into stiff board covers.

Lithuanian Short-Wave Association

We have been advised that an Association of Lithuanian Short-Wave Radio Amateurs has been formed. The Association will be known as L.R.M.

Correspondence and QSL cards intended for Lithuanian amateurs should be sent to P.O. Box 100, Kaunas.

The officers are: President, LY1J; Secretary, LY1S; General Manager, LY1AP; Treasurer, LY1AT; QSL Manager, LY1AA. The official address of the Association is Hipodrome 14B, Kaunas.

We wish the L.R.M. every success in the years to come.

NEW MEMBERS

HOME CORPORATES.

W. K. ALFORD (G2DX), Orchard Cottage, Sandhurst, Camberley, Surrey.
J. E. JOHNSON (G2HR), 25, Clivedon Road, Highams Park, E.4.
S. HARDMAN (G3AC), 62, Abingdon Road, Bolton, Lancs.
G. W. RISELEY (G3FW), Newtown, Uppingham, Rutland.
W. POGSON (G3GT), "Westerglen," Longlands Road, Slaithwaite, Nr. Huddersfield, Yorks.
L. A. WHALEBELLY (G3HD), Leswyn House, Gloucester Street, Faringdon, Berks.
H. W. HERMAN (G3JH), 152, Kingston Road, Merton, London, S.W.19.
J. G. TREECE (G3QD), 95, High Road, Beeston, Notts.
J. A. EDWARDS (G3SR), 10, Oak Road, Sale, Nr. Manchester, Lancs.
J. T. BLACKWOOD (G3TG), 23, Red Post Hill, Dulwich, London, S.E.24.
J. WOOD (G3VG), Ivanhoe, Minney Moor Lane, Conisborough, Doncaster, Yorks.
J. S. BELL (GM3WO), 3, Gordon Street, Hopeman, Morayshire.
A. L. UPSTONE (G3XR), Doverhay, Porlock, Somerset.
G. M. MCMINN (GM3YN), 54, Greenbank Road, Edinburgh, 10, Scotland.
H. DAVIES (G3YW), 7, Birch Avenue, Romiley, Stockport, Cheshire.
H. BRABROOK (G5ZD), 59A, Emmanuel Road, London, S.W.12.
G. H. WILKINS (2AFN), 24, Clapham Terrace, Leamington Spa, Warwicks.
A. R. RICHARDSON (2CXT), 53, Mill Lane, Newbury, Berks.
T. M. CARTER (2DNL), 32, St. Mary's Avenue, Shortlands, Kent.
L. W. LIMB (2DTD), Powys, Bolsover, Chesterfield, Derbys.
G. E. SHACKLE (2DVQ), 32, Bromwich Street, Bolton, Lancs.
C. DIDCOTT (2FHF), 9, Second Avenue, Selly Park, Birmingham, 29, Warwicks.
F. P. HALLSWORTH (2FRN), 14, Grenville Street, Dukinfield, Cheshire.
J. K. NELSON (2FRV), Sherwood, Queen's Promenade, Douglas, I.O.M.
S. T. JOHNSON (BRS3480), 84A, Clements Road, East Ham, London, E.6.
C. J. BAYLEY (BRS3481), 61, High Street, Uxbridge, Middlesex.
C. L. TURVILLE (BRS3482), 46, Biggin Hall Crescent, Stoke, Coventry, Warwicks.
A. W. S. IZZARD (BRS3483), 19, Water Street, Todmorden, Lancs.
MISS P. FOWLER (BRS3484), 31, St. John's Avenue, Scarborough, Yorks.
R. H. HARRISON (BRS3485), 29, Merryhills Drive, Enfield West Middlesex.
M. P. KING (BRS3486), Greystone, Cleeve Hill, Cheltenham, Glos.

A. E. Bayley (BRS3487), 34, Happaway Road, St. Marychurch, Torquay, Devon.
J. C. Noble (BRS3488), 56, Withert Avenue, Bebington, Cheshire.
G. J. Lumsden (BRS3489), 28, Old Nelson Street, Lowestoft, Suffolk.
A. L. Chantler (BRS3490), 346, Woodham Lane, New Haw, Weybridge, Surrey.
E. F. Dimmack (BRS3491), 607, Chepstow Road, Newport, Mon.
G. A. Yerbury (BRS3492), 3, Arthur Road, Erdington, Birmingham, 24.
T. M. Palmer (BRS3493), Yew Tree Cottage, Bushey Grove Road, Bushey, Herts.
R. A. Willis (BRS 3494), 20, Wrightson Avenue, Warmsworth, Nr. Doncaster, Yorks.
H. D. Riley (BRS3495), 171, Elborough Street, Southfields, London, S.W.18.
J. T. A. Henry (BRS3496), 85, Glencairn Drive, Pollokshields, Glasgow.
G. A. Paxton (BRS3497), 4, Garland Place, Dundee, Scotland.

Dominion and Foreign.

W. W. Diefenbach (D4MXF), Berlin-Oberschoneweide, Fuststr, 42 Germany.
E. Bonamy (F8RR), Les Pieux (Manche), France.
J. A. Davanzo (W2KHR), 100, W. 94th Street, New York City, U.S.A.
W. S. Borton (BERS457), R.N.W/T Station, Rinella, Malta.
H. J. Knowles (BERS458), Zhob Signal Section, Fort Sandeman, Baluchistan, India.

R.S.G.B. Slow Morse Practices

Details appear below of the slow Morse practices organised by the Society for those members wishing to learn or improve their code. As usual, test matter will be taken from recent issues of the T. & R. Bulletin. The page number and month of issue will be given at the end of each test—by telephony. A telephony announcement will also be given at the commencement of each test to assist those interested in tuning-in the sending station. It is emphasised that reports will be appreciated and are desired in order to ascertain useful range and numbers utilising the service. If, however, a reply is desired, a stamp should be sent. Will stations in areas not at present served offer their services to Mr. T. A. St. Johnston (G6UT), "Normandale," Little Hallingbury, Essex (Telephone: Bishops Stortford 785). A service for Somerset will commence as shown in the following schedule, and is given by G3KX, Mr. W. T. Gould, 61, Ashcombe Park Road, Weston-super-Mare.

	G.M.T.	Kc.	Station	Location
Sundays ...	0900	1755	G8NF	Manchester
	0900	1865	G3LP	Cheltenham
	0930	1792	G8AB	Loughton
	1000	1800	G8PR	Staffordshire
	1300	1920	G6VC	Northfleet
	1230	1758	G6VD	Leicester
	1500	1897	G3GH	N. Devon
Mondays ...	2230	1925	G2CF	S. Devon
	2345	1763	G3KX	Weston-s-Mare
Wednesdays	2215	1865	G3LP	Cheltenham
Thursdays	2345	1763	G3KX	Weston-s.-Mare
Fridays ...	2230	1925	G2CF	S. Devon

British Calls Heard

BERS 195, *Telegraph Station, Powell Creek, North Australia. November* 11-*December* 8, 1938.

14 Mc. C.W.—G3bs, 3ct, 5ug, 6dl, 6gb, 6gl, 6td, 8cv, 8rq, gm5sc, 28 Mc. CW.: G2cr, 2xc, 2zp, 3 bi, 5gi, 5li, 5my, 5sy, 5xy, 6cl, 6dh, 6fu, 6wy, 8jv, 8mh, 2pl.

Medway Amateur Transmitters Society

The Seventh Annual Dinner and Dance arranged by this go-ahead Society was held at the Swan Hotel, Chatham, on November 30. The company, which numbered 60, sat down to an excellent meal under the chairmanship of Mr. W. E. Nutton, G6NU. Although the Society's patron, Capt. L. Plugge, M.P., was prevented from attending, several well-known visitors, including G6CL, 6PA, and 2UJ came along to give their support.

During his reply to the toast of "The R.S.G.B.," Mr. Clarricoats congratulated the M.A.T.S. on their splendid progress, and expressed his pleasure at again being invited to their annual dinner. Before presenting the many valuable club trophies, he stressed the value of contests which, he said, were designed to bring out the best in every competitor.

The winners of the various trophies were:—

Capt. Plugge Trophy—S. Howell, G5FN (Leading M.A.T.S. station in 1938 Junior B.E.R.U. Contest).

Stone Challenge Cup—W. Burrin, M.R.S. 1 (Leading M.R.S. in B.E.R.U. Receiving Contest).

Howlett 56 Mc. Transmitting Award—W. E. Nutton, G6NU.

Howlett 56 Mc. Receiving Award—R. Nicholson, 2DOH; G. Burbridge, M.R.S. 38.

The latter award is to be held for six months by each winner.

Mr. Moss, of *The Kent Messenger and Observer*, in proposing "The Medway Amateur Transmitters' Society," paid a tribute to the excellent work carried out by the Club, and on behalf of the proprietors of his paper, conveyed best wishes for its future success. In his reply, G5FN, the Secretary, thanked Mr. Moss for the valuable publicity given to the Club by *The Kent Messenger and Observer*.

At the conclusion of the speeches, 2AFT displayed films taken at G5FNP during N.F.D. This was followed by a Spelling Bee and a raffle, both of which provided good entertainment. G6NU contributed his usual comedy turn, after which the company danced until nearly midnight.

Thus ended yet another highly successful M.A.T.S. function.

The organisers were Messrs. Howell and Nicholson.

In Search of B.E.R.T.A.

Call	*Dominion Districts*	*Colonies*	*Total*
G6XL ...	25	13	38
G5HH ...	24	14	38
G8IG ...	23	13	36
ZS6BT ...	18	16	34
G5ND ...	24	10	34
G6ZO ...	21	13	34
GM8HA ...	22	11	33
G3BI ...	23	10	33
G2GK ...	23	7	30

Please send only the total of *confirmed* contacts for listing in the above table.

The Amateur Radio Handbook

WE have pleasure in publishing a selection of letters of appreciation received from members and non-members concerning our new Handbook.

We would urge everyone to do his or her best to popularise this publication, the production costs of which were very considerable.

Single copies cost 6d. to post, but batches of ten can be sent for 1s. It is suggested that Groups of members combine when placing an order thereby reducing the post free price from 3s. to 2s. 7½d. per copy.

* * *

"I would like to congratulate those responsible for the R.S.G.B. *Amateur Radio Handbook* for the excellent way in which the whole publication is compiled and set out.

"To the Newcomer and Old Timer alike its pages contain a wealth of technical information which does credit to many technical works selling at a much higher figure than a modest 2s. 6d.

"Those members who contributed articles must have given many hours of leisure, and to them let us say, 'Thank you, O.M.s.'

"A final word to those who have not yet obtained a copy. Honestly, chaps, you've no idea what a good thing you are missing—it's worth twice the price asked for!"

J. N. ROE (G2VV).

* * *

"I should like to take this opportunity of congratulating you on the publication. The book fulfils a long-felt want, and covers the field in a most comprehensive manner."

L. C. C. AYLING
(Radio Officer, T.S.S., Thanet).

* * *

"I would like to say a few words in appreciation of all the hard work which must have been entailed in the production of the Handbook, and which one is often too ready to take for granted.

"I am sure that I am only expressing the feelings of all who have seen the book (and I hope that's the total R.S.G.B. membership, as well as plenty of non-members) when I say that such a book has long been awaited in Britain. The information contained in it is all up-to-date, and the theory and practice are well balanced. With the present standard maintained the book will deserve all the success it receives in its present and future editions."

T. L. FLETCHER (BRS2763).

* * *

"Many thanks for the excellent book which you and your colleagues have prepared. I am sure the great and valuable amount of information it contains will be satisfying even to the keenest transmitter."

J. ANDERSON.

* * *

"The Handbook is very good value, and is well worth double the price asked."

C. K. GILBANK.

* * *

"May I offer you my very sincere congratulations on this F.B. publication; we members have much to be thankful for what is a really great piece of work."

C. R. THOMPSON (G8WI).

"May I take this opportunity of congratulating you upon a fine achievement by providing such a fine book for the British amateur."

R. CAVE (G2KQ).

* * *

"Congratulations on a fine publication in the British tradition."

DR. J. B. SCOTT.

* * *

"I have just received my copy of *The Amateur Radio Handbook*, and would like to congratulate those responsible for this fine production.

"As one interested in Amateur Radio for nearly 20 years, I consider it a beginning worthy of the traditions of the R.S.G.B. It has far exceeded my expectations, and it reflects the healthy state of Amateur Radio in this country."

JOHN DALE (G5VD).

* * *

"I would like you to convey to all responsible for the production of the new Amateur Handbook, my appreciation for this very fine endeavour. It is certainly the 'Berries,' and all of you deserve the best of thanks and congratulations. I have shown it to some of my friends, and that accounts for the following orders."

LESLIE COOPER (G5LC).

* * *

"I am not very well up in these matters yet, but this book appears to be a veritable treasure-house of information and wonderful value for money. It is exactly what I've been looking for, and I imagine it will meet with a warm reception everywhere."

S. C. HOBBS.

* * *

"May I congratulate everyone who made this excellent book possible.

"I have not yet had a chance to do anything other than skip through the pages, but what I have seen has made me regret that I have not much spare time this week—it really seems a very F.B. job."

T. R. THEAKSTON (2DBK).

* * *

"I would like to express my appreciation of this book. The valuable information it contains is well worth double the price to a newcomer to amateur radio like myself."

A. V. HOLLOWAY, M.N.I.Ch.

* * *

"It isn't often I hand bouquets out, but I feel I must congratulate those responsible for the publication of *The Amateur Radio Handbook*.

"I have copies of all publications dealing with amateur radio, and it is my honest opinion that the R.S.G.B. book offers the best value of them all.

"Every amateur in this and, for that matter, other countries should possess one of these comprehensive books, and I shall certainly endeavour to make its merits known as widely as possible in Hull and district."

J. W. GILL (G6OS).

NOTES and NEWS from the BRITISH ISLES

DISTRICT REPRESENTATIVES.

DISTRICT 1 (North-Western).
(Cumberland, Westmorland, Cheshire, Lancashire.)
Mr. J. NODEN (G6TW), Fern Villa, Coppice Road, Willaston, near Nantwich, Cheshire.

DISTRICT 2 (North-Eastern).
Yorkshire (West Riding, and part of North Riding).
Mr. L. W. PARRY (G6PY), 13, Huddersfield Road, Barnsley, Yorks.

DISTRICT 3 (West Midlands).
(Warwick, Worcester, Staffordshire, Shropshire.)
Mr. V. M. DESMOND (G5VM), 199, Russell Road, Moseley, Birmingham.

DISTRICT 4 (East Midlands).
(Derby, Leicester, Northants, Notts.)
Mr. W. A. SCARR, M.A., (G2WS), Wharfedale, Heanor Road Ilkeston, Derbyshire.

DISTRICT 5 (Western).
(Hereford, Wiltshire, Gloucester.)
Mr. J. N. WALKER (G5JU), 4, Frenchay Road, Downend, Bristol.

DISTRICT 6 (South-Western).
(Cornwall, Devon, Dorset, Somerset.)
Mr. W. B. SYDENHAM (G5SY), "Sherrington," Cleveland Road, Torquay.

DISTRICT 7 (Southern).
(Oxfordshire, Berkshire, Hampshire, Surrey.)
Mr. E. A. DEDMAN (G2NH), 75, Woodlands Avenue, Coombe, New Malden, Surrey.

DISTRICT 8 (Home Counties).
(Beds., Cambs., Hunts and the towns of Peterborough and Newmarket.)
Mr. S. J. GRANFIELD (G5BQ), 47, Warren Road, Milton Road Cambridge.

DISTRICT 9 (East Anglia).
(Norfolk and Suffolk.)
Mr. H. W. SADLER (G2XS), "The Warren Farm," South Wootton, King's Lynn, Norfolk.

DISTRICT 10 (South Wales and Monmouth).
Mr. A. J. FORSYTH (G6FO), 29, Stow Park Avenue, Newport, Mon.

DISTRICT 11 (North Wales).
(Anglesey, Carnarvon, Denbighshire, Flintshire, Merioneth, Montgomery, Radnorshire.)
Mr. D. S. MITCHELL (GW6AA), "The Flagstaff," Colwyn Bay, Denbighshire.

DISTRICT 12 (London North and Hertford).
(North London Postal Districts and Hertford, together with the area known as North Middlesex.)
Mr. S. BUCKINGHAM (G5QF), 41, Brunswick Park Road, New Southgate, N.11.

DISTRICT 13 (London South).
Mr. J. B. KERSHAW (G2WV), 13, Montpelier Row, Blackheath, S.E.3.

DISTRICT 14 (Eastern).
(East London and Essex.)
Mr. T. A. St. JOHNSTON (G6UT), "Normandale," New Barn Lane, Little Hallingbury, Bishops Stortford.

DISTRICT 15 (London West).
(West London Postal Districts, Bucks, and that part of Middlesex not included in District 12.)
Mr. H. V. WILKINS (G6WN), 539, Oldfield Lane, Sudbury Hill, Greenford, Middlesex.

DISTRICT 16 (South Eastern).
(Kent and Sussex)
Mr. W. H. ALLEN (G2UJ), 32, Earls Road, Tunbridge Wells.

DISTRICT 17 (Mid East).
(Lincolnshire and Rutland.)
Mr. W. GRIEVE (G5GS), "Summerford," New Waltham, Lincs.

DISTRICT 18 (East Yorkshire).
(East Riding and part of North Riding.)
Mr. E. MITCHELL (G5MV), 40, North Marine Road, Scarborough.

DISTRICT 19 (Northern).
(Northumberland, Durham, and North Yorks.)
Mr. R. J. BRADLEY (G2FO), "High Crest," Yarm Road, Eaglescliffe Co. Durham.

SCOTLAND.
Mr. JAMES HUNTER (GM6ZV), Records Office, 51, Camphill Avenue, Langside, Glasgow.

NORTHERN IRELAND.
Mr. J. A. SANG (G16TB), 22, Stranmillis Gardens, Belfast.

NEW MEMBERS ARE CORDIALLY INVITED TO WRITE TO THEIR LOCAL DISTRICT REPRESENTATIVE.

DISTRICT 1 (North-Western).

District Representative : J. Noden (G6TW), "Fern Villa," Coppice Road, Willaston, Nantwich, Cheshire.

District Scribe : H. W. Stacey (G6CX), "Sandleas," Eddisbury Road, West Kirby, Cheshire.

Town Representatives :

Birkenhead : G. Russell Lee (G6GL), 25, Boundary Road, West Kirby, Cheshire.

Blackburn : Jim Bolton (2CRM), 6, Ash Street.

Blackpool : H. Fenton (G8GG), 25, Abbey Road, Blackpool, S.S.

Burnley : P. Nicoll (G5ZN), 35, Reedley Road.

Bury : T. G. Platt (G2GA), 64, Holcombe Avenue.

Liverpool : H. Caunce (G6KS), 24, Vanbrugh Road, Anfield, Liverpool, 4.

Manchester : W. Lucas (G2OI), 25, Boothfields, Winton, near Manchester.

Oldham : F. Sutton (2DJV), 194, Shaw Road, Royton.

Warrington : F. A. Vost (G2IF), 26, Pinewood Avenue.

The above T.R's. have been properly nominated. No official advice concerning T.R's. for other towns in the District has been received by Headquarters or the D.R.

Burnley.—The following are active :—G8TD, 8UA, 3SJ, 2RB, 3HK, 3VO, 3IY, 3KT, 5ZN, 2BFB, 2FBI and 3WU, but no detailed reports are to hand. Please send reports to the T.R. by the 20th.

Liverpool.—The December meeting was attended by G2FZ, 2JT, 3WT, 5MQ, 5XP, 6DP, 6GL, 6KS, 6YQ, 8DI, 8OB, 8VY, 2APQ, 2CDQ, 2DCG, 2DAX, 2DMS, BRS2640, BRS3145 and BRS3223.

Before proceeding further with the acquisition

of the proposed club room, it was decided to ask all members to attend the next meeting, to be held on January 18, 1939, at 56, Whitechapel, Liverpool, when they will be able to express their views and state whether they will support the new venture. If it is not possible to attend the meeting please write to the T.R. beforehand, giving him your views. It is proposed that a club room be obtained and fitted out for A.A. experiments with transmitting and other apparatus, including testing equipment, to be available at all times to every member.

A talk will also be given at the next meeting on the subject of "Oscillators—Types and Uses."

Warrington.—Congratulations to 2CDC who is now G3TM. He has worked U5 on 14 Mc., using very low power, and is now awaiting G.P.O. permission to operate on 1.7 Mc. 8TR is back in town and working on 1.7 Mc. 8AF and 2DF are also active on that band. Reports to the T.R. before the 20th of the month, please.

Manchester.—About thirty members attended the last meeting. The talk which was to have been given by G6OM had to be postponed owing to the absence of 6OM through a bereavement in the family. Manchester members take this opportunity of expressing sympathy with him. A sale of disused apparatus took place, and the profits were placed to the credit of the Section's account. Will the member who left a parcel of apparatus for disposal please get into touch with G2WQ or 2OI so that he can receive the monies due to him; unfortunately he left no call sign or address on the parcel.

G2DH is doing good work on 28 Mc. and hopes to claim one or two awards on this band soon. G6TL 8BI, 3DA, 2RA, and 2OI are CC on 56 Mc., and would welcome schedules.

Congratulations to G6KS on his appointment as T.R. for Liverpool. Through his long stay in Manchester he has an intimate knowledge of this section, and members are hoping for close co-operation between the two sections during the coming year.

Manchester members extend the compliments of the season to all amateurs, wherever they may be.

DISTRICT 2 (North-Eastern)

District Representative: L. W. Parry (G6PY), 13, Huddersfield Road, Barnsley.

District Scribe: C. A. Sharp (G6KU), 316, Poplar Grove, Great Horton, Bradford.

Town Representatives:

Barnsley: T. Malkin (G5IV), 5, White Hill Terrace, Dodsworth Road.

Bradford: C. A. Sharp (G6KU), as above.

Doncaster: A. Dickinson (2FJO), 111, Sprotboro' Road.

Halifax: R. P. Pohlmann (2DOR), 138, Skircoat Moor Road.

Harrogate: J. Pullan (2BPI), 1, Roseville Avenue.

Huddersfield: J. Dale (G5VD), 12, Langley Terrace, Crosland Road, Oakes.

Sheffield: A. H. B. Cross, Ph.D. (G3FN), 51, Masefield Road, Sheffield, 2.

The above is the list of T.R.'s elected or appointed up to date. T.R.'s seldom receive or expect any thanks for their labours, so we appeal to everyone to make the New Year a better one by giving them support whenever possible.

Halifax: The Halifax Experimental Radio Society has now removed to 32, Clare Road, where there are better facilities and accommodation. Meetings are held weekly, on Wednesdays from 7.30 to 10 p.m., and all interested in radio are welcomed. Three members have recently become fully licensed —G3ZK ex 2DOR, G3UF ex 2BHI, and G3UI ex 2ABC. All are active on 7 Mc., and would welcome reports and contacts. G8SJ, 2DUX and 2DGK are also active.

Doncaster.—We are pleased to see the appearance of notes from Doncaster. It is hoped shortly to have a meeting place available where regular meetings can be held. Numerous stations are active, including G3NJ, 3VC, 8IC, 2BCQ, 2FJO, 2FTO and BRS193. The T.R. would like to contact those members in the area whom he has not met, and asks them to get in touch with him for that purpose. G2XK and 2BIP have recently left the town.

Harrogate.—A little group of members is steadily growing here, and a T.R. has been appointed. Members are asked to give him their help, in attending meetings, etc., and maintain the interest which has been created. 2BPI and 2DRA are active and are working to obtain a full licence.

Huddersfield.—A visit to Barnsley has been arranged provisionally for Thursday, January 19, and a return visit on February 14. Details later. The last meeting was held at G8CD, who is to be congratulated on a workmanlike station. G5VD is active on 56 Mc. using C.C. Regular reports are received from 3NJ near Doncaster. G8CD and 3UR are welcomed to membership.

Bradford.—The syllabus of the Bradford Radio Society has been provisionally fixed for the second half of the season as follows:—*January* 18, G6KU, "Quartz Crystals"; *January* 31, Mr. Price, "Modern Developments in L.F. Amplifiers"; *February* 15, Mr. James, "Psychic Television"; *February* 28, Mr. Milnes, "Radio from Gas Mains"; *March* 8, G6AZ, subject later; *March* 21, Talk on the Hammond Organ. Those interested in any of the above subjects, or in radio generally, are invited to come to the meetings held at Cambridge House, 66, Horton Lane, Bradford. The subscription has been recently lowered to the nominal one of 2s. 6d. per annum.

The last Bradford group meeting was held at G6KU, but only a small attendance was recorded. In the past, meetings have been held at members' homes, which gave one an opportunity of seeing the other man's station, as well as taking part in the business and social side. Possibly owing to the fact that there are now two radio societies in the city, these meetings are not fully supported, and events such as National Field Day are often left to a few to run. Will Bradford members please send a card now to G6KU saying what they would like, and support, so that a meeting can be arranged at an early date.

G6BX recently gave a talk at the Radio Society on "A.C. Theory," which was much appreciated. 6XL has taken up telephony after about ten years on C.W. 5HB has again come to reside in Bradford after some years in York. 5TQ is on the air after some months of inactivity and a change of QRA. 2FFH hopes to be active soon with a full call-sign. The best wishes for 1939 are sent to all by the D.R. and T.R., and, please, *don't forget to send that card.*

DISTRICT 4 (East Midlands)

A happy New Year to all members in the District.

Incidentally, the District membership is now in the region of 170 and growing steadily.

The 1.7 Mc. contest was eagerly anticipated, especially in the Leicester area, and there will undoubtedly have been a record entry from District 4 this year. A tankard is to be presented to the District winner as shown by the highest number of points in the published list.

The December meeting at Mansfield produced a record attendance of 41, and we are indebted to Mr. Slack (G5KG) for giving us, in simple language, a full explanation of the various methods and systems of modulation. KG's paper was followed by a brief discussion, and then G2RI once more took over the job of organising the junk sale. Unfortunately on this occasion there appeared to be more gear than available cash and many articles were unsold. Our thanks are due to Dr. Vance (G8SA) for organising such a successful meeting.

The next District meeting will take place at the St. James Restaurant, St. James Street, Derby, on Sunday, January 22, at 3.30 p.m., when the question of Field Day, 1939, will receive preliminary consideration.

Mansfield.—The local meeting on December 4 was attended by eleven members, and G8SA reports a high level of activity in the Mansfield area.

No reports from other areas have been received this month.

DISTRICT 5 (Western)

District Representative : J. N. Walker (G5JU), 4, Frenchay Road, Downend, Bristol.

Town Representatives :

Bath.—G. R. Marsh (G2IW), Oriel Lodge, Lower Swainswick.

Bristol.—H. Gratton (G6GN), Richmond House, Sydenham Road.

Cheltenham.—P. Malvern (G8DA), Boldre Villa, Selkirk Street.

Gloucester.—J. Hamilton (G5JH), Brook Cottage, Bristol Road, Hardwicke.

First of all, appreciation must be expressed for the very able way in which the T.R's. within the District carried out their duties in 1938, which, on the whole, was a very successful year. The sincere thanks of the members are accorded them.

R. Griffin (G5UH), Bristol, and W. G. Brown (G5BK), Cheltenham, have resigned from T.R. office, their places being taken by H. Gratton (G6GN), who is well known locally for his consistent DX work, and P. Malvern (G8DA), another very active member. We have no doubt that the support they will receive from the members will be fully maintained.

A fine set of glassware was put up for raffle, through the generosity of 2BYU, at the Bristol December meeting, and resulted in a substantial sum being realised for the local fund, which now stands at a very healthy figure. G2IK gave a detailed report of the activities of the Bristol section during 1938, this being followed by a financial statement. G3YH having intimated his desire to resign from the office of Treasurer, was thanked for his past services. G. Moon (2FHP) accepted the position. The appointment of G6GN as the new T.R. was unanimously approved.

On December 6 a party visited the Physics Laboratory section of the Bristol University. A very interesting evening was spent with the inspection of apparatus for splitting the atom, an X-ray demonstration and other scientific "side-lines." We are indebted to Mr. Rogers for the arrangements.

Good activity is reported from *Bath.* A new 56 Mc. transmitter, with a 210 as final, built by G8DX, has proved very successful, and regular transmissions will be commenced shortly. Reports will be appreciated. G8HW has received a permit for the 28 and 56 Mc. bands, and expects to be active on both before long. G8JQ was unfortunate enough to injure his knee, this preventing him from hauling aloft his new 28 Mc. beam aerial. Lying in bed, he had perforce to confine his activities to 7 Mc. G2IW has succeeded in overcoming his 28 Mc. modulation troubles.

G5JH, *Gloucester,* having no mains available, has acquired several rotary machines and now generates his own A.C. He is busy working on a new D.F. system. G3MA is a sadder but wiser man as a result of losing a P.A. valve through a grid bias battery proving faulty. One of the first G4 calls has been allocated to J. B. Burtt, Stroud, who is G4AB, ex 2DKQ. He is active on 7 and 14 Mc., and will welcome reports. It is learnt with interest that an amateur at Cinderford (Forest of Dean) is consistently receiving good television pictures, the distance being well over 100 miles.

With a view to increasing interest in the B.E.R.U. Receiving Contest, a member who prefers to remain anonymous has offered to put up a prize of radio components to the value of one guinea (to be selected by the winner). This will be awarded to the member of District 5 who is highest in the Contest, and the following simple rules will apply :—

1. The entrant must send a copy of his official entry to G5JU within the time limit specified for Contest entries.
2. Said copy must be duly certified that the rules of the Contest have been observed in all respects.
3. Only BRS and A.A. members will be eligible.

With this additional incentive, it is hoped that a considerable number will enter for the Receiving Contest, and who knows but that one of the "hot-stuff" DX loggers (and the writer is aware that there are plenty within the District) will also carry off the prime award.

The D.R. and T.R's. send wishes to all members for Health and Prosperity in the New Year.

DISTRICT 6 (South Western)

District Representative : W. B. SYDENHAM (G5SY), "Sherrington," Cleveland Road, Torquay.

Town Representatives :

Exeter : H. A. BARTLETT (G5QA), Lendorie, Birchy Barton Hill, Heavitree.

N. Devon : MRS. C. MYLER (G3GH), Knowle, Nr. Braunton, N. Devon.

Plymouth : J. EDDY (G3TX), 55, Greenbank Avenue, Lipson.

Taunton : DR. A. J. ILES (G5LM), Shutterne House.

Torquay : L. MAYS (2CWR), 185, Windsor Road.

It will be seen from the above list that three of last year's T.Rs. are continuing in office, and that there are two changes. We record our appreciations to the retiring T.Rs. for their services in the past, and thank those who are carrying on for another year. We wish all happiness and success to G3GH and G3TX, who have taken office for North Devon and Plymouth respectively.

No response has been received to our appeal for help in Cornwall, although there are a number

of members in the vicinity of Truro, Penryn, etc. Cannot something be done to get an active group going in 1939?

Torquay.—Unfortunately the D.R. had no alternative but to postpone the December meeting for a week, the result was that on the evening chosen the roads were covered with ice and snow, which made walking or driving a real trial. G3ID, 3JD, 6JL, 2CAA, and BRS2927 showed their enthusiasm by braving the conditions. The main topic of discussion was the new Handbook, which all considered very good.

during his term of office, especially 3GH for her assistance in connection with District Notes.

Exeter.—The bi-monthly Exeter meetings are being well supported. The present arrangements are that there is an hour's Morse practice, followed by a discussion on problems which have been sent in to the T.R. beforehand. This gives the latter a chance to look up any difficult points, thus saving time at the meeting. It is hoped that all who have difficulties will bring them forward.

Taunton.—In spite of a very wet afternoon, fifteen met at the Bristol Hotel, Bridgwater, in-

FORTHCOMING EVENTS

Jan. 18.—District 1 (Liverpool Section). 7.30 p.m. at 56, Whitechapel, Liverpool. Discussion *re* proposed Club Room and talk on "Oscillators: Their Type and Use."
,, 18.—Scotland "E" District, 7.30 p.m. at Fleury Meng's, 48, Newmarket Street, Ayr.
,, 19.—District 13 (Central Areas), 8 p.m. at Brotherhood Hall, West Norwood.
,, 19.—District 6, 8 p.m. at G5SY, "Sherrington," Cleveland Road, Torquay. Combined meeting for Torquay and Exeter. Display of R.S.G.B. films.
,, 20.—District 12, 7.30 p.m. at the Orpheum Cinema, Finchley Road, N.W.11. Discussion on N.F.D.
,, 21.—Scotland "H" District Annual Dinner. 7.30 p.m. in Station Hotel, Kirkcaldy, tickets 7s. 6d. each.
,, 22.—District 11, 7 p.m.* at GW3GL, Grenada, Conway. Talk by the Chief Technical Instructor, North Wales Wireless College.
,, 23.—District 6, at Plymouth. QRA not yet fixed.
,, 24.—District 13 (Wimbledon Area), 8 p.m. at Raynes Park Co-operative Hall, Raynes Park, S.W.20.
,, 25.—District 14 (East London Section), 7.30 p.m. at G6AH, 3, Bradford Road, Seven Kings.
,, 25.—District 15, 7.30 p.m. at 2DLM, 76, Uxendon Hill, Wembley.
,, 25.—Scotland "A" District, 7.30 p.m. in room "A," Institution of Engineers and Shipbuilders, 39, Elmbank Crescent, Glasgow.
,, 25.—Scotland "H" District, 7.30 p.m. in district shack, Bank Street, Kirkcaldy.
Jan. 27.—London meeting at the I.E.E. Tea at 6 p.m. Adjourned Annual General Meeting at 6.40 p.m., followed by a discussion on Beam Aerials opened by Mr. F. Charman (G6CJ).
,, 28.—R.T.U.N.I., 7 p.m. at Presbyterian Hostel, Howard Street, Belfast.
(instead of 27th)
Jan. 29.—District 7, 2.30 p.m. at Civil Service Sports Pavilion, Copnor Road, Hillsea, Southsea.
Feb. 1.—S.L.D.R.T.S., 8 p.m. at Brotherhood Hall, West Norwood.
,, 1.—District 14 (Colchester Section), 7.30 p.m. at G8PZ, 19-21, Artillery Road, Colchester.
,, 1.*—District 1 (Manchester Section), 7.30 p.m. at Brookes Café, 1, Hilton Street, Off Oldham Street, Manchester. Talk by G2HW.
,, 2.—District 6 (Exeter Section), 8 p.m. at Y.W.C.A., Exeter.
,, 2.—District 15 (W.L.S.), 7.30 p.m. at G6CO, 22, Chipstead Gardens, Humber Road, Cricklewood.
,, 3.—District 14 (Central Herts), G2NO, 4, St. Stephens Avenue, St. Albans.
,, 6.—District 14 (Chelmsford Section), 7.30 p.m. at G5RV, "Arvika," Galleywood Road, Chelmsford.
,, 8.—District 15, 7.30 p.m. at 2ADC, 111, St. Mark's Road, North Kensington.
,, 8.—Scotland "H" District. Details as above.
,, 15.—District 15, 7.30 p.m. at G8FA, 44, Cranmer Road, Hayes.
,, 16.—District 15 (W.L.S.), 7.30 p.m. at 2CSD, 48, Fordwych Road, Shoot-up-Hill, N.W.6.
,, 16.—District 6, 8 p.m. at G5SY, "Sherrington," Cleveland Road, Torquay.

* Sale of disused apparatus at this meeting.

N. Devon.—The group will soon be competing for the honour of being the first to contact VS6AH (brother of G6GM), who, we hear, has built a specially "hot" 14 Mc. transmitter for the purpose. G8US has now obtained a 28 Mc. licence and will shortly be active in this band. G3GH is trying out a 3 in. CR tube. All members report active.

In handing over the duties of T.R. to G3GH, 3BO wishes to thank everyone for their support

cluding G5LM, 3AS, 3NB, 3KX, 3SB, 3VA, 3XR 5GT, 5AK, 6LQ, 2CMM, 2DBB, BRS3388, and 3446.

G3KX has decided to give slow Morse practice on Mondays, Tuesdays, Fridays, and Saturdays at 2330 on 1763 kc. Congratulations to G5TN, who has WAC and WBE in one week on 10 watts. 6LQ is on 56 Mc. on Sundays from 12.00 to 13.00, using C.C.

Plymouth.—Those present at the meeting on December 12 were: G2HX, 3TX, 8HF, 8PN, 2DLJ, BRS2932 and 3464. The never-failing topic of receivers cropped up again, and, linked with it, the value or otherwise of the RS system of giving signal reports. An interesting argument arose on various methods of regeneration in superhets. G2HX is concentrating on 28 Mc. DX with two vertical half-waves in phase. 3TX has built a two-stage regenerative pre-selector which gives fine results. BRS2932 has applied for his A.A.

DISTRICT 7 (Southern).

As is usual, the February meeting is brought forward a week to avoid clashing with B.E.R.U. The meeting is to be held at the Civil Service Sports Pavilion, Copnor Road, Hillsea, on Sunday January 29, at 2.30 p.m. This will be the first District Meeting held in Southsea for a number of years, and we trust it will receive full support from all members.

The December meeting at G2YL's was a great success, and over 60 members and friends enjoyed the N.F.D. and Convention films. Once again our thanks are due to G2YL and her family for their hospitality.

The only notes received are from Croydon

Croydon.—A very successful dinner arranged by the Surrey Radio Contact Club was held on December 8.

Many members are co-operating with local fire brigades, while others have joined C.W.R.

Reports to G5XH by the 25th please, and remember the S.R.C.C. meets at 8 p.m. on the first Tuesday in each month at The Alhambra, Wellesey Road, Croydon.

DISTRICT 8 (Home Counties)

District Representative: S. J. GRANFIELD (G5BQ), 47, Warren Road, Cambridge. ('Phone: 54644.)

Town Representatives:—

Bedford: H. R. JEAKINGS (G5FO), c/o Jeakings and Son, Mill Street.

Cambridge: L. W. Jones (G5JO), "Mella Loona," 16, Leys Road. ('Phone: 3406.)

Luton: A. G. TEARLE (G3KG), 16, Kenilworth Road.

St. Ives: C. D. WHALEY (G6WA), "Danum," Ramsey Road.

Peterborough: W. CARTER (G2NJ), 1, Gladstone Road. ('Phone: 3587.)

The December monthly meeting took the form of a display of the R.S.G.B. films at the Chesterton Senior School, Cambridge, through the kindness of the Headmaster, Mr. G. W. Manfield, B.Sc. About forty members and friends took the opportunity of seeing themselves on the screen, the films being of particular local interest since they included N.F.D., the Cambridge Conventionette and the stations of G2XV and G5JO.

Cambridge stations do not seem to be particularly active just now, though 2PL and 5DQ have both been working DX on 7 Mc., 5DQ having contacted VK and VU on this band. 5DR is designing an efficient receiver. 8SY is on 7 Mc. phone. 5BQ was off the air for a month after a gale had wrecked all his aerials. Congratulations to Mr. and Mrs. 5JO on the arrival of a junior op.

G3BK, of *March*, has purchased a bungalow expressly for use as a transmitting station. 3WW is on 7 Mc. phone, as is 2UQ. 2NJ is moving his station to another part of *Peterborough*. At his station on the Norfolk coast a mast was blown down by the gale.

The District Contests for the Granfield Trophy take place on Sunday, January 15 (7 Mc.) and January 29 (14 Mc.)—operating times being from 0530 to 0930 G.M.T. on each occasion.

A very Happy New Year to all District members.

DISTRICT 9 (East Anglia).

District Representative: H. W. SADLER (G2XS), Warren Farm, South Wootton, King's Lynn, Norfolk.

District Scribe: H. A. SPASHETT (G3RK), Smallgate, Beccles, Suffolk.

Town Representatives:

Gt. Yarmouth: D. DAVY (G3RW), 59, East Road, Maygrove.

Ipswich: S. G. KEEBLE (G2AN), 139, Sidegate Lane.

Lowestoft: F. L. C. FIRMIN (G5QO), Hall Park Villas, Oulton Road.

Norwich: C. WHITE (G8VW), Ipswich Road.

Ipswich.—Meetings are being held at 66, Norwich Road, every Saturday evening at 8 p.m., where all members are welcome.

G6TI made a good start on 28 Mc.; 8MU still concentrating on 28 Mc. beams; 8KB completed his Super Gainer; 2JD took advantage of poor conditions to build a heterodyne frequency meter; 3OJ building a separate 7 and 14 Mc. transmitter; 2AN active chiefly on 7 Mc. No reports have been received from 8AG, 8CU and 8IS, while 8AN is QRT for the present.

Norwich.—G6QZ on 28 and 56 Mc., and preparing gear for 224 Mc.; 2MN ready for district 1.7 Mc. working (C.W. or telephony) on Sundays, 6.30-7.30 p.m., or any reasonable time; on that band he has worked OZ, using a 6L6G straight C.O. with 10 watts. Reports from other Norwich stations would be welcomed.

Great Yarmouth.—BRS3434 has joined C.W.R.; BRS3256 is building an all-band receiver; G3RW has completed a phone monitor and field strength meter.

Lowestoft Area.—G5QO is rebuilding his modulator; G3RK (Beccles) is on 7 Mc.; 3UT (Bungay) is on 14 Mc.; 3IN (Saxmundham) has been working Ws on 7 Mc., using QRP. Congratulations to 2DRM, how G3XT.

Kings Lynn.—G5UD hopes to be on the air again by the time these notes are in print. 2XS is on 1.7 Mc. and ready for district working at any time.

Reports should be sent to G3RK by the 25th.

DISTRICT 10 (South Wales and Monmouthshire)

If the paucity of reports is any indication, a general atmosphere of lassitude in the radio sense must be pervading the District—perhaps only to be expected in view of the season of the year. So without wasting any more space, let us report what news there is.

Cardiff.—A surprisingly well-attended meeting on December 15, drew GW2BG, 2JL, 2UH, 2XZ, 3AJ, 3VL, 5AB, 5BI, 5XN, 6FO, 8UH, 2AXT, 2BQB, 2BUF, 2DHM, and 2DOS; with Christmas

so near, the discussion was general, and no set programme was followed. G2JL and G6FO visited the new plant at GW5WU (Penarth) later in the evening.

Will all concerned please note that the next Cardiff R.S.G.B. meeting is on February 16, at the new Club-rooms, and it is hoped there will be a large attendance by way of a house-warming.

Blackwood.—The only news here is both urgent and important. Get in touch immediately with W. H. Mudford (G6BK), 3, Albany Road, Blackwood, Mon., and book your place for the Hamfest at the Butchers' Arms Hotel, Blackwood, at 7 p.m. on Thursday, January 19. It's going to be a great show.

The T.Rs. are now in their places for the coming year, and are asked to get in touch with the D.R. as soon as possible in connection with the arranging of meetings and visits.

The D.R., in sending his greetings for the New Year, records his thanks to those many members who so kindly sent him personal Christmas messages, including one to the District from BERS444 in VS2.

DISTRICT 12 (London North and Hertford)

Owing to the festive season and the fact that no meeting was held in December reports from individual members are scarce this month. The January meeting will be held at the Orpheum Cinema as usual unless members have received a notice to the contrary. We should like to remind everyone that the January meeting will be devoted to National Field Day discussions, therefore those interested in this event should make a point of being present.

Central Herts.—The meeting of the Central Herts amateurs on December 2 was held at G3JX, Harpenden. Information about the C.W.R. was given by G6LL, who is a district controller in that organisation. Other C.W.R. members present include G3JX, G8PM, G8TK and G5UM.

Local activities: G3JX obtains phenomenal results with his new Kraus beam, and works dozens of VK's with 10 watts. G8FZ, Hatfield, for three years *Daily Mail* air pilot, leaves to take up a position in New Zealand. G8TK continues to work U.S. stations on 7 Mc., while G5UM has done so on 3.5 Mc. with 10 watts. Members hitherto inactive are energetically rebuilding in preparation for the local low-power contest to be held at the end of January. Mr. Jowers (G5ZJ) has kindly offered some useful prizes. At the next meeting Mr. H. R. Adams will demonstrate *Webb's Radio* communication receivers.

DISTRICT 13 (London South)

A meeting of the Central Areas took place on December 22 at West Norwood; it was unfortunate that the weather was so bad, although in spite of this many members were present. News within the District is scarce owing probably to the Christmas season and no reports of outstanding interest have been received. Mr. Chiffey has now received the call G3ZJ and is already on the air. Good luck O.M.

It is with pleasure we announce that a meeting of the Wimbledon Area will take place on January 24 at 8 p.m. sharp. This will be held at the Raynes Park Co-operative Hall, which is at the corner of Vernon Avenue and Kingston Road, opposite Raynes Park 'bus terminus and about three minutes' walk from the S.R. station. We hope all members in the Wimbledon Area will make a special effort to be present as well as those from other parts. It is hoped to arrange a T.R.'s meeting early in the year and notification will be posted in due course.

The D.R. would like to wish all members of the District a very happy and prosperous New Year.

DISTRICT 14 (Eastern).

East Essex.—The Arctic weather prevailing at the time of the December meeting held at G5UK no doubt accounted for an attendance of only 10. A hearty vote of thanks was passed to G5UK for presenting a handsome cup to this section. This will be known as the "East Essex Challenge Trophy" and the first winner was G2SO, leader in the QRP transmitting contest held in May last. The winner of the December QRP contest will be presented with the cup at the next meeting. Arrangements were made for a Hamfest and meeting to be held at the Smack Inn, Leigh, on January 13. G5UK's new transmitter was the subject of much discussion and interest, as was the gear for a new rotating 56 Mc. beam. Most stations report activity and many took part in the 1.7 Mc. Contest.

East London.—Despite the prevailing fog the December meeting at G6UT, Little Hallingbury, was well attended. Those present included G6LL, G6FY, G5RV, G8PZ, and parties from Chelmsford and Chingford. The meeting welcomed its latest licensed transmitter, G3YF (2CID) to whom we offer congratulations. 2DHD of Highams Park has applied for his full licence, and G8AB for a 3.5 Mc. permit. Offers for meeting places for February and March are solicited.

DISTRICT 15 (London West, Middlesex and Buckinghamshire).

District Representative: H. V. Wilkins (G6WN), 539, Oldfield Lane, Sudbury Hill, Greenford, Middlesex.

Town Representatives:

West London (North): H. B. Crowe (G6CO), 22, Chipstead Gardens, Cricklewood, N.W.2.

West Middlesex: E. J. Napier (G8FA), 44, Cranmer Road, Hayes, Middlesex.

High Wycombe: V. O. Hawkins (2BVX), 35, Green Lanes, Terriers, High Wycombe, Bucks.

Only three nominations came along for T.R.'s. The D.R. hoped that members would have taken more interest in their own welfare. However, he now intends to communicate with likely members with the view to making appointments himself.

The membership was introduced to the products of G8ZD at the December meeting. The attendance was good, and great interest was shown in the apparatus displayed.

Those intending to attend the January meeting are advised to travel to Preston Road station by train or 79 bus, or to Bridge Road, Wembley, by buses 46, 83 or 92. The February meeting is reached by trolleybus on the Uxbridge Road *only*.

Congratulations to 2DGM, who is now G3YM, and a welcome to Mr. Triefus, who holds a A.A. and comes from District 12.

About a dozen reports have come to hand this month, but there is nothing of outstanding interest.

West London.—Reporting: G3UQ, 3YM, 6CO, 6RW, 8WR, 2DYD.

West Middlesex.—Reporting: G6VP. *South Middlesex.*—Reporting: G2NN, 3JC. Active: G2KI, 2VV, 3GQ, 3JG, 3RD, 6GB, 8HN and 8IP. *Bucks.*—Reporting: G3MI.

The D.R. would like to thank all those who sent him Christmas cards and reciprocates their wishes for the New Year.

DISTRICT 16 (South Eastern)

District Representative: W. H. ALLEN (G2UJ), 32, Earls Road, Tunbridge Wells.

Town Representatives:

Brighton and Hove: H. T. LUNSON (G3WR), 80a, Beaconsfield Road, Brighton, 6.

Eastbourne: F. Wingfield (G3CX), 48, Willingdon Road.

Gravesend: R. S. MARTIN (G2IZ), 41, Mayfield Road.

Maidstone: L. J. CLEGGETT (BRS2834), "White Cottage," Detling Hill.

Medway Area: J. E. BRYDEN (2BOL), 24, City Way Rochester.

Worthing Bognor, etc.: C. J. ROCKALL (G2ZV), "Aubretia," Seafield Road, Rustington, Sussex.

The following have kindly agreed to take on the duties of T.R. for their respective towns, but were not nominated in the usual way:

Heathfield: R. J. LEE (BRS1173), 9, Theobalds Green.

Whitstable: W. CROSSLAND (G5CI), "Griz Nez," 13, Queen's Road.

Please let your T.R. have an activity report prior to the 25th of the month.

Brighton and Hove.—G8OQ gave a much-appreciated talk on "The Generation of Electricity" at the December meeting. Congratulations to 2DGR on receiving the call G3YY. This is the fifth full licence issued in Brighton in the past year. 6RM has completed the building of his shack, and is now on the air. The following are active: G2RU, 3HP, 3JF, 3KJ, 3WR, 3YY, 6CY, 8AC, 8OQ, and all AA and BRS.

Eastbourne.—G2AO (1.7, 7 and 56 Mc.), 3AT (14 Mc.), 3CX, 5BW, 5IH, 8CP, 2AVQ, and 2FMC are active.

Gravesend.—On December 5 Mr. Nixon, of the G.E.C., lectured on "High Fidelity Speech Amplifiers," and demonstrated an amplifier on which the different methods of amplification were immediately available by switching. The lecture was illustrated by lantern slides, and an extremely instructive evening was spent. "Ham" Whyte was again unable to give his lecture on the 14th. This time we understand he was busy with a blow-lamp thawing out his hot-water system. Active: G2IZ, 2TN, 5IL, 5SI, 5SU, 6BQ, 6PG, 6VC, and 2BDL.

Heathfield.—The following report active: G5AQ, 5JZ (rebuilding), 5PN, 5PR (3.5 Mc. from new QRA in Horam), 2CJZ, and BRS1173 (has recently heard G6DH of Clacton on 56 Mc.).

Maidstone.—We are asked by Mr. Cleggatt, the newly-elected T.R., to state that all R.S.G.B. members in the Maidstone area are cordially invited to attend the meetings of the Maidstone Amateur Radio Society (affiliated to the R.S.G.B.), held every Tuesday at the Clubroom, 244, Upper Fant Road, Maidstone, at 7.45 p.m. The T.R. and several active members are usually present, and it is hoped that those members not at present attending will come along, as it is proposed to organise R.S.G.B. activity in the area. Active: G5XB, 8UC, 2BXW, BRS2834.

Medway Towns.—The M.A.T.S. annual dinner and presentation of trophies was held at the Sun Hotel, Chatham, on November 30. A report appears elsewhere. The event reflected great credit on those responsible for its organisation. G8VG reports direct from Dartford. He is on D.C. mains, but manages to get his 25 watts by using PP 25L6s. His DX on 14 Mc. is most impressive, and would do justice to a station working under far easier conditions.

Tunbridge Wells.—Congratulations to 2DIC, who now awaits his call. Our first G4? Active: G2UJ (56 and 1.7 Mc. Has a very successful ECO on the latter band, which should prove useful in the Contest. 5KV, 6ML (28, 14 and 1.7 Mc., but suffering from BCL trouble on all bands), 6OB (DX on 14 Mc.), 2AKQ, 2CUS, and 2CUX.

West Sussex.—Meetings: December 8. Discussion on "Super-het. *v.* Straight Receiver," between G2ZV and 2CDR and 2DDD. December 20, at The Picturedrome, Bognor Regis. *Standard Telephones and Cables* on "Short Wave Valve Design."

The following are active: G2ZV (28 Mc.), 2BAG, 2BGH (getting excellent results with home-constructed television receiver. Aerial on 60 ft. lattice tower), 2CDR, and 2DDD (co-operating with 2ZV on 56 Mc. receiver design).

The Sussex Short Wave Club has been granted affiliation to the R.S.G.B.

Whitstable.—G5CI continues his work on 7 Mc. with the RES Propagation Section, and had 1500 C.W. contacts on that band in 1938!

We are pleased to hear that ex-2BBB, who is with the R.A.F. in Egypt, has been elected President of the Heliopolis Amateur Radio Club, and hopes to take out an SU call. The D.R. has had two very interesting letters from him relating to his experiences in that country. Best of luck, OM.

The D.R. would like to take this opportunity of wishing all members a very happy and prosperous New Year.

DISTRICT 17 (Mid-East).

Grimsby.—We are pleased to welcome G6LI to this area and trust that his visit will be a long and happy one. Congratulations to our latest call G3ZG, whose QRA was thrown open to all members of the Grimsby and District Short-Wave Society for a very successful Christmas Hamfest.

Mablethorpe and Sutton.—G5CY still reports active on most bands. There is keen competition between G5BD and 2FT for elusive DX, but we feel confident that G5BD will retain the laurels!

Cranwell.—As there is very little news from this town we presume Christmas leave seriously curtailed the usual activity.

We shall be pleased to hear from other towns who have so far failed to send in reports.

The D.R. extends Greetings and Best Wishes for 1939 to all members.

DISTRICT 18 (East Yorkshire)

Hull.—At the November meeting it was gratifying to see the return of several old-timers who had not attended for some while. An interesting talk was given by G5HA covering his 56 Mc. experi-

ments, and appropriate apparatus constructed by G5HA and G5MN was exhibited. The D.R., G5MV, was present, accompanied by G3KS and G5GI from Scarborough, and they received a warm welcome. The policy of the District was discussed at length, and there was certainly evidence that the Hull members are optimistic as to its future.

A scheme for Hull was agreed upon in principle, which, if carried out, should prove of immense value to members. It is essential to have the whole-hearted support of all local members before this scheme can be put into operation. Those who are not already aware of the suggested project are urged to get into touch with the T.R., who will be pleased to discuss the matter.

Thanks were expressed to G2XA for his services as T.R., which duties have now been taken over by G6OS. Members are reminded that meetings are now held on the second Wednesday in each month.

Scarborough.—Hearty congratulations to Mr. J. H. Wetherill (G2TK) on his recent marriage. He is well known in Hull as well as in Scarborough, and his transmitting activities are to be restarted very shortly. 5GI has abandoned the use of battery bias in his P.A. stage, and is experimenting with various other methods. 6CP is receiving on 56 Mc., and hopes to be operating on this band shortly. He reports a curious case of interference on 56 Mc. A noise sounding similar to a flashing sign caused QRN in his O-V-1 receiver, and this was eventually traced to the escapement of a grandfather clock in another room of the house. He would like suggestions for a cure. 8KU is using a Zepp aerial on 7 Mc., and has worked his best DX so far in a U5.

A new member, Miss P. P. Fowler, BRS 3484, is welcomed, and the T.R. and D.R. would be pleased to hear from her. It is also a pleasure to know that there is activity in two towns not previously mentioned in these notes. In York there are three A.A. and one full licence-holder, whilst in Thirsk G3MB and G3NY are experimenting with aerial systems, mainly on 14 Mc. There is also an A.A. licence in this town.

No reports have been received from Driffield, Beverley, or Bridlington.

Scotland

Hon. Scottish Records Officer: JAMES HUNTER (GM6ZV), 51, Camphill Avenue, Langside, Glasgow, S.1 (Telephone: Landside 237).

"*A*" *District*, comprising Glasgow and the counties of Renfrew, Lanark, Dumbarton and Argyll. *D.O.:* J. B. DUNCAN (GM6JD), 379, Mosspark Drive, Mosspark, Glasgow.

"*B*" *District*, comprising North of Scotland, Aberdeen, etc. *D.O.:* G. W. MCDONALD (GM2OX), 122, John Street, Aberdeen.

"*C*" *District*, comprising Dundee, Angus, Forfar, Perthshire, etc. *D.O.:* J. G. HALLEY (GM8CF), 180, Lochee Road, Dundee.

"*D*" *District*, comprising Edinburgh and Midlothian, etc. *D.O.:* J. J. E. BLACK (GM6NO), 20, Easter Drylaw View, Edinburgh, 4.

"*E*" *District*, comprising counties of Ayr, Dumfries, Wigton and Kirkcudbright. *D.O.:* HUGH MCCONNELL, JUN. (2ACQ), "Ashgrove," 23, Carrick Road, Ayr.

"*F*" *District*, comprising Stirlingshire. *D.O.:* D. M. K. HARROWER (GM6NX), 22, Waverley Crescent, Stirling.

"*G*" *District*, comprising Borders. *D.O.:* D. S. BRUCE (GM3NI), 158, Wood Street, Galashiels.

"*H*" *District*, comprising Fifeshire, etc. *D.O.:* A. W. LAWSON (2ANL), "Makora," Kinghorn, Fife.

Another year has now started its run and we wish all members a prosperous 1939. Following the customary elections for D.O., we welcome as newcomers GM6JD as D.O. of "A" and GM6NO as D.O. for "D." Other districts remain unchanged.

"*A*" *District.*—The usual monthly meeting was the scene of a morse receiving and sending competition, which aroused much interest. Many members were surprised to see their "fists" after recording. During the meeting it was intimated that the only nomination received for the position of D.O. was that of Mr. J. B. Duncan (GM6JD), and his election was unanimously carried. Our thanks are due to the retiring D.O., Mr. D. M. J. Tyre (GM5TY), for his many services during the three years he held office. A committee to make arrangements for N.F.D. was appointed.

"*B*" *District.*—On December 23 the District held a supper and social evening at which 26 members and friends were present. A good evening's entertainment was had by all. At the last business meeting of the old year a programme for the coming six months was arranged. Any member who has not received a copy by post should apply to the D.O. Mr. D. W. Milne (GM6BM) is taking up an appointment near Liverpool and he leaves Aberdeen with the best wishes of all members. General activity is still variable with a number of stations tuning up for contests.

"*C*" *District.*—No news to hand.

"*D*" *District.*—Mr. J. J. E. Black (GM6NO) has been elected D.O., and we thank Mr. S. W. Rowden for his services during his term of office. Little news is to hand. GM5GK and GM5YX report.

"*E*" *District.*—Despite terrible weather conditions there was a good attendance at the December meeting when Mr. John H. Preston (BRS1295) delivered a lecture on "Reception on 1.7 Mc. and 3.5 Mc.," which was much enjoyed. Mr. H. McConnell was unanimously re-elected D.O. It was also agreed to continue the present "get together" meeting in preference to a more formal

SCOTLAND, DISTRICT H

ANNUAL DINNER

to be held on

JANUARY 21, 1939

at 7.30 p.m. in the

STATION HOTEL, KIRKCALDY

TICKETS 7/6 from Mr. A. W. Lawson, 2ANL, "Makora," Kinghorn, not later than January 16th.

type. The D.O. regrets that only one reply was received to the circular sent out to Largs and district members regarding a T.R. for that area. It is presumed that no one is willing to accept such office. BRS1295 sends in his usual monthly report, indicating many hours spent at the receiver.

"F" District.—At the December meeting N.F.D. was the subject of discussion and the present intention is to run two stations. Attendances are keeping up.

"G" District.—Mr. D. S. Bruce (GM3NI) has been re-elected D.O. Sites for N.F.D. 1939 have been under discussion. Mr. F. Adam (2FBM) is now GM3ZH.

"H" District.—N.F.D. matters are fully in hand, and the final arrangements will probably be completed by March. Members wishing to attach themselves to a particular station please notify the D.O. at their earliest opportunity in order to avoid confusion at a later date. The R.S.G.B. and N.F.D. films were screened at the District shack on December 18, and the D.O. wishes to thank all those who assisted. There was an attendance of approximately 30 and the evening was wound up with the serving of refreshments. Code practice at meetings is being received very favourably, nearly all present taking part. 2DMC has passed morse test, but notification of call has not yet come to hand. GM6JJ has a 3.5 Mc. licence. Mr. A. W. Lawson has been unanimously re-elected D.O. and Messrs. A. T. Wood and W. N. Craig (GM3ND and GM6JJ) were again re-elected as honorary auditors for the District.

Northern Ireland

Reports are scanty as usual. GI6WG is active at week-ends, and some time ago worked VK6SA in the 7 Mc. band. 6YW recently worked K6. We congratulate both him and 5NJ on bagging B.E.R.T.A. for the GI's. 8PA is starting experiments on micro-waves, under 1 metre, and would appreciate co-operation from local members interested.

Will members of R.T.U.N.I. please note that the date of the next meeting has been altered from Friday, January 27, to *Saturday*, January 28, at 7 p.m., in the Presbyterian Hostel, Howard Street, Belfast, when a talk will be given by GI8PA.

A very happy and successful New Year to all.

Town Representatives, 1939

The following T.R.'s have been appointed since the first list was published in the December, 1938, issue :—

District 2.	
Bradford ...	... Mr. C. A. Sharp, G6KU.
Harrogate	... Mr. J. Pullan, 2BPI.
District 4.	
Derby ...	... Mr. R. H. Streete, G2SD.
District 15.	
High Wycombe	... Mr. V. O. Hawkins, 2BVX.
District 16.	
Heathfield...	... Mr. R. J. Lee, BRS1173.
Littlehampton, Bognor and District	Mr. C. J. Rockall, G2ZV.
District 18.	
Bridlington	... Mr. T. Woodcock, G6OO.
District 19.	
Newcastle ...	... Mr. S. O'Hagan, G2CR.

QRA Section

Manager: H. A. M. WHYTE (G6WY)

When sending in a new, or changed address members are requested to print their names and addresses in block letters, as frequently signatures and names of streets are illegible. This necessitates reprinting the corrected address in the next issue of the BULLETIN.

New QRA's

G2DX.—W. K. ALFORD, "Orchard Cottage," Sandhurst, Camberley, Surrey.
G2GU.—J. W. LIMMER, "Filby," 65, The Fairway, Leigh-on-Sea, Essex.
G2HR.—J. E. JOHNSON, 25, Clivedon Road, Highams Park, London, E.4.
G2NJ.—WM. CARTER, 52, Park Road, Peterborough, Northants., and at "The Pilot," Bungalow, South Beach, Heacham, Near Hunstanton, Norfolk.
G2YD.—A. J. H. WATSON, "The Moorings," 46, Friars Avenue, London, N.20.
G3AC.—S. HARDMAN, 62, Abingdon Road, Bolton, Lancs.
G3BA.—THOS. P. DOUGLAS, c/o Mrs. Southcliffe, 41, Braunston Road, Daventry, Northants.
G3HD.—L. A. WHALEBELLY, Leswyn House, Gloucester Street, Faringdon, Berks.
G3KL.—C. LANCASTER, 12, Stanley Road, Lytham, Lancs.
GI3KN.—A. T. KENNEDY, 14, Taunton Avenue, Lansdowne Road, Belfast, N.I.
GM3NL.—DAVID BRUCE, 158, Wood Street, Galashiels, Scotland.
G3RW.—D. E. DAVY, 59, East Road, Maygrove, Great Yarmouth, Norfolk. (Reported incorrectly in December BULLETIN.)
G3SR.—J. A. EDWARDS, 10, Oak Road, Sale, Near Manchester.
G3TG.—JAS. T. BLACKWOOD, 23, Red Post Hill, Dulwich, London, S.E.24.
G3TZ.—R. F. BORRILL, 3, Melbourne Avenue, Grimsby, Lincs.
G3UY.—D. HANN, 58, Manor Drive North, New Malden, Surrey.
G3VF.—J. E. APPLETON, 28, Glentrees Road, West Derby Liverpool, 12.
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2FNY.—J. A. EASTERBROOK, "Marfield," Cadewell Lane, Torquay, Devon (incorrectly as 2FNU in December BULLETIN).
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Cancelled.—G2QI, G6AJ, G6UD G8CJ, G8CU, G8DK, G8RH, G8SU, 2ACL, 2AHZ, 2AJA, 2APU, 2ARN, 2AWB, 2BCL, 2BDR, 2BGA, 2BIB, 2BLA, 2BNB, 2BPJ, 2BVH, 2CID, 2CKD, 2CRA, 2CRQ, 2CUQ, 2CVP, 2CWK, 2CXF, 2DAD, 2DDB, 2DDL, 2DGM, 2DHO, 2DJI, 2DKQ, 2DKZ, 2DPR, 2DPV, 2FBM, 2FBW, 2FDI.

CALIBRATION SECTION

Crystals and frequency meters of the heterodyne type can be accepted for calibration and these should be sent *direct* to the Calibration Manager:

Mr. A. D. Gay, (G6NF),
156, Devonshire Way,
Shirley,
Croydon, Surrey.

Crystals should be enclosed in a small tin and securely packed to avoid loss in transit, whilst frequency meters should be packed in a *wooden box or substantial cardboard container.*

Return postage for crystals and frequency meters must be enclosed as stamps and not attached to the postal order. The Society cannot accept resposibility for any loss that might occur in sending apparatus for calibration through the post.

Calibration Fees.

Crystals, 1.7, 3.5 and 7 Mc. types...1s. 6d. each
Crystals, 100 kc. type ... ...2s. 6d. ,,
Heterodyne frequency meters 5 points within the amateur bands ...5s.
For each extra point at any desired interval 6d.

Some More Bouquets

"I have just received my copy of the new Handbook, and would like to take this opportunity of offering my very sincere congratulations to those concerned in the project. The book should be a great help to everyone. It is very well got up, and has a thoroughly established appearance. It says a great deal for the work which has gone into the preparation of this new publication that it should look as though it were perhaps Volume Four!"

BRYAN GROOM (GM6RG).

* * *

"*The Amateur Radio Handbook* has just arrived, and I really must hasten to offer my very hearty congratulations to all members who contributed towards this wonderful first effort.

"It certainly appears to contain everything an amateur requires, and to my mind is quite up to the standard of the American publications."

N. E. READ (G6US).

* * *

"Congratulations on the first edition of *The Amateur Radio Handbook*. It is simply splendid. Someone has been working *darned* hard to produce this book. From the little I have had time to read the whole book appears to be completely new, with copious references to T. & R. BULLETIN articles.

"It is the biggest single effort since the formation of the R.S.G.B."

E. SHACKLETON (G6SN).

* * *

"I feel I must just write a line of sincere congratulation on the new Handbook. You and your collaborators have done a real job this time, and the new production is worthy to take its place for Britain alongside the American counterparts.

"I found the handbook in the hall when I got home one night, and had to look right through it before I even took my hat and coat off!"

F. W. GARNETT (G6XL).

1·7 Mc Telephony Contest

If you are interested in a 1.7 Mc. Telephony Contest please send a card without delay to Mr. A. O. Milne (G2MI), 29, Kechill Gardens, Hayes, Bromley, Kent.

So far only about ten members have written regarding the suggestion made in our last issue that such a contest should take place later in the year.

CONTEMPORARY LITERATURE — *(Continued from page 432)*

CRYSTAL OSCILLATOR KEYING SYSTEMS. *Q.S.T.*, October, 1938.

A brief article consisting of solutions to the problem set in *Q.S.T.* "How Would You Do It." Series No. 20. Several keying systems, all of which have been tried out are described with circuit diagrams.

* * *

A COMPACT 100-WATT TRANSMITTER. Thomas Sue Chow (W6MVK). *Q.S.T.*, October, 1938.

The author describes the transmitter built for the last Sweepstakes Contest, which established new records—first C.W. station to work all sections and the highest score ever made under the present rules.

The transmitter is a small one, using a 6A6 as oscillator doubler, 6L6g buffer doubler and RK20 output, and except for a bias battery and H.T. supply for the final, is built up on a 10 ins. × 17 ins. × 3 ins. steel chassis.

* * *

LOW Z. FOR LINERARITY. M. A. Brown (W6ABF) and J. N. A. Hawkins (W6AAR). *Q.S.T.*, October, 1938.

A description of a 35-watt high-gain low distortion speech amplifier with push-pull parallel triode output. The unit uses a 6F5g R.C. coupled to a 6F8g, which in turn is R.C. coupled to another 6F5g, which is transformer-coupled to the four push-pull parallel 6A5g's.

Plenty of output power is available for driving a 500 watt class B modulator, and the unit is useful for public address work, too.

INDEX TO DISPLAYED ADVERTISEMENTS

EXCHANGE AND MART.

AS G2YN still has some bargains left; see advert, Mains Transformer, etc., December "BULL."—G2YN, 51, Woodhall Lane, Welwyn Garden City.

BARGAINS.—New Taylor T55, 33s.; 4 Raytheon 59, 4s. 6d. each; Mullard DO40, 12s.; 2 S.T. Co.4211D, 8s. each; Osram F.W.U8 (500-0-500 v.), 8s.; 2 New Mullard ½-wave UL4 (5000 v. at 300 mA. each), 22s. pair; Philips F.W.1200 (2,000-0-2,000 v.), cost £7, 35s.; Philips ½-wave 1562 (500 v.), 5s. Transformers: Heayberd 500-0-500 v. at 100 mA., 7.5 v. at 3 amps. C.T., £1; 7.5 v. at 3 amps. C.T., 8s.; Q.C.C. 3 v. at 4 amps. C.T., 7s. 6d.; 4 v. at 2 amps. C.T., 6s. 6d. Chokes: Heayberd 20H at 100 mA., 9s.; 20H at 100 mA., 6s. 6d.; 20H at 200 mA., 9s. Condensers: 2 Hydra 4 mfd., tested, 2,000 v. D.C., 11s. each; Hydra 2 mfd., tested, 1,000 v. D.C., 4s. 6d.; 2 T.C.C. 2 mfd., 800 v. D.C. working, 5s. each. Meters: Weston Model 301, 0-500 mA., D.C., 15s.; Turner Model 505, 0-7 Thermo-Ammeter, 15s.; 0-100 mA. D.C., 7s.; 0-50 mA. D.C., 4s. 6d.; etc. Write for list.—G2DZ, 11, The Inlands, Daventry, Northants.

COMPLETE STATION FOR SALE: two Transmitters, two Receivers, many components, valves, crystals, meters, microphones; stamp for list.—G2YW, 18, Broadmead Road, Woodford Green, Essex.

DB20, perfect £10, also Meissner Signal Shifter £12 12s. 0d.; accept £10, or will exchange either for National 1-10.—G5ZT, 69, Ribbleton Avenue, Preston.

EDDYSTONE ALL WORLD two, absolutely as new condition. Used few hour only. Owner building single signal super; £3.—2DTS, Delgarth, Harpenden, Herts.

EXCHANGE 913 C.R. Tube, practically new, for what have you? Xtals, Meters, etc.—GM3NH, 40, Cairns Street, Kirkcaldy.

FOR SALE, NC 100X Crystal Gate quality-ham 12-tube Receiver with 9-in. Rola Speaker in perfect condition, only 4 months old, £28. Demonstrations given.—G5YZ, 67, Highlands Heath, Putney, S.W.15.

FOR SALE.—Varimatch VM2 modulation transformer, 25s. Match any modulator to final up to 60 watts of audio. Also carbon microphone complete with adjustable stand and transformer Excellent quality, 10s.—Write G5LU, Haywards Heath, Sussex.

FOR SALE.—Complete modulator, three stage steel rack, microphone, speech amplifiers, 6L6's class A.B. output, varimatch transformer, power pack, meter clock. £9, or best offer. Other bargains.—Write G3KD, Cleveleys, Blackpool.

G5KT.—Outstanding QSLs. Trial order will convince you cannot do better. Samples. State AA, G, BRS, SWL, 33, Howard Road, Westbury Park, Bristol, 6.

Patent and Trade Mark Agents

GEE & CO. (H. T. P. Gee, Mem. R.S.G.B., etc.), 51-52, Chancery Lane, London, W.C.2 (Two doors from Govt. Patent Office). Phone: HOLborn 4547 (2 lines). Estd. 1905. Handbook free.

G6DS.—Known the world over for quality. QSL Cards and Log Books. Send for samples.—QRA, 14, Lambley Avenue, Mapperley, Nottingham.

LATE G2TY.—Whole Station to be cleared. SX17 1938, bought 3 months ago, cost £39 10s., £25, no offers. Skybuddy with preselector built in, 18 months old. Howard 8-valve All-wave 5 wave bands, cost £28, 3½ years old. Transverse current mike, crystal mike. 10 watt phone and CW transmitter, 160, 80, 40, 20 meter bands 59CO, 46BA, 46PA, built-in 4 panel rack including 4 meters. Offers wanted for above. Also Sky Champion, only used 3 months. FB £12 10s. Please write for list of other gear, stamp please, to, G5MV, 40, North Marine Road, Scarborough.

NATIONAL FBXA with 10, 20, 40, 80, 116, Meter Coils and Power Pack. Nearest £10 secures. Want RME.—G3AG, 110, Chester Road, Castle Bromwich.

OLDTIMER G6MN for 1st. grade QSL's and Log Books. Send for Samples.—G,AA,BRS, G6MN, Worksop.

QSL's.—250, 4s. 6d. 1,000, 9s. Post free. Samples gratis. State whether BRS, AA.—G. ATKINSON BROS., Printers, Elland.

SALE.—10 watt transmitter on 32 in. rack E.C.O.-P.A. (P.A. incomplete); 6 watt modulator AC/HL AC/PI-PX25; anode modulation. L.F. oscillator for I.C.W. 500 volt power pack. Only a few more parts required for a first class transmitter, with valves and coils. £10 (or exchange with RX) Valves and components for sale. Offers? —2AFZ, 15, The Close, Southgate, N.14.

SNIPS.—Two each only of the following Valves, brand-new: 10, 50, 81, 5s. each; 15/400, 8s.; Kt 66, 11s.; National Union 83, 5s. 6d. Also 425-0-425v., 150 ma., 3 4v. LTs; tapped input, 200-250v., 16s.; two only, 4mfd. 1,500v. working TCC, 11s. 6d. each.—BRS3437, 349, Copnor Road, Portsmouth.

START THE NEW YEAR WELL.—Samples of "HAM-AID" QSLs from G6XT.—TILLOTSON BROTHERS, Commercial Street, Morley, Yorks.

SURPLUS GEAR CHEAP. Send stamp for list. 8-valve SS super, xtal, R meter, coils for 10, 20, 40m., £6; 1,000 volt Power Pack, double section filter, 866's, £4; also 40m. TX complete or in parts.—GM3OL, Westland, Pleasance Avenue, Dumfries.

WANTED.—BULLETIN, March, April, 1938; state price. For sale, Tobe Receiver, all-wave, speaker, £6.—BRS3467, 10, Moor Park Road, Northwood, Mdx.

10-METRE TRANSMITTERS, with Rotary Transformers and Receivers, ex Government for disposal; also Osram D.E.T.I.S.W. Transmitting Valves with pockets, brand new. Bargain prices.—HUMPHREYS & Co., 1, Laurence Pountney Hill, Cannon Street, London, E.C.4.

60-watt Commercial Transmitter, plate modulated, 20 and 40-metre Coils, Collins Coupler Unit, 4 moving-coil meters, 1 R.F. Meter, Crystal and Key. All in black crackle cabinet. Very little used. Nearest £28.—G8UJ, Carleton, Pontefract, Yorks.

Printed in Great Britain for the Inc. Radio Society of Great Britain, 53, Victoria Street, London, S.W.1, by Loxley Brothers, Ltd., 50, Southwark Bridge Road, London, S.E.1.