THE T&R

BULLETIN

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RADIO EXPERIMENTERS

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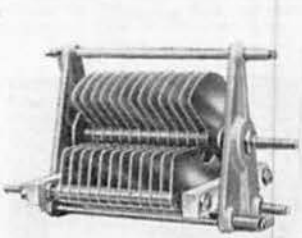

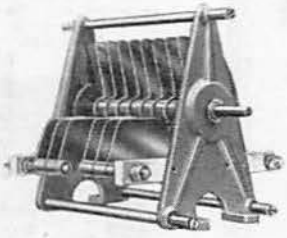

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THE T. & R. BULLETIN

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DEVOTED TO THE SCIENCE AND ADVANCEMENT OF AMATEUR RADIO

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CONTENTS

TRANSMITTER DESIGN

THERE are several good reasons for our almost continuous appeal for technical articles. The first and most obvious is that we are anxious to present an interesting BULLETIN each month, but there is also on our part a desire to encourage members, for their own good, to give us the results of their experiments. A further reason is that we wish to show to other amateur organisations that our members are as capable as any in the world of keeping abreast of progress.

We should have expected that the avalanche of new valves and components would have resulted in a host of new transmitter circuits, but so far as we have been able to judge no really new idea has broken on to the amateur's horizon for some time. It is true that the average British station embodies, what in effect is, the latest practice, but the basic principles employed are far from new.

Possibly the development of the Tri-tet Crystal Oscillator and the progress made in the stabilisation of electron-coupled oscillators represent the most important advances in so far as frequency control is concerned, whilst the introduction of many easily driven triodes and R.F. pentodes, coupled with a better appreciation of L/C ratios, has enabled more efficient power amplifier stages to be constructed.

In considering the design of a new transmitter the present day amateur has such a wealth of information available that it is necessary for him to guard against any tendency to become a copyist instead of an individualist.

We have to-day in our Experimental Section a group of keen members whose avowed interest lies in Transmitter Design and Development. Many of these members are young in years and with limited financial resources, but given opportunity and support they will assuredly prove their worth.

As we see it, the most pressing need of the Group is to be given specific problems for investigation, and it is in that direction we believe our more experienced members can render a service. Frequently such members evolve ideas based on years of experience, but pressure of private business prevents them from being followed up. The Transmitter Group would welcome the opportunity to work on specific problems, providing they are of a reasonable nature.

As our previous editorial on the subject of Reception Problems has already begun to bear fruit, we are optimistic enough to believe that our present remarks will be heeded in certain quarters.

THE UNCLAIMED CARD

At this time of the year the Society's normally hard-worked QSL Section is called upon to handle an even greater number of cards than usual. Since December the daily total has increased by many hundreds, and with DX contests in the air this month and next, the burden will still further increase.

The biggest task the Section has to tackle is the handling of incoming cards for G, and by that we mean GI, GM and GW, as well. If out of every 1,000 cards sorted several hundreds go into the unclaimed file it means that much of our effort is wasted. Every unclaimed card represents additional expense which has to be borne by the Society, not to mention the extra work involved. The solution, as we have repeatedly stated, lies in every active member making certain that he has a supply of envelopes always on hand at the Bureau.

Scores of members who have no envelopes are written to each month, and whilst a large proportion use intelligence and send a *reasonable* supply, a number forward one tiny envelope with a 1½d. stamp attached, and expect Headquarters to jam in perhaps 30 or more cards. Another type of individual appears to think that "supply" means a couple of dozen envelopes, of the sort used for despatching a 200-page sales catalogue!

Given the full co-operation of every active member, the QSL Bureau can be depended upon to do its job, but so long as the problem of the unclaimed card persists, efficiency must suffer.

Whilst on the subject of QSL's it seems appropriate to draw attention to two matters concerning the preparation of the cards for dispatch. In sorting tens of thousands of cards the staff are continually faced with the problem of bad writing. Unless a call sign is very clearly written mistakes must arise. Frequently we find cards passing through the Bureau with the call sign of the addressee tucked away in some obscure corner. When ordering cards members will help the R.S.G.B. Bureau, and to an even greater extent, overseas Bureaux, if they insist upon the printer placing the space for the call sign in a bold position near the top of the card.

Last year we criticised those who fill up their cards without giving such important information, as the date of contact and frequency band used. Our advice has been followed by nearly all members, but there still remains the equally important duty, when filling in a card, of stating whether the contact was by means of telegraphy or telephony.

Before the year is out it is highly probable that when a Telephony Award is applied for, the claimant will be required to submit evidence proving that the contacts were made by means of two-way telephony. To avoid disappointment at a later date we urge members to fill in their cards as completely as possible.

J. C.

FORTHCOMING SOCIETY MEETINGS AND CONTESTS

FEBRUARY

24. I.E.E. Meeting. Lecture by Dr. G. Bloomfield. Subject: "Insulating Materials for the Higher Frequencies."

MARCH

14. Council Meeting.
31. I.E.E. Meeting. Lecture and Demonstration by Mr. E. L. Gardiner (G6GR). Subject: "Band Pass Crystal Filters."

APRIL

2. Provincial District Meeting in Birmingham.
11. Council Meeting.
16. Provincial District Meeting in York.
28. I.E.E. Meeting. Lecture by Dr. C. G. Lemon (G2GL). Subject: "Communication Receivers."

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 Ionosphere *

By K. W. TREMMELEN

Short wave circuits operating between wavelengths of 10 and 100 metres (30 and 3 megacycles) are dependent, in the majority of cases, on reflections from the ionised regions or layers of the atmosphere collectively termed the Ionosphere.

In the absence of these reflections, communication by means of the ground ray alone is only possible up to comparatively short distances, the actual distances depending on such factors as the earth resistivity, the wavelength and the height of transmitter and receiver above the earth.

As the reflected rays are of major importance in these short wave communications, a study of the conditions existing in the ionosphere is essential to the study of short wave propagation.

Critical Frequency and Density Measurements at Vertical Incidence

IN order to obtain values of the critical frequency and density of the reflecting regions, pulses are transmitted and the echoes from these layers are observed on a cathode ray oscillograph at a receiving station nearby.

As the radio frequency on which the pulses are transmitted is increased, a frequency will be reached at which there are insufficient electrons to cause reflection, and penetration of the layer will occur. This frequency is known as the critical frequency, at vertical incidence, for the layer under observation, and the density N in electrons per cubic centimetre of the gas constituting the layer can be calculated from the formula $N = 1.24 \times 10^4 f^2$, where f is the critical frequency in megacycles per second for vertical incidence for the ordinary ray.

Layer Height

The delay time of these echoes from the various layers of the ionosphere gives the height at which reflection occurs with the following reservations.

Due to group velocity effects, the waves are retarded as the critical frequency is approached, their momentum being modified by the reaction of the electrons on the waves.

This means that, near the critical frequency, the delay time of the echoes is not a measure of the true height at which reflection occurs.

This variation of apparent height can be seen in the accompanying curve of frequency plotted against layer height (Fig. 1).

Even at frequencies lower than the critical frequency, the observed height of the layer will be dependent to some extent on the frequency, due to the fact that the higher frequencies penetrate more deeply into the layer than the lower frequencies. This can also be seen in Fig. 1.

Ordinary and Extraordinary Rays

It will be seen from Fig. 1 that a splitting of the curves into two branches takes place as the critical frequency is approached. This is due to magneto ionic effects.

* Reprinted with the kind permission of the Editor of *The Marconi Review* from the January-March, 1939, issue of that Journal.

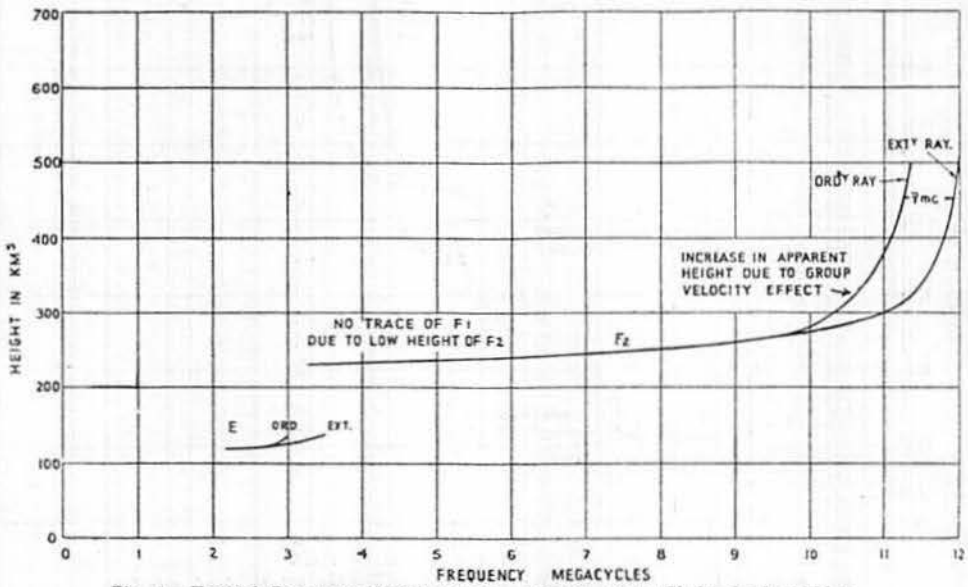

Fig. 1.—Typical Frequency/Height Curve. Winter, 1937, Chelmsford, midday.

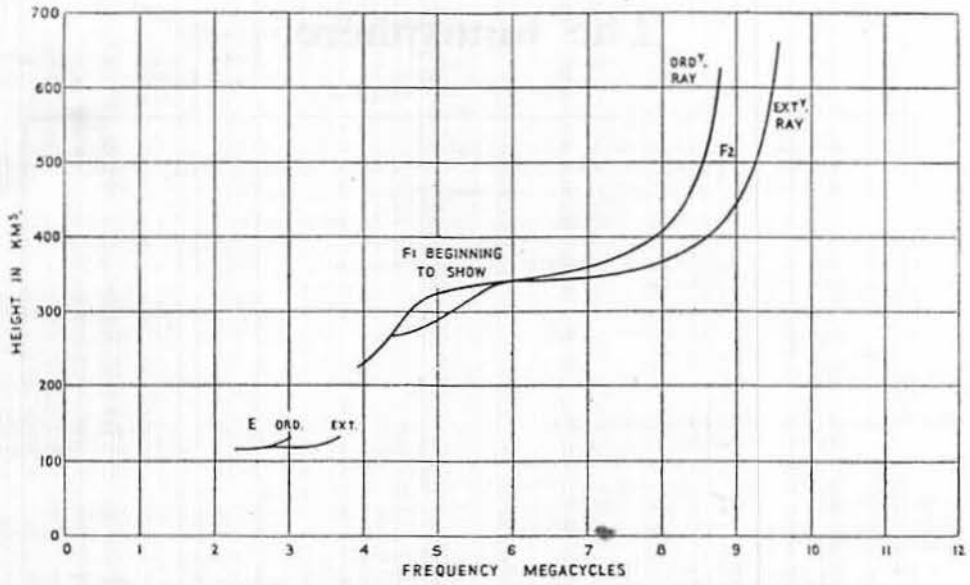

Fig. 2. Typical Frequency/Height Curve. Spring, 1938, Chelmsford, midday.

The two rays are known as the ordinary and extraordinary rays, and the separation between them is dependent on the strength of the earth's magnetic field.

In the Northern Hemisphere, at vertical iincdence, the ordinary ray comes out of the layer with a left-hand sense of polarisation when observed from above, and the extraordinary ray with a right-hand sense.

In the Southern Hemisphere the reverse is the case.

The calculated value for this separation in England is .66 of a megacycle, which agrees very closely with the observed values.

The above effects only apply to frequencies above what is known as the gyro magnetic frequency which has a value of about 1.3 megacycles (227 metres) in this country.

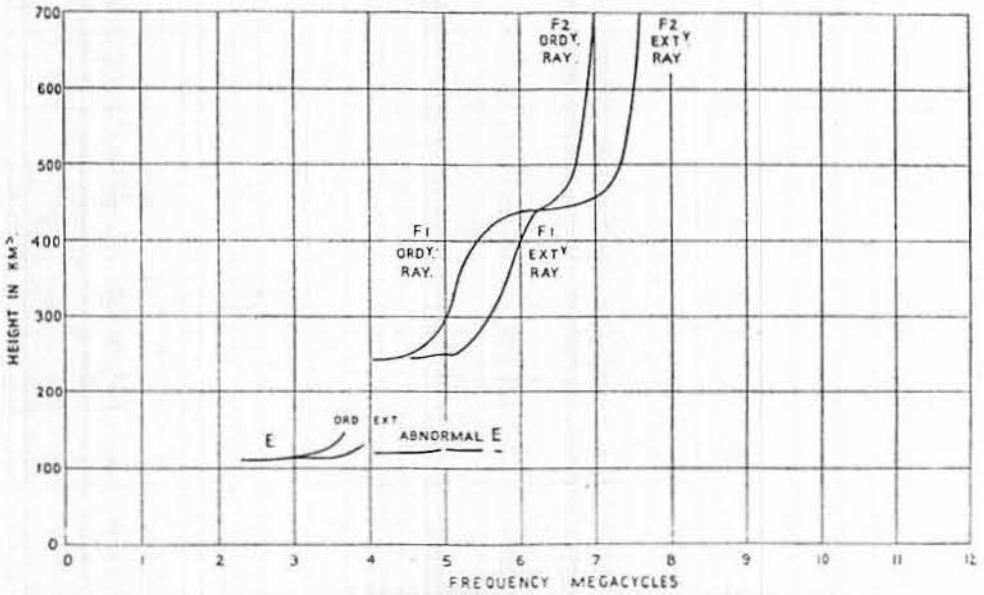

Fig. 3. Typical Frequency/Height Curve. Summer, 1938, Chelmsford, midday.

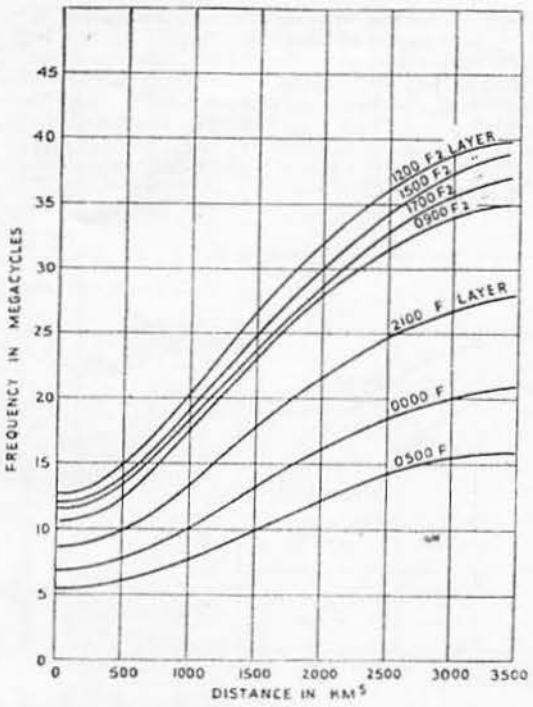

Fig. 4.
Maximum usable Frequencies for various distances at various local times. Equinox conditions. Washington, 1937. F2 and F layers (F2 day, F night).

The value of N in the formula previously given is calculated for the ordinary ray.

Conversion of Vertical Incidence to Oblique Incidence

To enable these measurements of critical frequency at vertical incidence to be used in the study of propagation conditions at a distance, it is necessary to convert them to oblique incidence values. For a given density and height, the critical frequency for a layer will increase as the distance is increased.

D. F. Martyn has calculated these values for a flat earth, and N. Smith, of the Washington Bureau of Standards, has produced a mechanical method of calculating them for the curved earth case, employing a set of sliding curves. Millington, of the Marconi Company's Research Department, has also written a paper on the latter subject. This has recently been published in the Proceedings of the Physical Society.

The "skip" curves, or curves for maximum usual frequencies obtained in this way for various distances, wavelengths, seasons, time of the day and sunspot cycle, may be presented in various forms, and examples are shown in Figs 4 and 5 for cases in which the "skips" are controlled by the F or F2 layers. The various layers are described in detail later.

Curves of this type can be used in any part of the world, providing the local conditions of layer height and critical frequency for vertical incidence are known, and it is of great importance that as many observing stations as possible should be established in all parts of the world in order that complete information may be obtained.

Observations at vertical incidence by means of this pulse technique in various parts of the world during the past few years have given considerable information as to conditions existing at various times of the day and seasons, and over a considerable portion of the eleven-year sunspot cycle.

Reasons for some of the changes recorded appear to have been definitely established, and predictions based on the results obtained can be made with some confidence, but the reasons for some effects still remain obscure.

With regard to the changes connected with the sunspot cycle, the density of the reflecting regions has increased with the increase in sunspot numbers from minimum to maximum years. This is illustrated later in more detail.

It should be remembered that an increase in critical frequency is equivalent to an increase in density.

The Layers

Three main reflecting regions exist in the ionosphere, the first at a mean height of 110 kilometres, known as the E layer, the second at a height of about 200 kilometres, known as the F1 layer, and the third at a mean height of 300 kilometres, known as the F2 layer.

The height and density of these layers vary with the time of day, time of year, sunspot cycle and latitude, and these conditions in turn decide which layers control the communications at various distances on various wavelengths.

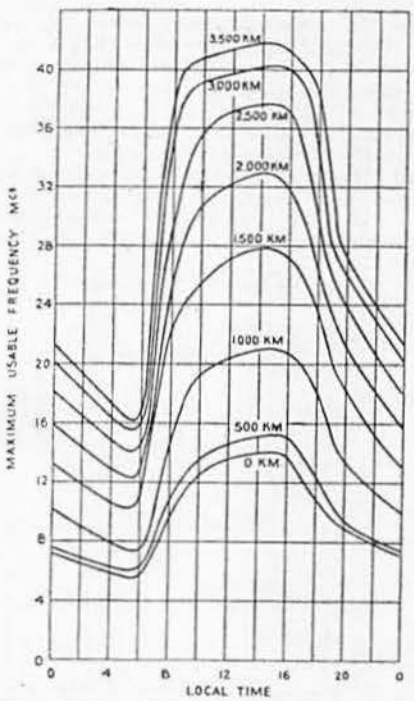

Fig. 5.
Washington, October, 1937. F2 and F layers (F2 day, F night).

The Normal E Layer

The normal E layer, at a height of 110 kilometres, appears to be produced by ultra-violet radiation from the sun. This is indicated by the fact that the density increases with the altitude of the sun, reaching a maximum for the day at local noon (see Fig. 6). The density is also greater in summer than in winter at any place, and no normal E layer is found in the absence of the sun in Polar regions during the winter months.

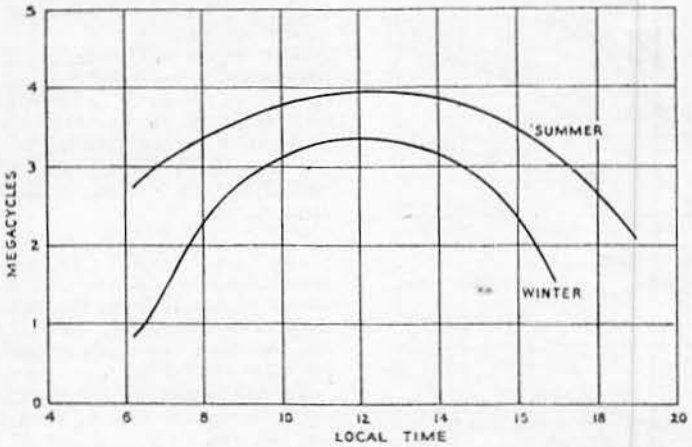

Fig. 6.—Diurnal variation in critical frequency. E layer (ordinary ray). Sunspot maximum years. Washington Lat. 40 N.

Perhaps the most conclusive proof that this layer is produced by ultra-violet radiation is given by the reduction of E layer density at the time at which the moon's shadow reaches the E layer during a solar eclipse.

Any normal E ionisation at night is due to a residual of that produced during the day.

The data from various parts of the world appear to be consistent with regard to the dependence of the density of the normal E layer on the altitude of the sun, and one can predict the daytime critical frequency for this layer for any place and time with a certain amount of confidence. There will still be some uncertainty as to the exact values at various states of the sunspot cycle. Values obtained over a portion of the last sunspot cycle can be used to predict those which may be expected during the next cycle, but it is known that one cycle may vary considerably as compared with another as regards the sunspot numbers. This is illustrated in Fig. 7.

From available data on critical frequencies of the E layer at various places and times, a curve can be plotted of critical frequency against the altitude of the sun. This is shown in the lower portion of Fig. 8.

From this curve one may predict the approximate critical frequency for a given place, knowing the altitude of the sun at the time. These values obtained from the curve have been used in the form of a sliding chart on transparent paper, which can be moved over a map of the world. The chart used for equinox conditions is shown

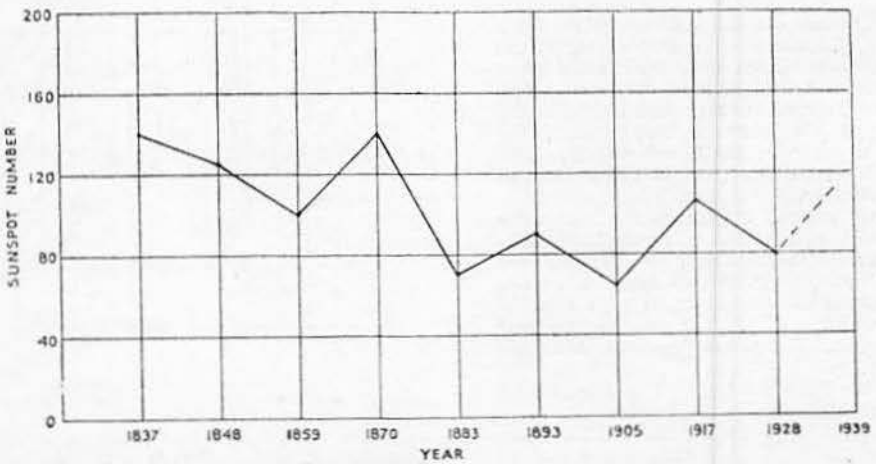

Fig. 7.—Sunspot numbers for successive sunspot maximum years.

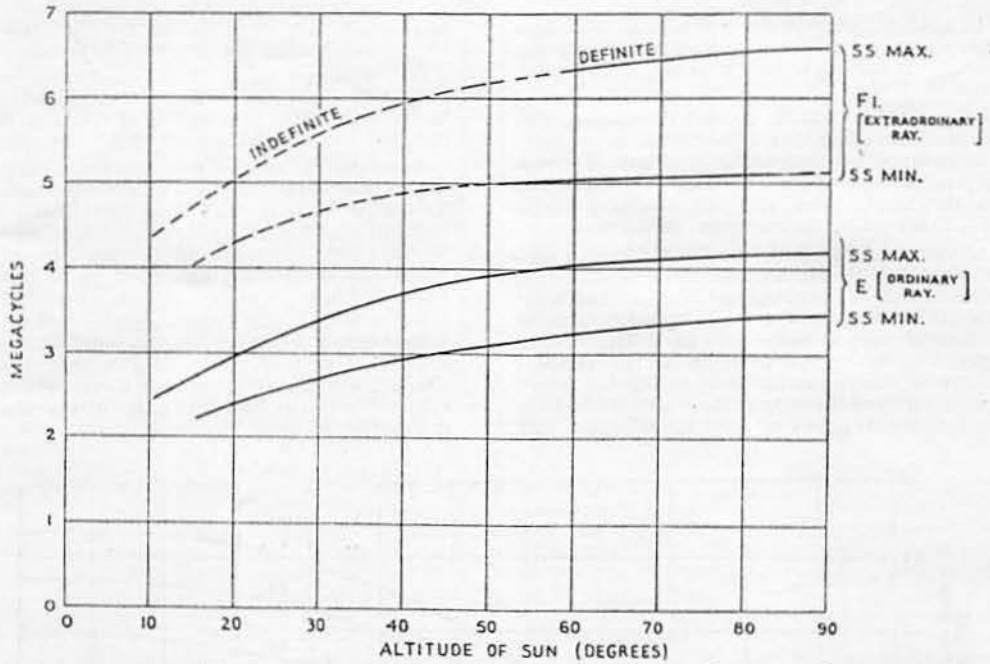

Fig. 8.-Variation of critical frequency for E and F1 layers with altitude of sun. Sunspot maximum and minimum.

in Fig. 9, set to midday G.M.T. The contours give the probable critical frequency for vertical incidence at any place for the E layer at that G.M.T. for daytime.

These will be less reliable near sunrise, as at this time they will depend to a certain extent on the previous history of the ionisation during the night.

A set of "skip" curves, as shown in Fig. 10.

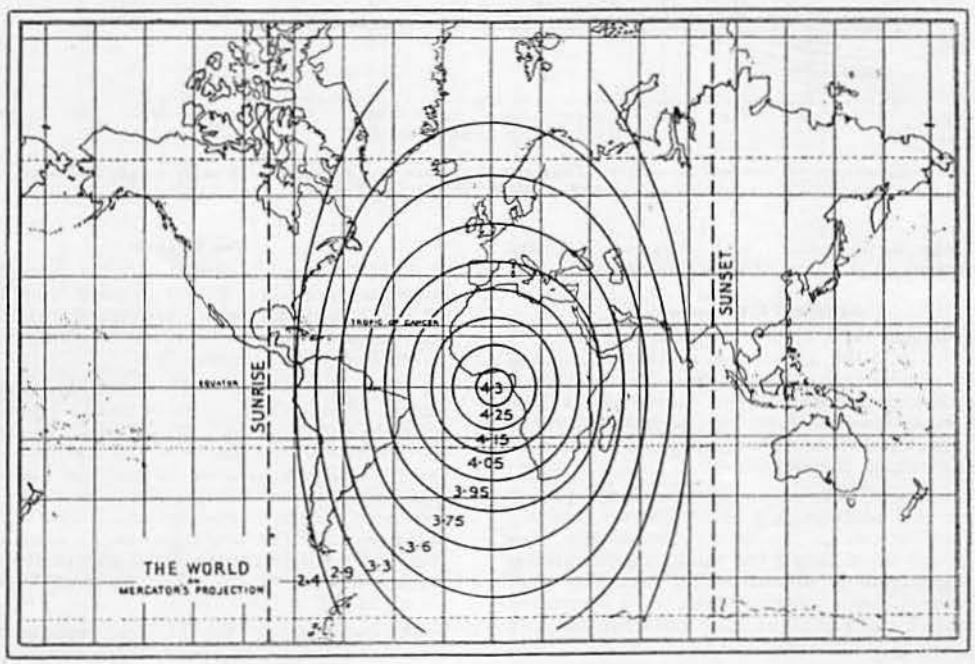

Fig. 9.-Contours for critical frequency for E layer (vertical incidence) in megacycles. Noon G.M.T., Spring and Autumn sunspot maximum conditions.

can be used with these charts to obtain the maximum usable frequency at oblique incidence at various distances on any route on which the E layer may control the " skip."

It is probable that E layer transmission, due to factors connected with attenuation, is normally of importance at comparatively short distances only, and in view of this, the contour value taken from the chart, when applying the skip curve, is that indicated by the mid point of the route.

The values on the charts are for the present sunspot maximum conditions, but those representing the conditions during the last sunspot minimum years (1933-1934) may be obtained by dividing the critical frequencies by 1.25. The critical frequency of the E layer at night, being dependent on recombination, steadily falls during the night, reaching values of the order of those used for medium wave broadcasting, but we have no extensive data on these night values, and they are of little importance in short wave communications.

Abnormal E Reflections

Reflections are sometimes observed from a height of 100-150 kilometres which are in some cases unconnected with ultra-violet radiation, since they may occur at night. These echoes differ from those received from the normal E layer in that they are received irregularly, and have no definite critical frequency.

This type of echo appears to be chiefly present during the summer day in Northern latitudes, and similar echoes, which may be of the same origin, are noted during the winter night, although they appear to be absent during the winter day. At present, with existing data, it is impossible to predict the extent of their influence on communications at any time or place.

It may be that the type of radiation producing this ionisation is always present, but that it can only become effective in producing a layer at this level when conditions in the upper layers permit.

On occasions when these echoes are present, frequencies may be used for communications far in excess of those normally used, but due to their irregular nature, they cannot be relied upon.

Abnormal E echoes were observed frequently during the Polar year ionosphere observations at Tromsö in Norway, and they have been recorded frequently in Australia, but they appear to be rare at Huancayo, Peru, latitude 10 deg. South, which may indicate some connection with magnetic latitude effects.

Reflections of the types mentioned above have been termed sporadic, or abnormal E, but the origin and type of the ionising agent still remain obscure, and it is difficult even to say whether the types observed in different parts of the world are necessarily the same.

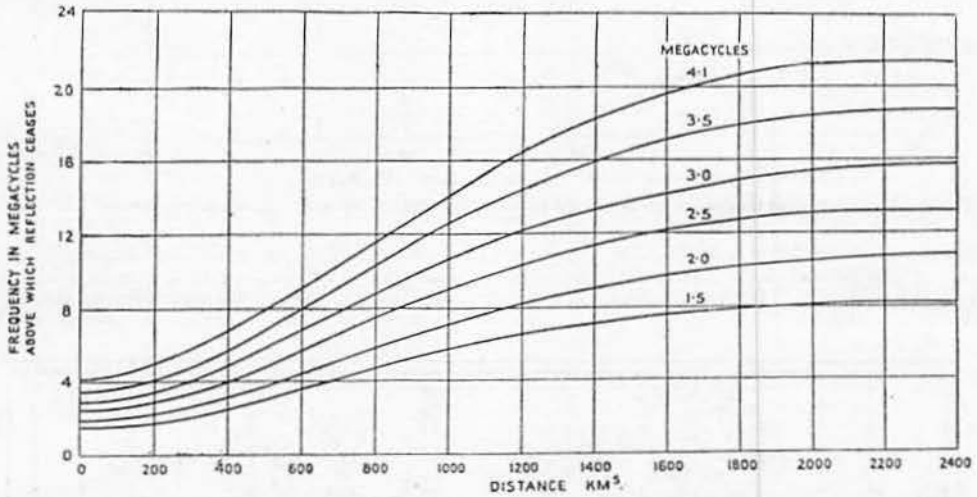

Fig. 10.—Skip curves for vertical incidence. Critical frequencies of 1.5—4.1 Mc. E layer height 120 kms. For use with contour charts for E layer.

The F1 Layer

The F1 layer cannot always be observed as a separate layer, and it will be seen from Figs. 1, 2 and 3 that the critical frequency for this layer can only be definitely observed during certain seasons in these latitudes.

The ionisation of the F1 layer, like that of the normal E layer, appears to be chiefly dependent on ultra-violet radiation. Its density, when it can be observed, reaches a maximum about local noon, and the summer density is higher than the winter value at any place. As in the case of the normal E layer, there is no F1 layer during the Polar night. The height of the F1 layer changes very little with the time of the year or the sunspot cycle, but there may be considerable changes in the height of the F2 layer.

As the height of the F1 layer remains more or less constant at a height of 200 kilometres, and as the F2 layer may change, in Northern latitudes, from a height of about 400 kilometres in the summer

months to about 200 kilometres in the winter months, there will be times at which the two layers become partially or totally superimposed.

This has occurred to such an extent in these latitudes during the sunspot maximum years that the critical frequency of the F1 layer cannot be observed during the winter months. This layer can still be partially observed during the spring and autumn, but it can only be observed as a separate layer with a distinct critical frequency in the daytime during the summer months when the F2 layer height normally reaches a value of about 400 kilometres.

In the tropics the F1 layer is observed during the day throughout the year, due to the fact that the F2 layer height is normally 300 kilometres, or greater, at all times of the year.

As a general rule it appears that the F1 layer can only be observed when the height of the F2 layer exceeds 300 kilometres.

The way in which the separation of the F1 and F2 layers varies with the season is illustrated in Figs. 1, 2 and 3.

The F2 heights do not appear to be solely dependent on seasonal effects, but appear to be controlled to some extent by an annual effect. This annual effect tends to reduce the F2 heights in all parts of the world during the months of September to March. As the latter months are summer months in the Southern Hemisphere, it is probable that the F1 layer is less defined, or more intermingled with the F2 layer, in the Southern Hemisphere summer than in the Northern Hemisphere summer, but we are awaiting confirmation of this. An approximate relation between the critical frequency of the F1 layer and the altitude of the sun is given in the upper curves of Fig. 8.

It should be understood that the foregoing relates to conditions during the daytime. At night only one layer is normally observed at any time and place known as the F layer. The latter may consist of the F1 and F2 layers intermixed, but only one layer can be observed by the pulse technique. Both the E and F1 layers may control the communications at certain distances at times when the F2 densities are low during the day.

The F2 Layer

The F2 layer does not appear to be dependent on ultra-violet radiation alone, but also on some type of corpuscular radiation which can be present in the absence of direct sunlight. This is indicated by the presence of this layer during the long night in the Arctic regions.

The density, in contrast to that of the E layer, is actually lower in the summer months than the winter months in our latitudes during the daylight hours, and is sometimes lower at local noon than during the hours preceding or following noon. With high altitudes of the sun, the F2 layer heights are frequently as great as 400 kilometres. The latter effects may be partly connected with expansion of the upper atmosphere due to a seasonal heating effect.

Another fact concerning the F2 layer is that the daytime density tends to be high in general in all parts of the world about the months of September

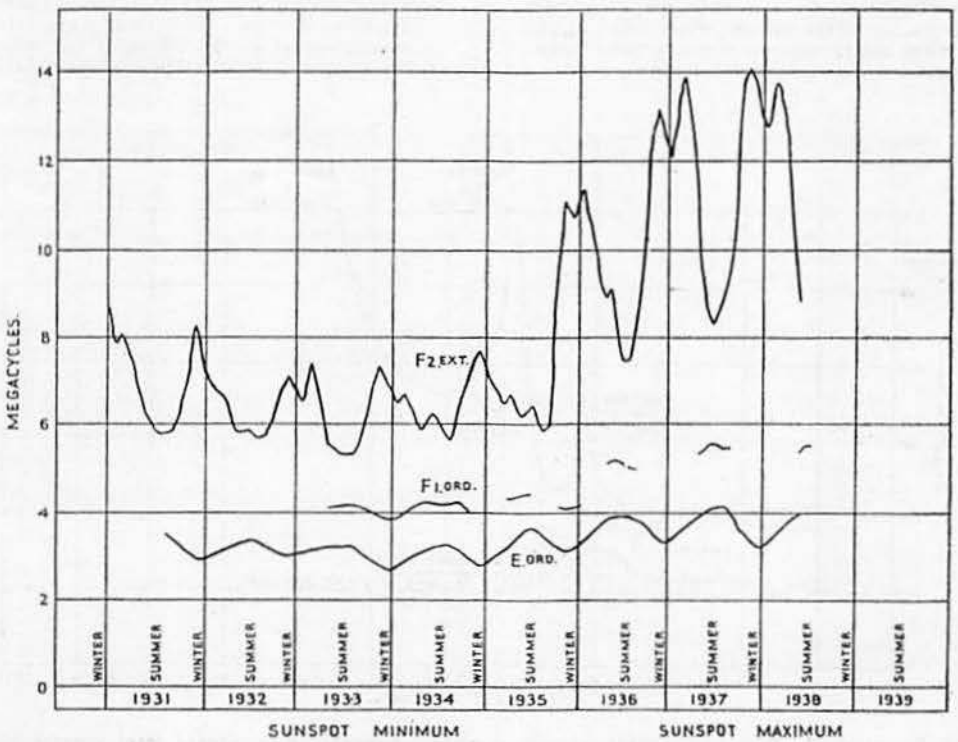

Fig. 11.—Variation of critical frequency with change in sunspot cycle. Washington midday values.

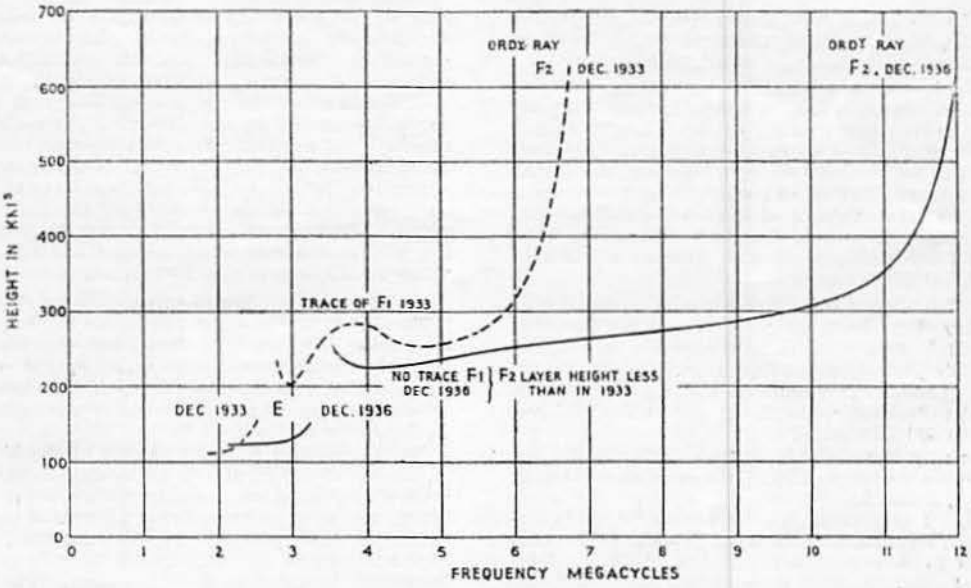

Fig.-12. Frequency/Height curves showing increase of critical frequencies with change from sunspot minimum (1933) towards sunspot maximum conditions. Washington, Winter, noon values.

and March, indicating some bi-annual effect in addition to a seasonal effect. This bi-annual effect may possibly be dependent on a solar latitude effect connected with the distribution of the active disturbed areas of the sun in certain solar latitudes which more nearly face the earth at these times of the year.

There are also indications of an annual effect which tends to increase the values of density of the F2 layer in the daytime all over the world between the months of October and February.

This latter increase of density might be attributed to a contraction of the F2 layer due to cooling effects in the Northern Hemisphere where it is

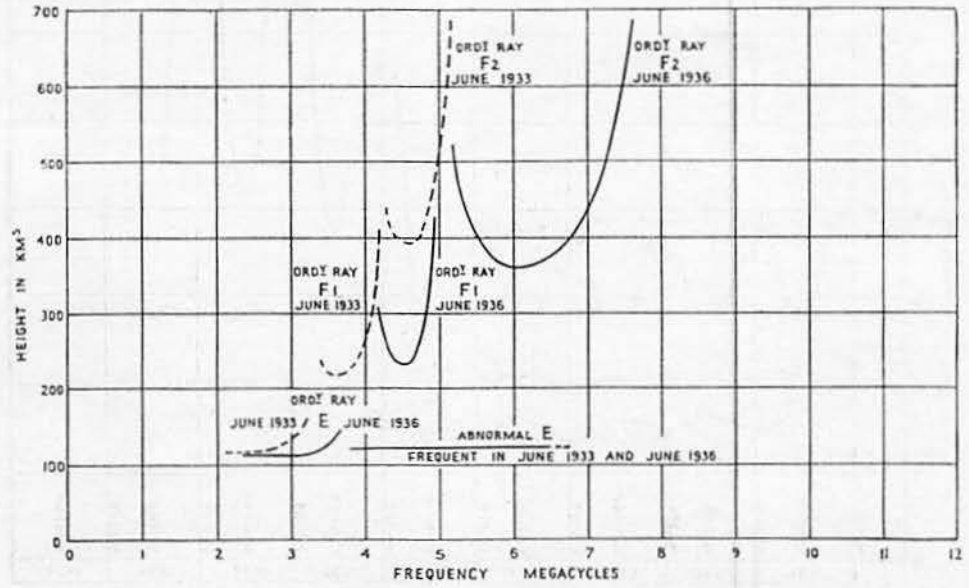

Fig.-13. Frequency/Height curves showing increase of critical frequency with change from sunspot minimum (1933) towards sunspot maximum conditions. Washington, Summer, noon values.

winter at this time, but there are indications that the densities are also greater than would be expected in the Southern Hemisphere where it is summer during this period. The F2 layer heights also tend to be low all over the world at these times.

Observations also show that the F2 layer heights are considerably less during the months of September to April in sunspot maximum years than in sunspot minimum years, and the percentage increase in density of this layer during these months for sunspot maximum years, as compared with sunspot minimum years, has been much greater than that for the E or the F1 layer.

Sliding charts in conjunction with a map of the world have also been constructed and used for the F2 layer, but due to the variable nature of the latter, these charts are more complex than those already described for the E layer, and more world-wide data is necessary to make them complete.

Owing to the annual effect already mentioned, the F2 chart for summer conditions in the Northern Hemisphere cannot be used for the summer in the Southern Hemisphere, although the E layer charts already described can be interchanged in this respect.

Measurements Illustrating Seasonal and Sunspot Cycle Changes

The changes which have taken place in the critical frequencies of the various layers at Washington during the past few years connected with changes in the sunspot cycle are shown in Figs. 11, 12 and 13.

To simplify Figs. 12 and 13, the extraordinary ray has been omitted.

Fig. 14 shows measurements made at Chelmsford from June, 1937, to June, 1938. The values of critical frequency in this article have been chiefly confined to midday, as there is hardly space to consider the diurnal changes in detail.

Scattering

It has been known for a number of years that, in addition to the continuous reflections from the ionised regions, other reflections or (scattering) of a sporadic type are frequently observed. This scattering appears to be produced by electron clouds at a height approximating to that of the E layer, and is observed chiefly when high power transmitters are used.

In the case of a reflected ray communication having a skip for the F2 layer of, say, 1,000 kilometres, scattering can frequently be observed from short distances corresponding to the points at which the rays pass through the scatter region on their way to the higher F2 reflecting region. We have called this " short scatter " to distinguish it from scattering back, which may also be received from the points at which the rays reflected from the F2 layer again pass through the scatter region on their way to the earth at approximately 1,000 kilometres distance.

The short scatter may be present at any time and on any frequency, but the second or distant scatter can only be observed on frequencies below the minimum usable frequency for the F2 layer, as the reflection from the latter is necessary to bend the rays down again to the scatter region

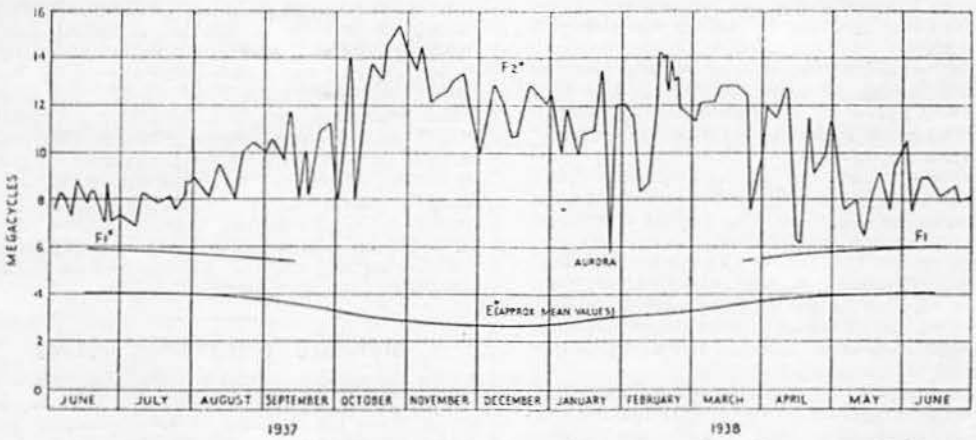

Fig. 14. Critical frequency at midday. F2, F1 extraordinary ray; E, ordinary ray. Chelmsford.

below. The distant scatter also varies in strength with the wavelength and time of the day in the same manner in which a distant signal varies with these factors. When a beam transmitter is used, the scattering is more intense from that portion of the scattering region which is illuminated, as it were, by the beam.

Some years ago the short wave direction finder gave us a clue to the origin of this distant, more or less horizontal scatter, and it is difficult to convince some observers that it is not received from other layers of the ionosphere at great heights.

Effect of Solar Disturbances. Magnetic Storms

Changes in height and density of the layers occur during magnetically disturbed times. These changes are of a complex nature, and the reasons for them are not fully understood.

As might be expected, they are more marked as one approaches the Magnetic Poles, very little change being noted in central latitudes.

The general effect of magnetic storms on the F2 layer is to decrease the critical frequency and increase its height in this country, but at Washington, especially during the winter months, these

effects appear to be less marked, and there appears to be a tendency to the reverse effect at times.

Washington being differently situated with regard to the Magnetic Pole, it may be that there is an ion drift under certain disturbed conditions which decreases the ionisation in this country and increases it in other parts, forming zones of low and high density, with the result that the local noon value of critical frequency for the F2 layer during the winter in England may be several megacycles less than the local noon value in Washington for the same day. During disturbed conditions the critical frequencies of the E and F1 layers do not appear to be affected to the same extent, but a highly absorbing layer may be formed at times about the height of or below the normal E layer, which may result in a condition of no echoes on any short wavelengths.

The departures from the mean annual curve for the F2 layer shown in Fig. 14 illustrate the variable nature of this layer from day to day. A typical example of the effect of disturbed conditions can be seen at the end of January, 1938, on the occasion on which the Aurora was observed in England.

On some occasions the increase in height of the F2 region during disturbed conditions has permitted the F1 layer to be observed during the day at a time when the F1 and F2 layers would normally have been superimposed.

On other occasions the critical frequency of the F2 region has been reduced until it coincided with or was actually less than the critical frequency of the F1 region. In the latter case, only one critical frequency for the F layers can be observed, the height indicating that this is the F1 layer.

The increase of height and decrease of critical frequency of the F2 region may be connected with heating effects due to the magnetic storms or possibly to some ion drift as suggested above.

Communications may suffer for several days and nights under magnetic storm conditions, but, as previously mentioned, these effects are chiefly confined to Polar magnetic latitudes.

Catastrophic Disturbances

At times, fortunately comparatively rare, there may be a complete fade-out of signals on short waves.

This type of fade-out occurs suddenly and simultaneously at all places, and the recovery, which often takes place after only a few minutes, is almost as rapid.

The interesting point concerning this type of fade-out is that its effects are only observed over the portion of the world which is in daylight at the time, and the effects are not confined to the magnetic latitudes, in fact they are more marked in central latitudes.

These disturbances appear to be definitely connected at times with bright hydrogen eruptions on the sun. Short wave fades of this type appear to be caused by the formation of a dense absorbing layer in the lower regions of the ionosphere.

It is of interest that during this type of disturbance signal strength on long wave circuits is usually increased.

Factors Controlling Propagation

Apart from these disturbed conditions, the normal factors controlling ionosphere propagation on short waves are electron limitation and attenuation. The former fixes the maximum usuable frequency at any time, and the latter controls the signal strength received.

The attenuation appears to be mainly in the E layer, except possibly when working near the critical frequency of the F2 layer, and this attenuation is increased with every successive reflection, especially in the case of low angle rays which have to pass through greater distances in the E layer.

We have already collected a large amount of data in an attempt to predict the performance which may be expected on any short wave communication at any time, but, as may be gathered by this very brief outline, the whole matter is of a very complex nature, depending, as it does, on so many variable factors.

Optimum Plate Tank Values

In connection with the above article, which appeared in our November, 1938, issue, we consider it is of interest to publish an extract from a letter sent by the author to Lieut. Johnston, G2ZP, who asked whether the figures given are suitable for telephony as well as for telegraphy operation.

Mr. Slack wrote as follows:—"The values stated are based on a "Q" of 12, that being a value which has proven to be about the optimum "Q" for best engineering practice. The values will be suitable for both telephony and telegraphy operation, although for 'phone operation alone it may be advantageous to use a slightly higher value of "C" to get a "heavier flywheel effect" in order to ensure linear output with the constantly varying output. The sacrifice in efficiency would only be very minute."

Standard Telephones Valves

We are asked to announce that the price of the 4316A Acorn Triode has been reduced from £5 5s. to £4, while the price of the 4307A Double Screen Valve has dropped from £2 5s. to £1 15s.

The selling price of the 4074A Twin Triode is fixed at £1 10s. and not £1 7s. 6d. as given on Page 85 of our Handbook.

New Trinidad Society

Mr. Douglas Bagg, VP4TO, ex G6BD, informs us that a Radio Society has been formed in Trinidad, under the title "Pointe à Pierre Amateur Wireless Society."

The Chairman is VP4TO and the Joint Hon. Secretaries are Messrs. T. H. Albeyne and T. L. O'Brien. Mr. J. M. MacDonald is Technician and Mr. L. F. W. Loveless the Librarian.

The Society hopes to develop a complete radio laboratory for the use of its members.

The Society has applied for and been granted affiliation with the R.S.G.B.

Good luck to P.A.P.A.W.S., which incidentally is the name of a favourite locally grown fruit resembling a melon.

Automatic Grid Bias

Will the author of an article entitled "Automatic Grid Bias without dropping H.T. Volts," please communicate with Headquarters?

AT LAST! A BRITISH MADE 6L6 G

WITH CERAMIC BASE

IN COLLABORATION WITH MESSRS. TUNGSRAM, WEBB'S have the pleasure of announcing that they can now supply to British Amateurs a First-grade British-made Glass 6L6 fitted with a **Ceramic** base (Octal fitting), and the Price is **7/6** (seven shillings and sixpence), **NOT** seventeen and six.
Deliveries will be available within a few days, and the supply will be limited for a short period.
Show the Manufacturers your appreciation of their efforts to meet your requirements.

PRICE 7/6

These new Valves are only available from WEBB'S.

AND A NEW HARVEY TRANSMITTER, THE UHX-25

The new UHX-25 has everything you could ask for in performance, price and appearance. From the chrome trimmed cabinet to the rugged chassis it looks and is an outstanding value in the transmitting field.

For efficiency and high output the popular 6L6 is used as crystal oscillator, followed by a second 6L6 as frequency multiplier, which in turn drives an 807 final amplifier to 50 watts input on all bands (5—200 metres). The final amplifier is plate and screen modulated by a pair of 6L6G tubes, preceded by a 6C8G and 6J7 as speech amplifiers. This modern combination of tubes permits the use of a high gain crystal microphone, which is so important for clear, crisp speech.

The power supply for the UHX-25 is mounted on a separate chassis, and connects to the transmitter through a removable cable and plug. The unit is housed under a rugged grille cover, which gives adequate safety protection as well as proper ventilation. Power requirements for the transmitter are 500 volts at 250 mA for the amplifier and modulator plates, and 300 volts at 100 mA. for oscillator, doubler and speech amplifier.

UHX-25 SPECIFICATION

Frequency Range, 1.5-60 Mc. **Power Input,** 50 watts on all frequencies in the above range. **Power Output,** 25 watts on 60 Mc., 37 watts on 1.5 Mc. **Radio-Frequency Tubes,** 6L6 Oscillator, 6L6 Frequency Multiplier. **Audio-Frequency Tubes,** 6J7 1st Audio Amplifier, 6C8G 2nd Audio Amplifier, 2-6L6G Class B Modulators. **Power Source,** 110-115 volts 50-60 cycles, or 12 volts D.C., depending upon power supply used. **Power Drain,** 360 watts under complete modulation. **Microphone,** Single Cell Crystal Type.

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Designed & manufactured by T. R. McELROY,
"World's Champion Telegraphist"

TRANSMITTING KEYS. Semi-Automatic Bug Types

DE LUKE MAC KEY, employs carefully selected and tested springs, which make for fast and perfect sending. 3/16-in. heavy contacts with pigtail connections, all metal parts except base chromium plated. Shorting switch for C.W. or 'Phone. Very heavy one-piece cast base **45/-**

THE STANDARD "BUG." A very popular Mac Key, same design and construction as the De Luxe, but with nickel-plated parts. Not equipped with the dot stabiliser... ... ... **37/6**

MAC AUTO

Light from exciter lamp on to photo-cell is interrupted by inked dots and dashes on ordinary recorded slip. Impulse is amplified to actuate the sensitive relay which delivers keying output to work local oscillator or transmitter. Not guaranteed for more than 75 w.p.m., although tested at 100 w.p.m. Ideal for training operators ... ... Price **£8 0 0**

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Designed for direct coupling to the output of any popular radio communication receiver. Complete with input transformer and rectifier. "I consistently record 100 w.p.m. from a Hallicrafter receiver and in tests have recorded perfect slip at 300 words per minute." . . . T. R. McELROY.
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McElroy's Automatic Equipment can be hired by local Radio Societies, etc., at **7/6** per week. NOT hired to private individuals.

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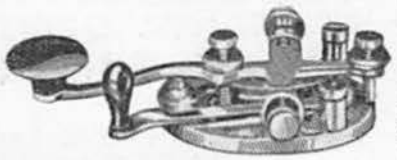

DE LUXE STREAMKEY. Excellent design and beautifully balanced lever, coupled with MAC coil spring. The action will positively thrill any operator. Case-hardened steel-bearing screws, heavily chromed. Carefully machined and very heavily chromium plated throughout. Heavy 3/16 in. contacts. **15/-**

COMMERCIAL HAND KEY. Same base, lever and spring that delight the operator and make excellent sending so easy. Black crackle base, chrome parts above. Case-hardened steel bearing screws. Heavy 3/16 in. contacts ... **8/6**

AMATEUR HAND KEY. As above, perfectly designed and balanced, but priced within the reach of the beginner. Black crackle base ; metal parts cadmium plated **6/6**

PROFESSIONAL HAND KEY. Same base and same case-hardened steel bearings as all MAC Keys. Main lever designed to give everything in balance that one needs for anything from the lowest to the extreme high speeds **12/6**

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An extra heavy A.C. induction type motor that runs silent and creates no interference. Tachometer type speed governor. Constant speeds as desired up to 100 w.p.m. Designed especially for AUTO or RECORDER, but desirable for any application where a good variable speed tape pulling arrangement is needed. A.C. Sockets are provided for neat connection to mains supply ... ... Price **£3 7 6**

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BIRMINGHAM DEPOT: 41 CARRS LANE

The Utility A.C./D.C. Transmitter

By J. N. Walker (G5JU)

IN many parts of this country, and abroad, the only convenient source of electrical power available is that provided by D.C. mains. Whilst a D.C. supply is a drawback when compared with an A.C. supply, it is certainly much better than batteries, since the current available is not limited, except within reasonable limits.

Almost any transmitter can be run off D.C. mains by using primary or secondary cells to light the filaments or heaters (as is annually demonstrated during N.F.D.) but it is undoubtedly more convenient to be independent of batteries.

By choosing suitable valves it is possible to build economically a transmitter which will operate at a high degree of efficiency off whatever type of mains is available. The "Utility A.C./D.C. Transmitter," which has been constructed with these factors in mind, should appeal to those resident in districts confined to a D.C. supply.

If the transmitter were to be operated from D.C. mains only, the design would be simplified, but it must be borne in mind that the day may come when A.C. mains will be available. For that reason it is as well to include, at the beginning, the few extra parts which will enable the transmitter to operate equally well off either type of supply without alteration.

The transmitter about to be decsribed also offers a number of advantages to those who already have A.C. mains available. For example, the normal type of exciter unit requires suitable high and low tension supplies to operate it, and it is often necessary to build a special power pack, in addition to the unit proper. This transmitter can be used either as an exciter unit, to drive a medium power transmitter, or as a transmitter in itself. Being completely self-contained it can, if desired, be employed as a stand-by transmitter, ready for instant use quite independently of the power packs feeding other transmitters.

It is of interest to note that the valves and components used are of British manufacture throughout.

Points Concerning the Design

The design has been made as simple as possible, compatible with efficiency, following, in many respects, that of the "Utility Two-valve Transmitter," which was described in the August, 1938, issue of this Journal. By incorporating more stages, and employing several more valves, a much greater output could be secured, and a few suggestions concerning this point are given at the end of the article.

The Circuit

The circuit, which is given in Fig. 1, consists of a crystal oscillator, followed by a push-pull power amplifier. The C.O. stage can be used either as a straight oscillator, with the cathode tied to earth, or as a Tritet, with the cathode circuit tuned, to enable an output of double the fundamental frequency to be obtained from the one valve. In order to derive the maximum output from this stage the losses have been reduced to a minimum by the employment of first-class components, and, in particular, a ceramic condenser, C4, is used as a by-pass in the anode circuit, in place of the usual mica type frequently employed. Actually this is the only fixed condenser in the whole circuit called upon to pass any appreciable amount of radio frequency current. The value selected, 500 $\mu\mu$F, will be found very effective for operation on both the 7 and 14 Mc. bands.

The coupling between the anode circuit of the first stage and the grids of the output valves is of the same aperiodic inductive type employed in the "Utility Two Transmitter," but, in view of the fact that the output circuit is of the push-pull type, the grid winding is divided into two sections, one on each side of the primary anode winding. Tests were carried out to discover whether it was better to connect the "earthy" ends of the grid windings to earth *via* a by-pass condenser, or to allow them to "float" and find their own balance respecting earth through the various stray capacities. As indicated in Fig. 1, the second alternative has been adopted, a radio frequency choke being inserted in the lead to the grid bias supply. No by-pass condenser is necessary, as this would be likely to result in the valves being unequally driven and loaded, unless the grid windings were very carefully matched electrically.

A push-pull output circuit is employed to enable an increased input and output to be obtained, and to eliminate, as far as possible, the strong second harmonic output resulting from the use of heavily biased valves.

A certain amount of cathode bias is incorporated to avoid damage occurring to the valves should the excitation fail, but the resistance values have been kept low to prevent loss of anode voltage. The greater part of the bias voltages necessary are obtained from the grid resistances, and, in the case of the output stage, from a dry battery. The whole of the bias voltage for the latter could, if desired, be obtained by increasing the value specified for R_2 but this is not advisable, as it would reduce the amount of excitation available.

Choice of Valves

As Tritet operation is required in the first stage a Pentode type of valve is obviously essential. Similar valves are also employed in the P.A. stage because of their low driving power requirements at normal amateur frequencies, and because of their higher efficiency, when compared with triodes, at the low anode voltage used.

The actual choice of valve is limited, because the heater rating must be suitable for wiring in "cascade," the normal manner of valves running off A.C. or D.C. mains. A study of British valves possessing Universal Heater characteristics resulted in the choice of the *Osram* KT33 as being suitable for all three radio frequency positions. This valve is rated for 26 volts .3 ampere heater consumption; 200 volts maximum on both screen and anode, and 10 watts maximum dissipation. It possesses the high mutual conductance of 10 mA/volt, which ensures a high output with a low value of drive.

Actually, the valve, not being fitted with a suppressor grid, falls into the tetrode class. The

base is of the International Octal Type, and the valve holders selected for use with it are the new *Clix* Lemon Ceramic Octal type, designed to ensure the lowest possible losses.

The value of 10 watts dissipation relates to audio frequency use; under oscillating conditions the dissipation will be much less. The maximum permissible anode current per valve is 50 mA., so that, provided sufficient drive is available, and assuming an anode voltage of 200, a maximum input of 20 watts is theoretically possible. Actually, when employed under Class C telegraphic conditions, it would be permissible to use a higher anode voltage, with a consequent increase in input. In point of fact, ample drive *is* available, but, in practice, the input which may be used is dependent upon the total current which the rectifier valve can pass.

The screen voltage should not be greater than 200 under any conditions, as the dissipation of the screen is limited. This point is mentioned later.

The rectifier valve is an *Osram* U31, a type which matches the other valves. This is an indirectly heated half-wave rectifier, rated for a maximum anode voltage of 250, and a maximum current of 100 mA. The total consumption of the three R.F. valves, not forgetting the current taken by the screen grids, must be kept reasonably close to this figure. Due to the low impedance of the U31 the voltage dropped across it is very small.

The current rating of the heaters of all valves is .3 ampere, and it is necessary to ensure that this value is maintained, irrespective of the mains voltage. This explains the reason for the inclusion of a Barretter, the choice of which will depend upon the mains voltage. The type specified, an *Osram* 302, will maintain the current at its proper value with mains of a voltage exceeding 215. For mains of a lower voltage a type 304 should be substituted.

Smoothing Requirements

If the transmitter were to be used solely on D.C. mains the smoothing requirements could be covered very simply, as the crystal would remove any ripple from the emitted signal, but, when operated from A.C. mains some care is necessary if the signal is to be absolutely clean, since half wave rectification is employed. In practice, however, it has been found that a simple smoothing circuit, consisting of two *Dubilier* 8 μF electrolytic condensers in conjunction with a 10 henry choke, can be quite

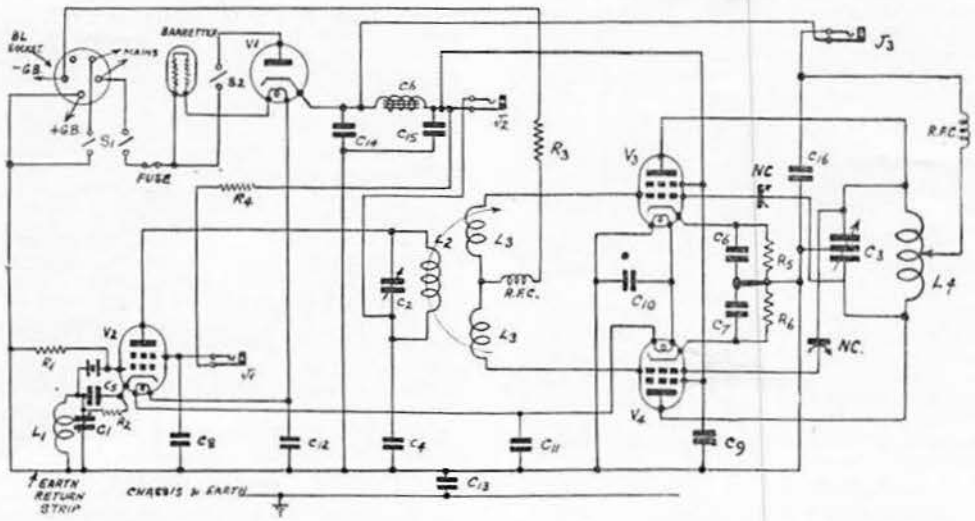

Fig. 1.
Circuit of the Utility AC/DC Transmitter.

Keyed Components.

C1—160 μμF Variable Type 1131, Eddystone.
C2—40 μμF Variable Type 1129, Eddystone.
C3—50×50 μμF Variable Type 1081, Eddystone.
C4—500 μμF Fixed Ceramic Type CTS945, Dubilier.
C5, 6, 7—.01 μF Fixed Mica Type 691 W, Dubilier.
C8, 9, 10, 11, 12, 13, 16—.002 μF Fixed Mica Type 690W, Dubilier.
C14, 15—8 — 8 μF Electrolytic, Type 9203E, Dubilier.
R1—25,000 ohm, 1 watt, Polar-N.S.F.
R2—100 ohm, 1 watt, Polar-N.S.F.
R3—5,000 ohm, 1 watt, Polar-N.S.F.
R4—25,000 ohm, 20 watt, Type PR13, Bulgin.
R5, 6—50 ohm, 1 watt, Polar-N.S.F.
R.F.C.—Type "A," Q.C.C.
J1, 2, 3—Closed circuit jacks, Type J6, Bulgin.
S1—Double-pole Mains Switch, Type S126, Bulgin.
S2—Single-pole Mains Switch, Type S80, Bulgin.
V1—Rectifying Valve, Type U31, Osram.
V2, 3, 4—Tetrode Valves, Type KT33, Osram.
Barretter—Type 302, Osram.
L.F. Choke—10 Henries, Type HT11, Wearite.
Crystal and Type B2 Holder, with base, Brookes.

Other Components.

3 Ceramic Octal Valveholders, Type V.248, Clix.
1 Bakelite Octal Valveholder, Type V.218, Clix.
2 Coil Formers, 6-pin plain, Type 1002, Eddystone.
1 Coil Base, 6-pin, Type 969, Eddystone.
2 Adjustable Insulated Brackets, Type 1007, Eddystone.
2 Stand-off Insulators, Type 916, Eddystone.
9 Midget Stand-off Insulators, Type 1019, Eddystone.
1 Terminal Saddle, Type 1086, Eddystone.
4 Insulating Pillars, 1½ in., Type 1029, Eddystone.
2 Knob Dials, Type 1099, Eddystone.
1 Plain Knob (for C1), Type 1096, Eddystone.
1 Single Safety Fuse Holder (with 1 amp. fuse), Type 1045, Belling-Lee.
1 Moulded Rubber Plug and Cord, Type 372, Belling-Lee.
1 Multi Plug and Socket, 5-pin, Type 126, Belling-Lee.
1 Barretter Lamp Holder, Type E.S.5, Bulgin.
2 Tank Coils, R.V. Inductances.
Supply Trolitul for Coils (Denco), Coil Pins and Sockets (Clix) and Nuts and Bolts (Bulgin).

effective. The latter should possess a low resistance in order that the voltage inevitably dropped across it may be small. A *Wearite* type H.T. 11 has been chosen as being entirely suitable for the position.

As shown in Fig. 1, the anode of the crystal oscillator and the screen grids of all three R.F. valves receive their high tension supplies *via* the choke, the ripple content of the applied voltage being very low. It is very important that the screen grids should be supplied with smoothed current, otherwise the signal will be modulated with a 50 cycle ripple. The anodes of the P.A. valves may be supplied direct from the cathode of the rectifier, and, using the circuit shown, the note is absolutely T9 in character. The total current, therefore, does not traverse the choke, the inductance of which is thereby maintained at a high value.

Construction

As in the case of the previous "Utility" transmitter, a strong steel chassis was selected as the basis on which to build the present model. Because of the extra components and valves the size is necessarily greater, the dimensions being 20 ins. by 8 ins. by 2½ ins. The layout is, on the whole, very similar to that previously employed. The general arrangement can be seen in Fig. 2.

As the valve-holders are mounted flush with the chassis it is desirable to order the chassis with the holes, which are 1 in. in diameter, cut out ready for their insertion. This suggestion also applies to the electrolytic condenser (which is of the double type, in one cylindrical case), and to the Barretter holder, the holes for which are ¾ in. and 1 in. respectively. Further holes are required on the front of the chassis for three jacks and two switches, and, on the rear, for the earth terminal and input sockets. The *Belling-Lee* socket specified requires a hole slightly greater than 1 in. diameter.

The Barretter, although it does not glow, dissipates considerable heat, and it should therefore be mounted, together with the rectifier valve, at the rear of the chassis, in order to enable the heat to be radiated off without affecting other components.

Behind the oscillator valve can be seen the crystal, which is mounted in a *Brookes* B2 holder. This holder is of a type specially designed to give a high and constant output.

Insulation Precautions

Special precautions must be taken when apparatus is used directly off the mains. As one pole is earthed—in the case of D.C. mains it may be either the positive or the negative—a direct earth connection to the apparatus is not permitted, owing to the danger of shocks to the operator, and to avoid the possibility of the mains being accidentally shorted.

To overcome difficulties in this direction all components on the chassis are insulated from it, whilst the chassis itself is directly earthed *via* the terminal fitted at the rear. All the normal earth returns are taken to a long metal strip mounted on two insulating pillars beneath the chassis, this strip being connected to the chassis, at one point only, *via* a .002 μF. mica blocking condenser. A larger capacity should not be used.

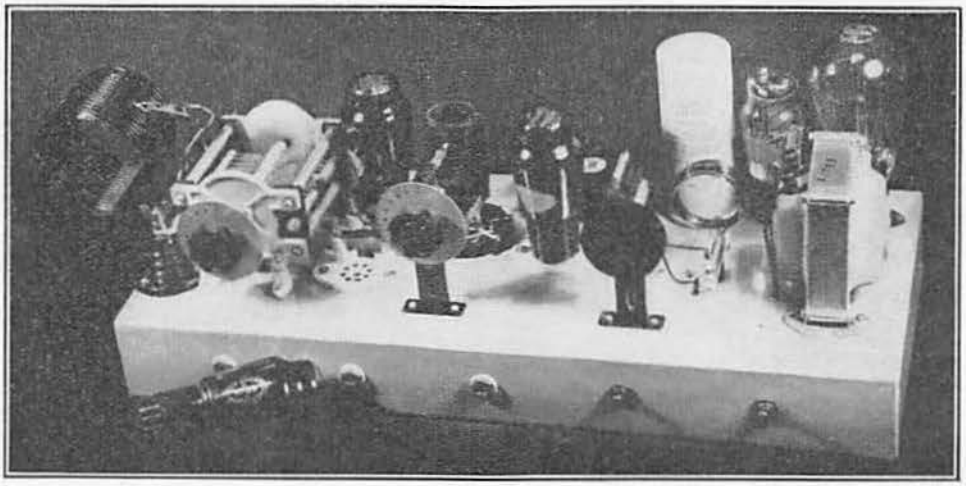

Fig. 2.
Top view of the transmitter. One of the output valves has been removed to show the neutralising condensers.

The two tuning condensers associated with the first valve are mounted on Eddystone insulating brackets, the split-stator tank condenser being fitted on midget insulators. The frame of the tank condenser is connected to the earthing strip by means of a wire, of substantial gauge, passing through the chassis.

The other parts are automatically insulated. The connections of the smoothing condensers are insulated from the case, which may be allowed to make metallic contact with the chassis. The jacks, which are fitted for the purpose of measuring anode current, and for keying, will require insulating bushes. The mains switch is of the double pole type, completely disconnecting the mains when in the "off" position.

The Neutralising Condensers

Valves of the KT33 type are not specifically designed for radio frequency operation, and the internal capacity existing between the anode and control grid is sufficient to provoke self-oscillation

unless special precautions are taken. This capacity has therefore to be neutralised out, but because it is of a very low value commercial neutralising condensers are hardly suitable.

Each of the two condensers needed consist of two plates of hard sheet copper (brass or aluminium may be used) measuring $\frac{3}{4}$ in. by $\frac{3}{8}$ in., mounted on midget stand-off insulators. These are situated between the two output valves, and can be seen in the photograph, one of the valves having been removed for the purpose. The insulators are set 1 in. apart, and one plate is suitably bent to overlap the other, with a space of about $\frac{1}{8}$ in. separating them. The terminals of the insulators nearest the tank condenser are connected to the fixed plates of the latter, whilst wires run down through the other two insulators and connect to the grids of *opposite* valves, underneath the chassis.

To avoid referring to the subject again, it is well to state here that the most effective way of neutralising the transmitter is as follows: the cathode coil of the first valve should be removed, thereby cutting off all current to the crystal oscillator. The bias on the P.A. valves should be reduced to a value which allows a reasonable amount of anode current to flow (say 40 mA.), and the spacing of the plates comprising the neutralising condensers varied until it is impossible to provoke self-oscillation at any setting of the tank and oscillator anode condensers, as indicated by a steady reading on the milliameter.

Wiring Up

The only wiring above the chassis is that between the variable condensers and their associated coils. The stand-off insulators of the P.A. stage are mounted very close to the tank condenser, and are connected to the fixed vanes with short strips of copper foil.

Turning to the sub-chassis wiring, Fig. 3, the first thing to note is the length of tinned copper strip (as used by electrical wiremen for earthing power circuits) to which all earth returns are made. This strip, which is mounted on two centrally placed *Eddystone* pillars, is indicated in Fig. 1 by the upper base line, the lower one representing the chassis itself. The photograph shows clearly other details, the condenser (C.13) visible on the right above the strip being the sole connection between the strip and the chassis.

The right-hand switch and fuse housing, which are wired in series with the mains, control and protect the apparatus as a whole. The second switch controls the application of H.T. to the rectifying valve, and thence to the anodes and screens of the other valves.

The base of the Barretter holder can be seen on the extreme lower left. The hole for the holder was not quite large enough, but this was of little moment, as a slip of mica placed between the exposed metal of the holder and the chassis ensures effective insulation.

Care should be exercised in wiring up the valve heaters, and the order shown in the diagram should be closely followed. The fixed condensers between the heaters and earth are necessary to prevent modulation hum.

The wires from the anodes of the amplifier pass through the chassis and up through the stand-off insulators. These wires, and all others carrying radio frequency currents, should be spaced well away from the chassis, and other components. The oscillator anode by-pass condenser (C4) is the cylindrical component visible in the centre of the photograph.

The power supplies are connected *via* a five-pin *Belling-Lee* plug and socket, although only four wires are necessary. Two of these connect to the grid bias battery, which should be well insulated from earth and placed in a position where accidental contact with it is impossible. *Belling-Lee* have recently produced a high quality mains connection cord, fitted with a moulded-on five-ampere plug, and it is recommended that one of these be employed for making connection to the mains.

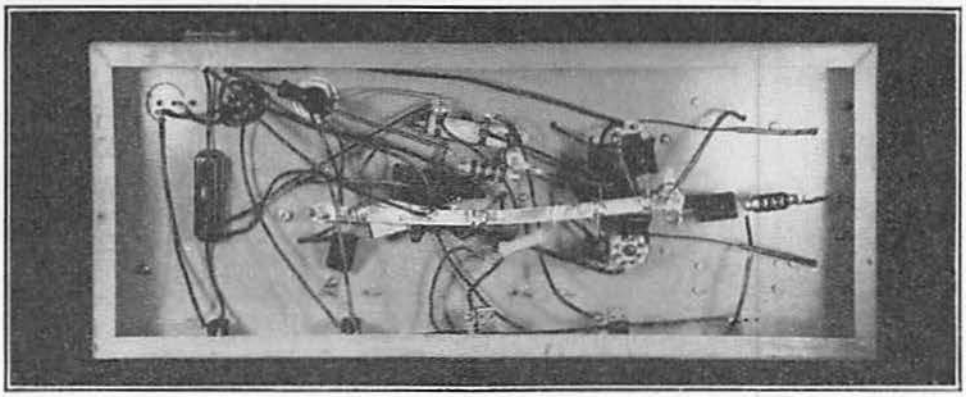

Fig. 3.
The majority of the smaller components are mounted in the wiring, as shown in this sub-chassis view.

In order to keep the oscillator valve current reasonably low, so that as much as possible may be available for the amplifier valves, a certain amount of resistance in series with the screen grid of this valve is desirable. The value will vary with the mains voltage, but 20,000 ohms has been found suitable, and is obtainable by adjusting the clip on a *Bulgin* 25,000 ohm 20 watt resistance.

If the mains do not exceed 210 volts, the screens of the amplifier valves may be connected directly to the output side of the smoothing choke, but if the mains are above this voltage, it will be advisable to insert a common resistance of a few thousand ohms. This may conveniently be obtained by an

additional tapping on the resistance mentioned above.

Coils

The cathode coils of the Tritet section, and the tank coils of the P.A. stage, are identical with those employed in the "Utility Two Valve Transmitter." As, however, fresh information is necessary regarding the inter-stage coupling coils, a chart has been prepared giving details of all coils. L_2 should be wound with 18 S.W.G., and L_3 with 28 S.W.G. enamelled copper wire, both sections of the latter being wound in the same direction.

Operating Adjustments

To obtain maximum output it is desirable to experiment with the coupling between L_2 and L_3, the latter being the grid coils considered as a whole. If the coupling is too tight, a double-humped band-pass effect will occur, and two peaks of maximum output (two minimum dips in the anode current) will be observed in the tank circuit. The spacing of the coils should then be increased, thereby loosening the coupling, until this effect disappears. A spacing of $\frac{1}{2}$ in. will be found approximately correct.

Using either a 3.5 or 7 Mc. crystal, with the appropriate coils, C_1 should be at nearly minimum capacity, and C_2 at nearly half capacity. The anode current of the first stage should be about 25 mA., and a neon lamp held against C_2 should strike fairly brightly.

With normal voltages applied to the anode and screen electrodes, the anode current cut-off of the KT33 valve occurs when the negative grid voltage reaches 40. For correct Class C operation, twice this value is necessary, and is obtained partly from the 60-volt battery and partly from the flow of grid current through R_3. A pronounced dip in anode current will occur at resonance, but the valves should not be run for long without a load, because, in this condition, the screen current rises, with a resultant rise in screen dissipation. The screen current will be quite low when an aerial load is connected.

Aerial Coupling

Although no aerial coupling arrangements are shown in the diagram, it is recommended that the same system as that advocated for "The Utility Two Transmitter" be employed. Alternatively, a separate tank circuit, with characteristics similar to the output tank circuit, may be inductively coupled to L_4. Under no circumstances should the aerial be tapped directly on to this coil.

Notwithstanding the employment of a push-pull output circuit, it is unnecessary, in the alternative method, to split the coupling coil into two sections because the two halves of L_4 are, in effect, so tightly coupled that any load applied will be borne equally by both valves.

As in any other transmitter, the load may be adjusted to give maximum efficiency, *i.e.*, high power output to power input ratio, or, alternatively, maximum output irrespective of input. With this particular transmitter, it has been found that maximum efficiency is obtained when the input is in the region of 12 watts, representing an anode current of about 50 mA. The transmitter may be loaded up beyond this figure, but the total current passed by the rectifier should not be allowed to exceed 120 mA.

It has been found absolutely essential to earth directly the chassis when using A.C. mains, otherwise a certain amount of ripple will creep into the note.

Keying

The method of keying employed is to break the H.T. supply to the screen of the oscillator valve. No difficulty has been encountered in this respect, the note being devoid of any trace of tail or chirp. With this arrangement the valve is liable to continue to oscillate very weakly, but break-in operation is possible, except when the frequency of the received signal is very close to that of the crystal or its harmonic.

Telephony Operation

The transmitter is primarily designed for C.W. operation, but the conditions under which the valves operate, and the amount of drive available, make it suitable for use on telephony. It will, however, be necessary to reduce the input by slacking off the aerial load, in order to enable the valves to deal with the modulation peaks without introducing distortion. When telephony is employed the combined anode current of the amplifier valves should not exceed 40 mA.

Operation on Different Bands

The same principles as were given in the previous article apply to the operation of this transmitter on amateur bands other than 7 and 14, therefore it is not proposed to repeat them here. The only exception is that, due to the use of a push-pull P.A. circuit, it cannot be used as a doubler. Operation is, therefore, confined to the fundamental and second harmonic frequencies of the crystal employed.

COIL CHART

Frequency		Number of Turns			
Crystal	Final	L1	L2	L3	L4
Mc. 3.5	Mc. 7	9	13	12×12	15
7	7	Shorted out	13	12×12	15
7	14	5	7	5×5	7

Details of L1 are given in the text. L2 and L3 are wound on 6-pin Eddystone formers. L4 are R.V. inductances.

Increasing the Output

As mentioned earlier, there is nothing to prevent the input being increased to a figure which may approach 50 watts, provided additional valves are included, when operating on D.C.

The simplest modification is to cut out the rectifier valve, and, on A.C., to add a second one. In the latter case the heaters will be wired in series, and the anodes and cathodes connected in parallel. Some, or all, of the resistance in series with the screen of the first valve may then be omitted, the input (and output) increasing slightly. The increased drive applied to the amplifier valves will allow them to be more heavily loaded, and an input up to 25 watts should be obtainable in this way.

Still further to increase the input it will be necessary to use two additional amplifier valves, each being wired in parallel with the existing ones, thus

(*Continued on page* 496)

An Interchangeable Aerial System for Six-band Operation

By HARRY HORNSBY (G5QY)

ONE of the greatest difficulties confronting the amateur, who wishes to operate on all six bands, is that of finding a suitable radiating system, which will be reasonably efficient on each. If he has only a small garden a lot of thought and experiment will be needed to overcome the problem satisfactorily. Such a problem confronted the writer some years ago, and how he managed to solve it in a satisfactory manner (at least satisfactory to himself) is the subject of this article.

Moving to a new location, the first return to amateur radio was on 14 Mc., in order to see how the new situation compared with the old one for DX. Luckily, the garden was about 80 ft. long, and satisfactory coverage on 14 Mc. was obtained by putting up a 67 ft. full-wave single-wire fed aerial (Windom). The line of the radiator portion was about 13° west of true north. This line gave very satisfactory distribution of the lobes, except perhaps the south-eastern one, which went out towards Kenya and north of Mauritius and wasted itself in the middle of the Southern Indian Ocean. However, its position could not be changed, as it happened to be the only possible line for the radiator at that time.

After a further taste of DX an attempt was made to obtain a satisfactory aerial system for all six bands again.

The 1.7 Mc. band was quite easily solved by using the above-mentioned aerial in conjunction with a 90 ft. counterpoise. This performed remarkably well. The other bands, however, still constituted a difficult stile to get over, and well over a year was spent without getting much nearer to a solution.

With the opening up of 28 Mc. for DX, the problem became really acute, and the old adage of "necessity being the mother of invention," proved itself true!

Before describing the arrangement finally adopted, the writer would like to mention that the germ of the idea, which is to make the single wire feeder detachable at the tapping point on the radiator, and to use a properly cut radiator or radiators on each band when necessary, came from G2PL. Of course, this meant having to run down whatever aerial was in position and fix and haul up the new one. At first this was a serious drawback, but after a little thought and the judicious use of ropes, pulleys and hooks, the disadvantage was overcome, and it was found possible to haul down one radiator and have the other in position in about seven minutes; this even in the dark or in snowy or frosty weather.

To many this may seem a rather nasty job, but they can rest assured that it is well worth the few minutes of trouble, because one can call wanted stations with confidence of "getting there in style" instead of pursuing them for hours and then perhaps only receiving a very poor report on a radiator that could not possibly function correctly or efficiently on that frequency.

Aerials Used

Now for a few words about the types of radiators used. As a full-wave radiator had performed so well on 14 Mc., a similar type was decided on for 28 Mc. This type, however, while giving highly satisfactory coverage, had the disadvantage of possessing two rather critical "dead spots" on each side of the line of the radiator and in a direction about 90° to the axis of the aerial. In the writer's particular case, the "dead spots" were Peru, British Guiana, Usbek, Malaya and Western Australia; all highly desirable places to contact at any time.

To overcome this disadvantage two other radiators were decided on. Both of these were of the half-wave type, one for 14 Mc. and the other for 28 Mc. These four aerials solved the 14 and 28 Mc. problem very nicely.

As the total available aerial space was some 70 ft. or so, 7 Mc. became "Hobson's choice," and a half-wave radiator, 65 ft. 10 ins. long was used. This performed very well on that band. There remained then only 3.5 and 56 Mc. to be considered.

The problem of the former band was solved by

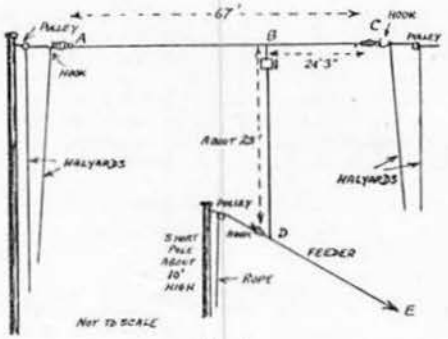

Fig. 1.
Diagrammatic Sketch of Aerial System used at G5QY.

making use of the full-wave 14 Mc. radiator and using the feeder in conjunction with it as a "G2BI" aerial. The tap on the 67 ft. aerial was 42 ft. 9 ins. from the far end, and as the total feeder length was around 90 ft, it was easy to shift a few feeder supports (thereby increasing or decreasing feeder length slightly) to make it resonate as a voltage-fed end-on half-wave radiator. Probably a lot of the success of this system on 3.5 Mc. was due to the fact that most of the feeder is well in the open.

Operation on 56 Mc. still remained to be tackled and for some time this was a big "question mark." In any case, even in the average garden it is not a difficult matter to find room for a separate 56 Mc. aerial or array. Up to the present moment best results on 56 Mc. have been obtained using the 14 Mc. full-wave with the feeder as a long wire aerial. Signals from this are excellent to the north, but so far no reports have been had from the south. However, the nearest active 56 Mc. station in this direction is some 130 miles distant.

Construction

The mechanical arrangements can be followed quite easily from the sketches. The halyards at each end of the aerial span are equipped with stout hooks instead of being fixed to the aerial insulators, as is normally the case. These hooks should be quite an easy fit through the insulator hole to enable quick-changing to be done. The tapping point on the aerial is made by soldering a few inches of wire to the radiator at the correct place, and soldering a telephone type of terminal to the other end of this wire.

All the radiators (excepting the 67 ft. one) are made up to 67 ft. approximately by adding lengths of rope to each end in such proportion as to always place the feeder tap the same distance (42 ft. 9 in.) from the mast (see Fig. 2). This job can be done by laying all the radiators out flat and using the 67 ft. one as a pattern.

This positioning of the feeder is an important point, as the portion BD must always be vertical, or, if this is not possible, as near vertical as can be obtained ; also this portion should be at least about one-sixth of a wave long on the lowest frequency upon which the system is to be used as a single wire-fed aerial (7 Mc. in the writer's case).

It is also advisable to make the portion DE of the feeder quite taut and allow a few inches of slack on the portion BD. This is important if a self-excited rig is in use, or if the receiver is a simple detector plus audio type. In any case, it will minimise sagging of the radiator due to the weight of the feeder.

In Fig. 2 only two of the radiators are shown, as this adequately explains the construction of any others.

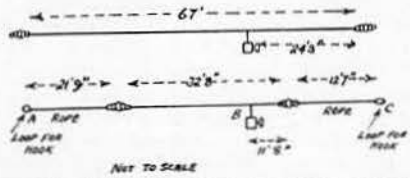

Fig. 2.—Sketch showing dimensions of two radiators.

Referring to Fig. 1, the hook at the point D enables the feeder to be pulled quite clear when changing radiators. This saves threading the up-going radiator over the feeder. Instead, it is only necessary to unhook the feeder at D, fit the new radiator, lift the feeder rope over the old radiator, re-hook the feeder rope, and then haul all ropes in. Thus much time is saved. It is advisable to mark the halyards at each end, so that even in the darkness the aerial can be positioned correctly. This can be accomplished by twisting a piece of thin twine tightly around the halyard at its tying-off point at the foot of the mast. The twine can be felt easily in the dark when hauling in the ropes.

Some readers will, no doubt, be asking what is done with those radiators when not in use. Those which are frequently used are kept lying ready pegged on the lawn, and others not so much in immediate demand are hung along the garden wall.

Perhaps the writer should mention that the lengths of the above radiators were determined from the formula :

$$L = \frac{492\ (K - .05)}{f}$$

where L is the length of the radiator in feet, K is the number of half-waves on the radiator, and f is the frequency in Mc. No doubt this formula is very familiar to most amateurs. The feeder tap was determined from the formula $D = .362 \times L$, where D is the distance in feet of the feeder tap from one end of the radiator, and L is as in the previous formula.

These formulæ are for No. 14 S.W.G. copper wire.

During seven years or so of almost constant use of single wire-fed aerials, lengths calculated on the above lines have been found to give admirable results, especially in the case of half-wave radiators, but in the case of full-wave radiators, an improvement in feeder matching can often be obtained by moving the tapping point a few inches (or even less) either way from the position determined by the formula. In any case, it is a good plan to test the feeder for standing waves with each different radiator. If these are present the length of the feeder should be altered by a few feet, and/or the tapping point shifted slightly ; in most cases this will provide a cure. However, if the radiator is at least one-half wave *effective* height on the frequency for which it is designed, no trouble should be experienced from standing waves on the feeder, unless this happens to be some multiple of a half-wave long.

If the operator uses several different frequencies in one band, then it is advisable to cut the top for the middle of the band, or for that frequency which is most used. The writer's experience is that it will perform quite well over about 200 kilocycles or so on 14 Mc.

Conclusions

In conclusion, it should be pointed out to would-be critics that this article is intended for those who like to work on every amateur band, and, at the same time, like to have a fair chance of contacting stations in almost any direction. Most beams, even rotary ones, fail to fulfil these stringent requirements.

Those of an inventive turn of mind will see that the same principle could be very nicely applied to the Zepp-fed aerial with perhaps even better all-round all-band efficiency, and certainly with less hooks and pulleys ! That, however, is outside the scope of this article, although it is hoped to try it out as soon as time permits.

To those who query whether the system is practical, and like to measure efficiency in DX achieved, the value of the system is proved by some 115 or more countries worked, as well as a large amount of DX even on the lower frequency bands.

It is hoped that this article may help those who would like to operate on more bands, but who have been deterred by the same reason as the writer. No amateur knows the full enjoyment of his hobby until he has used every band, and appreciated all the widely different phases of interest.

ZE1JA

We are asked to point out that Mr. Moore's address is P.O. Box 1089, Salisbury, Southern Rhodesia, and not P.O. Box 1087 as given in the footnote to his article on Beam Aerials which appeared in the December issue.

Why Not an "S" Meter?

By J. F. S. Carpenter (G8JQ)

SERIOUS experimental radio work demands accurate observation of results and for this purpose when experiments concern that debatable question of measuring signal strengths suitable methods must be employed. In many modern superhet receivers the problem has been reasonably well solved, or at least brought down to a standard method of comparison, by incorporating a device known as an "S" meter. For most practical amateur purposes an "S" meter gives all the information required, for it enables the operator to give a direct reading indication of the gain of the incoming signal.

It is not proposed to go into the theoretical pros and cons of such devices; this aspect is left to the more academical reader, as the writer feels that the whole question of signal strength reporting requires exhaustive study and authoritative treatment; neither is it intended to dispute the editorial comments made in the January T. & R. Bulletin concerning the basis of signal measuring, with which the writer entirely agrees. The intention of the article is to give some practical advice which will, perhaps, help certain readers to modernise their existing receivers by incorporating an "S" meter.

In the case of a receiver which does not include a signal strength indicator, the operator must depend largely upon intuition or guesswork when giving a report. The accuracy of his report is comparable with that of giving the temperature of a room without consulting a thermometer.

It will also be apparent that a carrier with a low percentage of modulation may appear to be a poor signal from an audio point of view, although the actual signal input in microvolts may be reasonably high.

An alternative to the "S" meter is the "Magic Eye" indicator, which is incorporated in certain well-known commercial receivers. A notable example of this type of device is to be found in the *National* NC101X, and it is concerning this receiver that our information applies in particular, although, as will be mentioned later, the method is applicable to other types of receivers.

Although it is appreciated that the Magic Eye method is very much better than no method at all, it is not, in the writer's opinion, really satisfactory. Firstly, the maker's calibration curve must be consulted before an accurate report can be given and, secondly, the operator always seems to be left with the feeling that he has not adjusted the R.F. gain control absolutely correctly. A further disadvantage is that the bottom end of the calibration curve is very crowded for the reason that in any logarithmic scale the lower points must fall close together.

In practice, the writer has always found it difficult to give an accurate report using a Magic Eye unless the signal happens to be a comparatively strong one.

In view of these difficulties it was decided to construct a more versatile type of signal strength indicator.

The Circuit

The basic principle of the device is illustrated in Fig. 1. This shows a conventional bridge circuit incorporating a low reading milliameter. Correct balance of the bridge is indicated by zero current reading in the meter; any change of resistance in one of the arms of the bridge showing up as a current change in the meter. The ratio of the resistances, when no current flows, can be expressed as $R_4/R_1 = R_2/R_3$.

In Fig. 2 a valve has been substituted for one of the resistances and, provided its internal resistance (marked "x") remains constant, no current flows through the meter when the bridge is balanced.

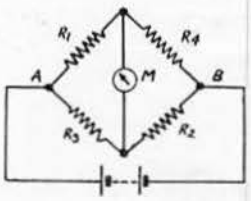

Fig. 1.—Wheatstone Bridge Circuit.

This is the principle upon which the "S" strength meter usually works; the valve or valves used being those which are affected by the action of the A.V.C. When a signal is received these valves become more heavily biased, their internal resistance increases and a corresponding current is caused to flow in the meter.

The practical application of this principle is illustrated in Fig. 3, which shows the first detector and I.F. stages of a conventional superhet receiver. The additions required are indicated by the dotted lines and symbols. Resistances R_1, R_2 and R_3 correspond to the similarly numbered ones in Fig. 2. The equation mentioned previously is helpful in determining the approximate values required, but in order not to drop the volts on the plates of the I.F. valves it is suggested that R_1 should not exceed 2,000 ohms. The internal resistance of the valves (corresponding to R_4) can be worked out approximately by Ohms Law from the voltage and

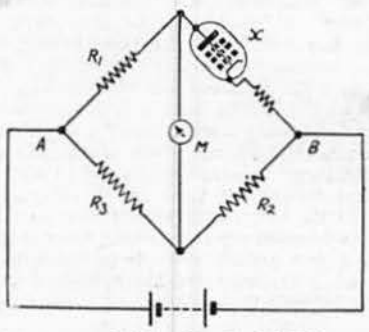

Fig. 2.—Wheatstone Bridge Circuit with Valve substituted for one of the resistances.

current ratings. The ratio of the values of R_2 to R_3 can then be chosen to approximate to the ratio of R_4/R_1. It is suggested that variable resistances be used for the initial experiments in order to find out the correct values required. Care must be taken to see that the combined value of R_2 and R_3 is high, in order that there may not be too large a current drain, with consequent voltage drop on the plates of the valves.

In the author's case the strength meter was designed to work in conjunction with a *National* NC101X, and the values found to be correct for

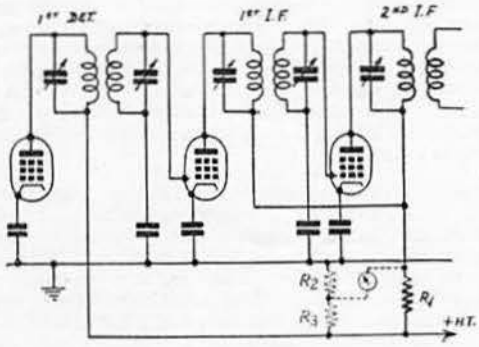

Fig. 3.—Skeleton Circuit of Super-heterodyne Receiver showing 1st Detector and I.F. stages.

this receiver were $R_1 = 2{,}000$ ohms (already in the circuit), $R_2 = 100{,}000$ ohms and $R_3 = 24{,}000$ ohms. Although it may appear desirable to make one of the resistances variable in order to adjust the meter to zero under "no signal" conditions, in actual practice this added complication was not found necessary and, provided fixed resistances are chosen which approximate sufficiently nearly to the exact values required, any discrepancy can be taken up by adjustment of the zero on the meter itself.

The meter used is a 0-1 milliammeter, and as a strong signal gives a deflection of .6 mA., it allows plenty of margin for a larger deflection from an S9 plus signal.

Incidentally, it would be as well during the initial tests for the correct values of bridge resistances to use a meter giving a larger reading, say, 0-6 mA., in order to prevent the accidental application of an excessive current through a 0-1 milliammeter.

"S" Strength Meter shown on the right of the Receiver.

If it is found that a strong signal gives a larger deflection on the 0-1 milliammeter than is desired, it is a simple matter to employ a shunt to lower the reading.

The indicator constructed by the writer has been assembled in a small cabinet, mounted alongside the receiver, with the resistances R_2 and R_3 placed inside. Three wires are brought out from the receiver: one from earth, one from a pin of the loud-speaker plug connected to the speaker field (which is used for additional smoothing of the H.T. supply), and the other from the I.F. transformer side of R_1 (lettered R_{12} on the circuit diagram of the NC101X receiver). No change of layout has therefore been found necessary in this particular case.

Calibration

For the present, calibration has been effected by chosing an arbitrary point on the meter scale (.6 mA.) for an S9 signal, and dividing up equally the remainder of the scale from the other "S" points. Any signal over .6 mA. is reported as S9 plus. The writer, however, is not satisfied with this method of calibration and intends to go further into the matter with a view to checking, in particular, the linearity of the scale.

The Perfect Test for Neutralisation

We have often seen methods of neutralising quoted, using loop and bulb, grid milliameter or neon tube, but even with the grid milliameter method generally regarded as the most positive, the stage may not be accurately neutralised. This condition in fact applies in the writer's P.A. stage! The following test will show whether neutralisation is complete.

When the stage being neutralised has been adjusted by means of a loop and bulb, grid bias is reduced until some anode current (about 10 mA.) flows. The receiver should then be tuned to a frequency very close to that of the stage in question. The tank condenser of that stage is then swung from maximum to minimum, and if neutralisation is complete, the receiver will not cease to operate at any setting of the tank condenser. If the receiver is put out of action by a spurious oscillation, a slight adjustment of the neutralising condenser, made while still listening in the receiver, will produce a setting at which no "noises" are heard from the transmitter. At this point the stage is perfectly neutralised.

G8ON.

VU2FH

Mr. Terry Adams, VU2FH, who will be on leave for about 11 months as from the end of February, will be pleased to meet London members. Mr. Adams tells us that he has a number of QSL's confirming contacts made with his station in Bombay and these will be distributed *via* the Society's QSL Bureau. Mr. Adams can be reached c/o H. A. C. Kennedy, Flat 5, 27, Hogarth House, Earl's Court, S.W.5.

D.C. Mains for Transmitter Operation

By A. S. Tripp (G8OT) and J. W. Cooke (G3XA)

WHILST the greater part of this country has an alternating current electricity supply, many districts are still served by the direct current system. It is hoped that these notes will be of interest to amateurs in these areas.

The majority of radio text-books and transmitter manuals give copious data as to the suitability for transmission of many valves for A.C. operation, but the question of D.C. operation is either ignored entirely or dismissed in a few lines as a matter of no importance. Thus the amateur, dependent on a D.C. supply, has to fall back on his own resources to decide what valves will most suit his case, and his choice must be made from valves which are by no means suitable for the purpose.

Valve Types Suitable

The writers have experimented with various types of valve, from the humble 2-volt battery type to the popular 6L6G, in an endeavour to find the most suitable type for lower power transmission from D.C. mains, and these comments constitute a few of the many interesting observations made.

Let us touch briefly on the use of directly heated filaments wired in series, for whilst indirectly heated valves are preferable, it is possible to operate directly heated valves in series if large capacity filament bypass condensers are used, a value of 2 μF will be found suitable for this purpose. The old 6-volt battery valves work quite well, and in particular DE5 valves have given yeoman service in this manner, as have the P625 types.

Turning to the more modern indirectly heated types, there seem to be no suitable triodes of the required size, so recourse must be made to the audio-output pentodes and tetrodes, and few are really suitable for the purpose.

The old type DPT pentode (13 v. 0.25 amp. heater) makes a useful crystal oscillator, providing a high value of grid leak is used, a value of at least 200,000 ohms being required. Another useful pentode is the American type 48 (30 v. 0.4 amp. heater), which will give an excellent output as a crystal oscillator, although it is inclined to pass a heavy crystal current. When operated in the Tritet circuit the output on the first harmonic was disappointing, being too small for practical purposes.

The most successful types tried to date have been the modern beam power tetrodes, the 6L6G and the 25L6G (6.3 v. 0.9 amp. and 25 v. 0.3 amp. heaters respectively). Both these valves will take a comfortable 10 watts input, and when tested under equal conditions, the output was practically identical. It must be left to individual choice which of two evils is preferred, either to overrun the 25L6G and have an economical heater consumption, with the risk of a short valve life (favoured by G8OT), or to work well within the rating of the 6L6G and to pay the cost of the heavy heater consumption (preferred by G3XA). Given sufficient drive a pair of either of these valves should take an input within the region of 25 watts using a 220-volt plate supply.

Series Heater Resistance

The provision of the series heater resistance must also be considered. By far the cheapest, and also the easiest method, is the use of standard vacuum or gas-filled lamps of the required wattage. It may be said, however, that the resistance of a lamp filament may vary widely between cold and hot conditions, and the provision of a shorting switch across the heaters is advisable, this switch being opened a few seconds after the resistance lamp is switched on. Thus, if a heavy current is passed by the lamp during the brief instant the filament is warming up, no damage to the valve heaters can result. In practice, however, no ill effects have been apparent when switching on in the normal manner.

Stability

Amateurs who, like the writers, are on " negative feed " (i.e., the supply looped across the earthed neutral and negative), which means in effect having an earthed positive, may find difficulty in keeping the transmitter stable. This can be overcome by using larger value bypass condensers than are conventional : values between 0.01 μF and 0.05 μF can be employed to advantage.

Smoothing

The use of smoothing in the D.C. supply is a debatable point, but for C.W. operation it has been found that a cleaner note and crisper keying is obtained without the use of smoothing. For telephony, of course, some smoothing is necessary, as the carrier must be reasonably free from D.C. hum. In any case when chokes are used they must be of the lowest resistance possible, as every volt dropped across a choke is reducing still further the already low plate voltage available.

The writers would be pleased to hear of other amateurs' experiences in the use of this rather doubtful blessing " D.C."

Things We Hear

A North Country amateur working a Southerner on 7 Mc. in the usual back-chat fashion, was heard to remark, " Well, I'm not much good at Morse, but I knew just enough to get through my test. Any case I'm not very technical."

We wonder what *would* have happened if he had been called on there and then to do his 12 w.p.m. !

* * *

Correspondence Wanted

Erhard Agricola, a German amateur living at Leipzig N22, Kirschbergstrasse 80, Germany, will be pleased to exchange correspondence with young London amateurs in either the English or German language.

* * *

Reports Wanted

G4AY (Tunbridge Wells) on his 7178 kc. C.W. transmissions. He is using 7 watts input with a C.O. All reports will be acknowledged.

* * *

G2LT (Sheffield 8), on his 14020 and 14072 kc. C.W. and phone transmissions. All reports will be acknowledged.

STANDARDS OF RADIO FREQUENCY

Emission of frequencies of reference from the National Physical Laboratory, Teddington, Middlesex.

THE National Physical Laboratory undertakes the emission of two types of frequency of reference for standardising purposes under the call sign G5HW. One is in the form of a modulation of 1 kilocycle per second, and the other a radio frequency of 1,780 kilocycles per second.

Frequency of 1 *Kilocycle per second* (1,000 *Cycles per second*)

This standard frequency emission takes place at 1040 G.M.T. on the second Tuesday of each month as a modulation of a carrier wave of a length of 758 metres (frequency 396 kilocycles per second).

The modulation frequency is derived from an oscillator in continuous operation at the Laboratory which has a nomiral frequency of 1,000 cylces per second. The accuracy with which this frequency is maintained is about two parts in 10 million, but during the emission the exact frequency will be measured, and its correct value to one part in 10 million will be announced at the end of the programme.

After the preliminary announcement in Morse code, the standard modulation frequency will be sent out for one hour continuously. This frequency will then be changed by an amount of about −2.5 parts in a million, and the emission will be continued for a further ten minutes. The object of making this change is to enable those receiving it to decide whether their own frequency of 1,000 cycles per second is above or below that of the Laboratory standard.

At the end of the emission an announcement will be made in Morse code giving any corrections that may be necessary.

Frequency of 1,780 *Kilocycles per Second*

The second standard frequency emission is primarily intended for amateur experimenters, and in this emission the radio frequency is the standard of reference. It has a value of 1,780 kilocycles per second—i.e., wavelength approximately 169 metres. This programme is emitted on the first Tuesday in March, June, September and December, commencing at 2100 G.M.T. The programme consists of an announcement in Morse, followed by a continuous dash, the whole lasting 15 minutes. This procedure is repeated for three similar periods, the whole programme lasting one hour. In this case no correction to the frequency will be announced, but it is expected that the frequency emitted will not be in error by more than one part in a million.

The following time-tables give the details of the programmes of standard frequency emissions described above :—

Standard Frequency of 1,000 *c.p.s.*

Standard Frequency to be used : 1,000,000 cycles per second.
Carrier Wave Frequency (nominal only) : 396 kilocycles per sec. (wavelength 758 m.)
Date : Second Tuesday in month.
Time : 1040 to 1200 G.M.T.

G.M.T.
1040 Announcement in Morse code.
" CQ de G5HW (3 times). Standard Frequency Emission at 1,000 cycles per second."
1045 Emission of modulation frequency uninterrupted.
1145 Modulation frequency changed by minus 2.5 parts in a million.
1155 Announcement in Morse code.
" CQ de G5HW. The correct frequency was {.999x * / .000y (3 times)."
1200 Programme terminates.

Standard Frequency of 1,780,000 *c.p.s.* (1,780 *kilocycles per second*)

Standard Frequency to be used : 1,780 kilocycles per second. (Wavelength 169 metres.)
Date : First Tuesday in March, June, September and December.
Time : 2100 to 2200 G.M.T.

G.M.T.
2100 Announcement in Morse code.
" CQ de G5HW (3 times). Standard Frequency Emission at 1,780 kilocycles per second."
2102 Continuous dash.
2115 Announcement as at 2100.
2117 Continuous dash.
2130 Announcement as at 2100.
2132 Continuous dash.
2145 Announcement as at 2100.
2147 Continuous dash.
2200 Programme terminates.

* In this announcement of the correct value the figures before the decimal point are omitted. Thus .999x indicates a frequency of 999.999x cycles per second, and .000y indicates a frequency of 1000.000y cycles per second.

Calls Heard

Eric W. Trebilcock (*BERS*195), *Powell Creek, North Australia. December* 8, 1938—*January* 4, 1939.

14 Mc. C.W. : ei4j, g2lb, 2ma, 2xr, 6mk, 6py.

28 Mc. C.W. : g2im, 2io, 2zp, 3cn, 5bd, 6dh, 6nf, 8rq, gi6tk.

A MATTER OF MILLIONS

To the Editor, T. & R. BULLETIN

DEAR SIR,—With regard to the article " Can We Predict Sunspots " by S. W. Allcorn (2FIH) in the January BULLETIN, I should like to point out that the 98 million square miles is the earth's hemisphere and not the total earth surface area.

Hence the supposed hurricane of 70,000 square miles is not 700 millionth's but 1,400 millionth's of the earth's hemisphere.

Yours faithfully,
A. E. DOWDESWELL (G4AR).

BOOK REVIEWS

THE ELEMENTS OF RADIO COMMUNICATION. (Second Edition.) By O. F. Brown, M.A., B.Sc., and E. L. Gardiner, B.Sc. 551 pages and 174 illustrations. Published by Oxford University Press, London. Price 16s. net.

The first edition of this book appeared in 1927 and these ten years have produced great advances in the art. The thermionic valve is now the predominant element and the book has been revised so that it takes its proper place.

The authors believe that a knowledge of the historical development should be acquired for a full understanding of the subject and point out that the earlier stages tend to repeat themselves in modernised form, *e.g.*, Hertz's ultra-short waves and Fleming's diode. Readers may doubt whether a study of either of these early developments is strictly essential for a full technical understanding of their modern counterparts. It will be admitted, however, that the early work, so closely associated with personalities, increases the student's interest. These remarks do not imply that the authors stress unduly the historical side, even, for example, in the section on thermionic valves which is mainly a record of development up to the present-day C.R. tube and the electron multiplier.

The book is an excellent introductory text in that it can be read easily and without the exacting concentration necessary in deeper books, which are often more useful for reference. This book may be read almost as easily as a novel.

The scope of the treatment, if not deep, is comprehensive. It is almost non-mathematical, as a pre-view of the subject should be, and the *tempo* of the text is leisurely. The subjects include such modern developments as television, rhombic aerials, Adcock aerials, Q bars and crystal filters. Every side, it seems, of the subject is covered, descriptively and the reader will obtain a sound understanding of principles which will enable him to approach the more exacting quantitative work of radio engineering with a clearer vision.

The book is very suitable for the general reader and for candidates for the Grade I examination of the City and Guilds. T. P. A.

THE AMPLIFICATION AND DISTRIBUTION OF SOUND. By A. E. Greenlees, A.M.I.E.E. 254 pages and 83 illustrations. Published by Chapman and Hall, Ltd., London. Price 10s. 6d. net.

This is a subject which closely touches many semi-technical people in their daily work. One immediately thinks of architects, electricians, engineers in charge of halls, hospitals, and other buildings, and even radio engineers who have limited experience in this specialised branch. There is a need for information about such work, but many enquirers are more concerned with the proper choice of equipment, its disposition, its intelligent use and maintenance, than with the principles of design of the equipment itself. However, they can carry out their work satisfactorily only if they have a clear understanding of the operational principles of the apparatus.

This book deals with the subject from such a point of view, and should enable the reader to meet his own problems with a fuller comprehension, and equipped with considerable quantitative data. Though many simple calculations are explained, the book is non-mathematical. The reader with little electrical education is provided with an introduction to fundamental electrical principles, and further chapters on amplifiers, transformers and amplifier gear. There is also a short chapter on receivers.

The author then deals with the subjects which are of prime importance to the reader, beginning, suitably enough, with various types of microphone. Their comparative merits as well as their principles of operation are discussed. Then record reproduction is treated, with details of scratch-filters, pick-ups, faders, and motors.

Going to the other end, the author next deals with loudspeakers, various baffles, sound distribution, volume control at the speakers, and phasing.

Perhaps installation planning is the most important section. Here are explained the many problems arising in indoor and outdoor work, and the proper choice of apparatus. Calculations of power required, and the disposition of speakers, is a useful part.

The next section deals with distribution lines and load matching, and is helpfully illustrated by simple calculations.

Much very practical and sound advice is given on the operation and maintenance of equipment, and a special chapter is given to central installations of the permanent type.

The book concludes with a chapter on specification requirements, and an appendix dealing with sound levels, dB tables, etc.

It is interestingly written and well illustrated, and is recommended as a practical and useful book on the subject.

T.P.A.

PRACTICAL WIRELESS SERVICE MANUAL. Edited by F. J. Camm, F.R.S.A. 288 pages and 221 illustrations. Published by George Newnes, Ltd., London. Price 5s. net.

The object of this book is to meet the needs of the amateur with limited test apparatus, as well as the professional service-man with proper equipment. Commercial gear is surveyed, but the home-construction, calibration and use of simple equipment is described. This apparatus includes a multi-range milliammeter, an A.C. meter, a simple capacity bridge, a valve-voltmeter, L.F., and signal generators.

The chapters on fault-finding which follow, though not presented in logical sequence, give a brief but clear explanation of many possible causes of trouble and their identification; usually the cure is then obvious. Perhaps the six pages on the cause and cure of distortion might usefully be extended to include, for example, that due to leakage in the coupling condenser of an R-C stage. A useful chapter on tracing sources of interference describes also many commercial anti-interference units.

The breadth of the service-man's technique is emphasised by a chapter on the renovation of

(*Continued on page* 496)

THE HELPING HAND

By J. N. WALKER (G5JU)

PART XVIII—APPLICATIONS OF THE OUTPUT METER

In the previous article in this series the author described the construction of an Output Meter. The practical applications of such a device are covered in the article now presented.

IN explaining the procedure to adopt when carrying out receiver adjustments, it is not proposed to deal with any particular frequency, therefore the remarks which follow are intended to apply to the range normally covered in amateur receivers. The tests outlined should be carried out, in the first place, on the band in which most interest is taken, and then on the other bands covered by the receiver. It will be found difficult, if not impossible, to obtain optimum efficiency on, say, both 28 and 1.7 Mc. with one particular set of components.

Testing Simple Receivers

In the case of the simplest type of receiver, the ever popular O—v—1, the range of experiment is somewhat restricted. Nothing in the nature of lining up is necessary and tests are best carried out with the oscillator removed some way off; a short aerial, a few feet long, being connected to the receiver. The subject of optimum aerial coupling will be dealt with later.

The heart of an O—v—1 receiver is the detector valve, it being called upon to both rectify and amplify incoming signals. To ensure that the operating conditions arrived at are such as to give maximum performance, the oscillator should be run in a modulated condition and the reaction control of the receiver set to a point just off oscillation.

Tests may then be carried out with different valves, coils, condensers, etc. Only one alteration should be made at a time, as changing both coil and condenser, for instance, might mask any improvement resulting from one component being superior to that formerly employed, whilst the probable difference in the L/C ratio would also affect the reading.

L/C Ratios

The ratio between the inductance and the capacity of the tuned circuit, commonly referred to as the L/C ratio, has a considerable effect on the results obtained. It forms an interesting test on its own to discover the value at which maximum signal strength is obtained, with the particular valve and components employed, and at a given frequency.

In general, the higher the L/C ratio, the higher is the dynamic impedance of the circuit, from which it follows that the oscillatory voltage built up is greater. However, various other factors complicate matters and it may not always be desirable to use a very high L/C ratio. For one thing, the tuning range would be unduly restricted and it would be difficult satisfactorily to arrange band-spread over more than one band.

The load imposed by the aerial (or by a previous stage) will damp a circuit of high L/C ratio much more in proportion than one of lower ratio and this fact should be borne in mind when conducting tests. The degree of selectivity obtained will depend on the tuned circuit and on the load imposed on it. Not only, therefore, should a note be made of the maximum meter readings at resonance but also tests made to ascertain by what degree the reading falls off when the receiver is de-tuned a definite number of degrees on the tuning dial. A final circuit "set-up" which gives a rapid decrease off resonance (i.e., high selectivity) will be preferable, even though signal strength suffers somewhat.

The Detector Valve

Whilst a high impedance triode valve generally performs well in the detector position, slightly greater sensitivity, especially to weak signals, may be obtainable from a screen-grid valve. It will be found, however, that the latter type is more critical as regards its operating voltages and particularly to the voltage applied to the screen. Individual valves vary considerably in their efficiency as detectors, and experiments carried out to find a really good valve and to determine the optimum operating conditions will well repay the time expended.

By-Pass Condensers

The effectiveness of a by-pass condenser depends partly on its capacity and partly on its inherent quality—that is, low dielectric and other losses. For example, the substitution of a mica type in place of a paper condenser will, in general, make quite a difference. Whether the resultant gain, which will depend on the position the condenser occupies, is worth while will be visible at a glance.

Where extremes of frequency are covered (e.g.,

28 Mc. to 1.7 Mc.), it is good practice to insert two by-pass condensers in parallel, the values being chosen to suit. In the example given, the capacities should be .0005 and .002 μF., both being of the mica tag type. This refinement will level out the performance throughout the range covered.

Similarly, the values of capacity and resistance used for the grid condenser and leak may be varied until the meter indicates maximum efficiency.

Further experiments which may be carried out with the O—v—1 type of receiver are alteration of the anode voltage and bias to the L.F. valve, substitution of different values of coupling resistances and condensers, etc. The effects of such alterations can be tabulated for future reference and the overall performance gradually improved in a manner which would be impossible if the ear alone were relied upon.

The foregoing remarks apply to the detector and L.F. stages of any type of receiver and repetition will therefore be unnecessary when dealing with more advanced types.

T.R.F. Receivers

As the number of stages are increased, so also does the usefulness of the Output Meter. Hints concerning the "hotting up" of the T.R.F. type of receiver have been given previously and covered such points as the adjustment of H.F. transformers, value of coupling capacity, etc.

A further point which merits attention is the benefit usually obtainable by tapping the grid of the valve, which may be the detector or one in an earlier tuned stage, some distance down the coil, so that the grid/cathode impedance is not placed across the whole tuned circuit. Since the input impedance of a valve decreases as the frequency increases, the improvement will be more noticeable on the higher frequencies. The optimum tapping point, lying between half and three-quarter way up the coil (from the "earthy" end) can easily be found for each band with the aid of the Output Meter and Modulated Oscillator.

The input impedance of a valve is partly governed by the applied grid bias and, particularly in the case of mains valves, it may be found that increasing the bias to a value slightly greater than that recommended by the makers for use on broadcast frequencies, will result in an improvement both in signal strength and selectivity.

The actual bias applied will, in its turn, be dependent on the anode and screen voltages. The anode voltage will usually be the maximum available from the power supply (providing it does not exceed that for which the valve is rated) but experiment with the voltage applied to the screen, either *via* a series resistance or by the potentiometer method, will probably result in an improved performance. In this connection, it may be found that the application of a lower screen voltage, whilst causing a slight decrease in gain, will reduce the noise level by a greater degree than the signal, due to the smaller current passing through the valve. This may be considered a definite advantage as the aim should always be to make the signal-to-noise ratio as high as possible. If more than one R.F. stage is fitted, the second or later stages should not be so treated (or not to the same degree) as the input grid will be unable to handle a large voltage swing and overloading, with its many unpleasant secondary effects, may occur.

Superhet Receivers

The alignment of a superhet type of receiver forms a subject on its own, and to go fully into it here would occupy too much space. Only a bare outline will therefore be given and readers desirous of further information are advised to study a standard text-book on the subject.

The first essential, be the receiver newly built or one which is suspected of having gone out of alignment, is to ensure that the stages working at various radio frequencies are all in proper tune. The intermediate frequency stages call for primary consideration and it is necessary to borrow (or otherwise secure!) a Modulated Test Oscillator, with a range which includes the particular I.F. employed—usually in the region of 465 kilocycles. Adjustment should commence with the I.F. trimmer condenser *nearest* the output stage, the output from the Oscillator being suitable injected, usually *via* the top cap of the valve preceding the I.F. Transformer. The earlier stages will follow and, as operations progress, the output from the Oscillator (or else the degree of coupling) must be reduced. During these and the following adjustments, the A.V.C. action, if incorporated, should be rendered inoperative, the simplest method of so doing being to connect the low potential ends of the grid circuit coils direct to the chassis.

Great care should be taken in making the adjustments, all the I.F. Transformer windings being tuned to the peaks of resonance. If one or more are slightly off tune, a band pass effect will occur and the overall selectivity will suffer. A 7 to 9 kc. bandpass is usually allowed for in transformers intended for inclusion in broadcast type receivers, but a much narrower band, 3 kc. at most, is desirable in communication receivers, even when it is desired to receive telephony at good quality. Once the correct adjustments have been found, the trimmers should not again be touched.

Next comes the oscillator stage. This may be set to function at a frequency 465 kc. (assuming this is the one to which the I.F. stages are tuned) higher or lower than that of the incoming signal. Except on the U.H.F., the former is usually adopted. Padding (series) and trimmer (parallel) condensers are included as part of the oscillator circuit to enable adjustments to be made such that the frequency difference between the oscillator and the grid circuit of the frequency-changer valve remains constant.

To make the adjustments, the Test Oscillator described last month should be operated in a modulated condition and its output weakly injected into the grid circuit of the frequency-changer valve. The settings of the trimmer and padder condensers should then be varied until a constant audio output results over the range of frequency covered by the variable condenser, this process being repeated with each range.

An R.F. stage should be considered as essential in a modern superheterodyne receiver and will be the last to be adjusted. Since the inductance of the tuning coil should be identical with the one employed in the frequency-changer circuit, it will mean only a matter of finding the correct setting of the associated trimming condenser. Should it not be possible to keep the R.F. stage in proper tune over the whole sweep of the tuning condenser, it indicates that the inductance is slightly different, in which case it is worth while adjusting the number or the

spacing of the turns to correct the discrepancy.

It is very essential that proper ganging be maintained throughout each range of frequencies covered. Otherwise, both signal strength and selectivity will suffer, the degree of second and adjacent channel interference increasing according to the degree of misalignment.

The further tests which may be carried out follow those previously outlined. Although the number of tuned stages will, to some extent, take care of the selectivity, the "Q" or goodness of the circuits must be kept as high as possible, to avoid broad tuning.

Efforts may be made to increase the gain of the R.F. stage, following the hints given under the heading of "T.R.F. Receivers"; the amplitude of the oscillations generated by the local oscillator may be altered by variation of either the value of grid leak or the series feed resistance (both should be tried), and the grid bias on the signal grid varied until maximum conversion conductance is obtained from the frequency-changer valve. The gain of the I.F. stages may also possibly be increased.

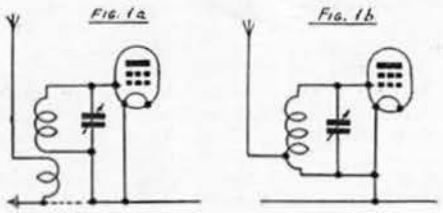

Fig. 1.
(a) Employing a separate coil for coupling a quarter-wave aerial to the receiver, and (b) an alternative method, using a tapping on the tuning coil.

The action of A.V.C., if fitted, may be tested by varying the voltage injected into the receiver and noting the readings on the Output Meter. It will be too much to expect that the readings will remain constant and it may be regarded as satisfactory if only small variations of power output occur with large changes in the value of injected signal.

The degree of coupling between the Beat Frequency Oscillator (B.F.O.) and the second detector is important. If too great, there is a danger of overloading the detector or impairing its efficiency—if too small, signal strength will suffer. Tests should therefore be carried out, with the Test Oscillator running unmodulated, to determine the degree of coupling which gives optimum results with a moderately weak signal.

Definite advantage accrues from making either (or both) the R.F. stage or the Frequency-changer stage regenerative, both the gain and the selectivity being increased. The simplest method of adding regeneration is to disconnect the cathode of the valve concerned from the earth line and connect it to a tapping made a little way up the tuning coil. The number of turns included between cathode and earth will be very few—in some cases, less than a single turn—as actual oscillation must be avoided. With the aid of the Output Meter, experiments can be carried out to discover the tapping point, for each range, at which a fair amount of gain is obtained, whilst still maintaining complete stability.

Aerial Coupling

The type and degree of aerial coupling employed has a very considerable effect on the performance of a receiver. The often seen statement that the length of an aerial does not affect the selectivity only applies to broadcast frequencies—there is no doubt that, on the amateur bands, a long aerial, unsuitably coupled, will reduce the apparent selectivity.

The principles involved are similar to those which apply in transmitting technique, only, in the case of reception, it is necessary to obtain the maximum transfer of energy from the aerial to the tuned circuit, instead of the reverse. At the same time, to avoid detrimental effects, the tuned circuit must not be unduly damped.

An aerial of dimensions in common use by amateurs—say, 50 to 100 feet long—will exhibit at the receiver end an impedance which will vary according to the physical length of the aerial and to the frequency of the signal being received. Rather than employ any "hit or miss" method it will pay to make an endeavour to secure as good a match as possible between the aerial and the input circuit of the receiver.

To cover this subject fully would entail an article on its own, so for the present we will simply indicate the various coupling methods which should be employed under different circumstances.

The necessity for a steady signal against which to make comparisons again makes itself felt. The pick-up must be entirely *via* the aerial and preferably by that portion out in free space. It is therefore suggested that the Test Oscillator be set up at the bottom of the garden and allowed to run in a modulated condition. The signal picked up should be of ample strength to actuate the Output Meter, but to avoid confusion it will be advisable to make the tests at a time when the particular band on which operations are being carried out, is quiet.

Roughly speaking, the type of coupling wil depend on whether there are an even or an odd number of quarter waves on the aerial, at the working wavelength. Taking as our first example one a quarter wavelength long—for instance, a 33 ft. wire used on 7 Mc.—a current antinode (maximum current, minimum voltage) will be present at the receiver end, the impedance, in consequence, being low. To couple this *via* a variable condenser to the grid end of the first tuned circuit is poor practice, the correct method being to employ either a separate aerial coil, of comparatively few turns, tightly coupled to the "earthy" end of the tuning coil or to connect the aerial to a tap a few turns up the coil. The two alternative methods are illustrated in Fig. 1, as (*a*) and (*b*) respectively.

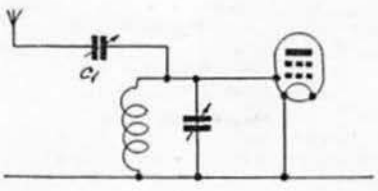

Fig. 2.
The capacitative coupling method illustrated is chiefly applicable to half-wave aerials.

The former method is to be preferred, as the degree of coupling can be controlled by alteration of the spacing between the coils.

Should there happen to be an even number of quarter waves (and, it follows, also half waves) on the aerial, a point of high impedance is presented to the receiver and it will be in order to couple to the tuned circuit by means of a variable condenser. Since both the aerial and the grid end of the tuned circuit may be considered high potential, even a small value of capacity will give a large degree of coupling. For this reason, the condenser employed at C, in Fig. 2, need seldom be larger than 20 $\mu\mu$F., whilst it is important that it should possess a very low minimum capacity. The optional method illustrated in Fig. 1 (*a*) may be used but, in this case, a larger number of turns will be necessary in the coupling coil, which should be wound with fairly thin wire, to level out the frequency response over a wide band. The coupling also should be somewhat looser.

Instances will often arise in which the length of the aerial is such that it falls in between the two classes enumerated and, in these cases, experiments should be made with the type of coupling, the number of turns in the coupling coil, or alternatively with the position of the tapping point on the coil, to determine which gives the best results.

When untuned feeders are employed, it is usually only necessary to connect them to a small coil arranged around the "earthy" end of the tuning coil. The spacing from the latter, and the number of turns incorporated for each band, are matters best determined by actual experiment.

Selecting the Best Aerial

Forgetting for the moment special refinements such as audio filters, etc., we have now run through all the major adjustments possible and the receiver may be considered to be working at the peak of efficiency.

The next step, when more than one aerial is available, is to discover which is the most effective for general reception and which for reception from particular directions. Reliance must now naturally be placed on signals emanating from distant sources and it follows that the times chosen for tests should coincide with periods of good conditions. Further, it will be almost essential to take the heterodyne of a telephony carrier as the basis for tests, since it will be difficult to take an accurate reading on a C.W. signal. It is advisable to install a simple switching arrangement to enable a quick change over from one aerial to another, although this point is not so important as when the ear only is being relied on as an indicator.

Another point to be borne in mind when testing aerials is the level of the noise produced by what is known as "man-made static." It may be found that a particular aerial, probably one well away from the house and near-by wires and employing untuned feeders, gives a much lower noise level than others. Other things being equal, and possibly even at the expense of a slight drop in signal strength, the low noise aerial will be the one to use for general reception.

The gain from a directive array, when employed for reception, will not be great unless the array occupies a relatively large area, but it will be interesting to carry out tests with aerials of this type to discover whether the gain is worth while. This will apply particularly when it is desired to receive signals from a certain direction, a further advantage accruing in the reduction of interference from other directions off the line of the aerial.

Cosmic Notes

Sunspots

A few observations of the sun were made during the month; a large spot was recorded with C.M.P. January 4 and a small group following on January 6. An average group crossed the central meridian on January 13-14 and another on January 16. A rather small group crossed on January 21 and an average group on the 27th.

Large prominences were reported by Tokio on December 30 and January 22. The sunspot numbers from Tokio indicate maximum activity around January 12.

The Bulletin of Character Figures issued by the International Astronomical Union records that spots associated with numerous chromospheric eruptions crossed the sun's central meridian on the following dates during the third quarter of 1938: July 1, 2, 7, 10, 15, 30, August 7, 11, 14, September 3, 6, 25 and 28. An extremely large number of eruptions were observed during July.

Magnetic Elements

The elements were generally quiet during the period covered by these notes, viz., December 24 to January 27, the few disturbances being of slight intensity only.

Ionosphere Measurements

Midday critical frequencies for vertical incidence at Washington, U.S.A., were as follow:—January 4, 12,000 kc.; January 11, 12,400 kc.; January 18, 11,700 kc.; January 25, 11,800 kc. These figures are for the F2 layer.

The writer wishes to thank G8DA for his assistance in compiling these notes.

G2XC.

Webb's Radio Log Book

Webb's Radio have just produced a most useful and up-to-date log-book containing 80 pages of rulings. A particularly attractive feature is its looped wire binding, which enables the book to be opened quite flat.

The rulings, which are clear and comprehensive, cover more data than any other log book on the British market, and as the reverse of each page is blank, the left-hand side becomes available for rough notes.

The first page contains the revised Q Code and the R.S.T. Code, whilst the inside covers give details of the Webbs' Radio Map of the World, and their Quick Reference Chart of American type valve connections.

We can thoroughly recommend this log-book, which is available, price 2s. 6d. (by post 2s. 9d.) from R.S.G.B. Sales Dept., or direct from Webb's Radio, 14, Soho Street, London, W.1.

Experimental Section

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

THE E.S.M. regrets there has been a little delay in issuing renewal discs, etc., due to his absence on holiday. It might appear that a number of other members have also been on holiday judging by the scarcity of reports from some of the groups—in fact many seem to have taken a holiday of a more or less permanent nature since joining the Section. It would be as well to point out that we have only room for those who, wishing to experiment, carry out the deed as well as the wish.

To come to a more pleasing topic, the fact that six articles in the January BULLETIN came from E.S. members shows that the Section is alive.

"Can we Predict Sunspots" (page 401) gives food for useful thought, and now that condensed monthly Cosmic notes are being published, members may care to try to reach their own conclusions with the assistance of their receivers and logbooks.

Log Books

Every amateur has his or her idea as to the way a logbook should be kept, but we are of the opinion that if more information in regard to weather conditions, atmospheric pressure, etc., were entered, the data might subsequently be of real use.

Many amateurs, who a few years ago were not interested in these matters, now wish their old logbooks contained more useful material.

Charts

When charts, graphs, etc., are sent around the groups they soon bear evidence of handling. Mr. H. R. Heap, G5HF (Receiver G.M.) has made an offer to "proof" such sheets for any Group of E.S., and we trust G.C.s and members will take advantage of his very kind offer. A sample has been through the post several times, and it has withstood its travels well. G5HF will treat the sheets either on the face, or on the face and back, the latter making paper impervious to damp. His address is 404, Victoria Avenue East, New Moston, Manchester, 10.

New N.P.L. Service

The National Physical Laboratory, Teddington, Middlesex, have just commenced a service of forwarding ionosphere data, giving layer heights and critical frequencies, as recorded at their laboratory. This information will be sent as a monthly Bulletin for one year for the sum of 2s. 6d. in Great Britain, or 5s. abroad.

* * *

Aerial Group

Letter budgets are now circulating round the newly-formed Aerial groups, and until these have been discussed, there is nothing that can be published.

An additional sub-group (2C) is in course of formation.

G2IM.

Propagation Group

It is with pleasure we announce that Mr. P. Murden, F.R.A.S., BRS3379, has agreed to take charge of the newly-formed Cosmic Group which will analyse data supplied by E.S. members, and supplement that already being provided by G2XC and others.

Another new group, to be known as the "Conditions Group," under the leadership of Mr. N. C. Hobbs, G8AA, has been formed. The daily variations in propagation conditions on the popular bands are to be shown in a form readily comparable with Cosmic and other data, and some interesting results should shortly be forthcoming.

The latest issue of *Aurora* contains much of interest. Among other subjects, it deals with the origin of Aurora, the periodicity of earthquakes, and the effect of the moon on propagation.

GM6JJ.

Receiver Group

The membership of this Group is growing slowly, but we are still too short-handed to attempt work on many of the problems requiring attention. The U.H.F. Sub-group is now large enough to start serious work and will shortly be split up.

G5HF.

Transmitter Group

Owing to the alteration in the status of the individual member, the Transmitter Groups are, at the moment, in a state of flux. A certain amount of reorganisation is necessary, and it is hoped to complete this very soon. In particular, all foreign and Colonial members are being transferred to the Group controlled by H. H. Phillips, 2BQB, who has facilities for duplicating Letter Budgets, thus saving both time and expense in circularising them.

All home individual members who wish to remain in the organisation (as Group members) are asked to notify their G.C. or the G.M. without delay.

The majority of members in the Transmitting Group are now working on set problems, and some interesting material should be forthcoming later.

G5JU.

SHORT AERIALS

The Editor, THE T. & R. BULLETIN.

DEAR SIR,—I was greatly interested to read of G2QM's work on short aerials. I have been using an aerial on 1.7 Mc. (its length being 150 ft.), which radiates very efficiently as a Hertz. It consists of two 75 ft. arms fed by 72 ohm. cable *via* a matching triangle with 3 ft. sides. This triangle size has been arrived at after adjustments to eliminate standing waves on the feeder. Although not strictly analogous to the loaded systems mentioned in the article, this aerial does seem to substantiate the statement that radiation takes place chiefly from the high current portion.

Results are very good considering that an input of only 3-4 watts is used. Contacts are easily obtained all round the British Isles, and several European stations have given reports of S6.

This aerial seems to give results at least equal to a good Marconi system, without the trouble of tuning adjustments, as coupling at the transmitter end is effected in the same way as with any other low impedance line.

Yours faithfully,

S. C. ABBOTT (G3JU).

Twelve Hours on One Point Seven*

By "Positron"

THE contest this year was coincident with a remarkable change in weather conditions. The intensely keen frost of the previous few days gave way on the morning of the contest to a very rapid thaw and the temperature during the following night and early morning was more characteristic of June than January. Many operators must have been grateful for the mild breezes which swept away the icicles and reconverted their shacks, which had become veritable ice boxes, into something more habitable. Curiously enough, less than twelve hours after the termination of the contest the frost returned, so that besides fixing the date and time of the contest the Awards Committee evidently has some control of the weather. Further their choice this year was a very popular one!

British Isles Observations

One of the main features of the contest was the phenomenally rapid rate of scoring in the case of the outstanding operators, and it will not be surprising if the winning score surpasses the existing record by a fairly good margin. The L.F. end of the band, as in previous years, was noticeably overcrowded and indeed between 1,770 and 1,800 kc. (which seemed to be the worst section), there were literally dozens of signals, the resultant effect being a high background of hopelessly intermingled CW with only two or three of the very loudest signals readable. Fortunately fading was not markedly present and did not add to any confusion already existing in the shape of QRM, so that stations operating in the comparatively thinly populated region between 1,840 and 1,995 kc. found scoring quite easy. In most cases signal levels were not outstandingly high, but the absence of QSB was ample compensation. An example was afforded by signals originating in Kent and London; on most nights high peak values are observed at the writer's station, but solid copy is often impossible due to violent fading. During the contest, however, signals from this area were rock steady at RS55, as was noticed in the case of G2MI, 2UJ, 5KV, 5WW, 5ZQ and 8NV, whilst G5IL and G6BQ were exceptional at RS57. From the Midlands G2WS, 5MY, 8MW and 8QZ were prominent, G5MY in particular being a splendid signal—a solid S9 throughout the darkness hours. Wales with 5FI, 5OD, 6AA and 8WU all at 57 was also productive of some excellent signals. GM2LQ and GM8SV at 56 were amongst the few Scottish signals heard, as was the ubiquitous GM5ZX, who during the two or three hours before dawn came through exceedingly well at S8.

DX Observations

Conditions for DX were apparently better than last year, for although none were observed here, other G's were heard calling W's and VE's. As Transatlantic signals during the few weeks around the contest date were so good on 7 and 3.5 Mc., it was hardly surprising that the minimum useful frequency should shift to a value as low as 1.7 Mc. during the "intense winter darkness" period (an hour or so before dawn in the British Isles), but it appeared that very few G's, if any, were getting over.† It is obvious that with the enormous difference in maximum authorised power on the two sides of the "Pond" two-way communication can only be expected when conditions are "dead on the mark."

It was noticed that several British operators were adding to an already difficult task by calling W's on frequencies higher than 1,800 kc. As the U.S.A. 'phone assignment lies between 1,800 and 2,000 kc., it seemed to be asking a lot of weak CW. signals to break through high powered 'phone. Admittedly the channel between 1,720 and 1,800 kc. was heavily congested with G's, but a call to the U.S.A. would have stood a much better chance of a reply if made from a frequency in this part of the band than from one in the 'phone band.

Operating Comments

Operating in general was of a very high standard and newcomers with no previous contest experience quickly adapted themselves to the procedure and style used by the old stagers. In particular, one useful trick employed when calling a station was to give the three figure report group between the signature and the customary AR, thus cutting down the time required for the actual QSO (if one resulted) by something like a half. The quality of signal in most cases was the usual clear-cut T9—the type of note traditionally associated with a British Isles transmission. The one very conspicuous exception was a G3 with a T6 note, but even this was c.c.

'Phone QRM was bad in the writer's area during the last hour of the 1938 contest, but not a single 'phone station was heard this year. This was partly due, it is believed, to the altered contest hours, because 1.7 Mc. 'phone activity on Sunday mornings seems to reach its peak at 1130 G.M.T. The feverish haste during the closing minutes of the contest again produced some "slick" operating and it was amusing to notice, in vivid contrast with more leisurely QSO's at normal times, contacts which took less than 90 seconds including the preliminary test call!

It would be superfluous even to mention the undoubted popularity which this event now enjoys, so in conclusion, here's to the 1940 Contest. Until then good luck, DX and *au revoir*.

* Being the observations of a South Yorkshire Member during the 1.7 Mc. Contest held last month.

† Several British stations worked U.S.A. and Canada.—Ed.

Strays

Mr. K. J. Cook, latterly ZC6AQ, wishes to thank all members who contacted him whilst in Palestine. Mr. Cook is now living in Rochester, and hopes to resume operations under his original call G2KK.

* * *

Andrew Boa, well known in District 12 under the call G5BO is now licensed as SU5BO. Until recently Mr. Boa was operating as ZB1T in Malta. His present address is Eastern Telegraph Co., Suez, Egypt.

* * *

Lieut. R. H. Johnston, G2ZP, "Westroyd," The Park, Yeovil, Som, would be glad to hear from any member who can give him information as to the cost, supply and erection of a 35-40 ft. telegraph pole.

THE MONTH ON THE AIR

A RUNNING COMMENTARY OF RADIO CONDITIONS FOR THE MONTH OF . . . . . JANUARY, 1939

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

THE story of the month of January, 1939, cannot be complete without reference to the transatlantic working which has taken place on 1.7 Mc. By observations in December on 3.5 Mc., it was believed that it would be possible to establish contact with U.S.A. on 1.7 Mc. during January and schedules were accordingly arranged, but we did not realise that the band would " open " in such a startling manner.

The night of the 1.7 Mc. Contest, January 8, saw the first Transatlantic QSOs ; VE1EA worked nine Gs, including G2JK, 2RC, 2CF, 5XH, 6BQ, 6GH, 6MK, and heard G5QY, 6GL, 2PU, 5MY and 5RI. W1AW worked G6MK, 2PU, 5QY, 6WY, and heard 5PR, 6GL, 2IZ and 2CF. W8PK worked 2PU and heard 5QY, while W1AW worked 5RI on January 10 at 0447 G.M.T. W1BB QSO'd G5RI, 2PU, 5QY, 6WY and W1DIZ was only using 6 watts when contact was made with G6WY. W1ERX tried 'phone with G6WY, but was too QRM'd !

The following week-end, January 15, saw no actual two-way working, but VE1EA was heard by G6GM, 3GH and FA8BG, the latter working G2PU and F8ZF who used 'phone receiving S6 report. Sunday, January 22, proved to be a good day for reception of W/VE signals, but contacts were not so easily established, and the signal strength of Gs were down on the other side. However, G2PL worked W1DIZ, W2FJY, W1KUW and VE1EA, while G6WY was successful with W1DIZ and VE1EA, who also QSO'd G2MI for his first " across." VE1EA was also known to have worked G6GM, G6GL and others. Other Ws heard were W1AW, 8QIB, 8QLY, 1BKL, 3IQN, 2FQB (?), 8BQ by G2PL and G6WY. FA8BG was a splendid S8 signal when he worked GW5FI, G6GL, 6WY and 2MI.

The last Sunday, January 29, produced no W signals of which we have details, but VE1EA was still a good signal and was heard in contact with G2AO. The remarkable part about these happenings is the fact that W1KUW and W2FJY were still audible at 0815 G.M.T. on January 22, showing that the radiation from the sun took well over an hour to alter the density of the F2 layer sufficiently to cause absorption. We believe that an indication as to whether 1.7 Mc. will produce W/VE signals between 0400 to 0800 G.M.T. can be found in observing the behaviour of the 28 and 14 Mc. bands. If these two H.F. channels fade out early it can be presumed that the ionisation is not sufficiently dense to permit signals being returned to earth, which in turn means that the effect of the sun has been weak during the daylight period, with the result that the condition of the F2 layer will bend 1.7 Mc. signals back to earth somewhere between 0500 and 0630 G.M.T. Conversely, in the case where the ionisation has been stronger during the daylight period, giving good late signals on the high frequencies, it may be anticipated that the F2 layer will be too dense, thereby absorbing the signal on 1.7 Mc. completely.

Many will believe that inputs for these contacts exceeded the permissible ten watts, but we hasten to assure readers that certain of the stations who were successful were *known* to have used *less* than this power ; witness also the 6 watts of W1DIZ !

G2YY raised LY1J for the first LY/G contact on 1.7, as LY1J has only just received permission to operate on this frequency. We also learn that G3UB worked him using *one* watt input.

To our mind, this 1.7 Mc. work shows that the rate of change of the solar cycle is more rapid from sun spot maxima than it was from the last minima to maxima, always presuming that we are on the downward trend. We have seen it stated that we are only now reaching the peak of sunspot activity, but in view of the fact that no known transatlantic contacts were made last winter, and that even 3.5 Mc. was poor when 1.7 Mc. was good in January, we feel that the maximum is well past.

Our congratulations go to G5ML for the magnificent " round table " that took place on January 4 at about 1300 G.M.T. On January 3, a preliminary trial took place and it was found that all the six stations taking part could hear each other, and on the following day G5ML, SU1WM, VK4JU, HK5AR, VU2CQ and W4DLH exchanged reports in the record time of 1 minute 50 seconds, thereby easily beating their last year's record of 3 minutes 20 seconds made on the same day. Telephony was used by all stations on 14 Mc.

G5FA has been one of our most consistent stations on 7 Mc. and contact was established with U.S.A. each morning in January. All districts of W/VE, except W6 and VE4, were worked, including 60 Ws in 18 States. The best contacts were W7EC (Montana) 7050, VE5VO 7060, ZL2MM 7160, and ZL3JA 7020, while South America is still needed for W.A.C. on 7 Mc. Stations heard regularly include ZL2BD, 3CV, CM2WD, K6PUS, K5AM, 5AP, 4FOV, 4FHR, VP2AD, 4DE, 6MR, TI2FC and LU2BD, while GI3KV contacted KA1AX three Sundays running on this band. G4AS reports working VP6MR on 7 Mc. 'phone and heard VP6FO, VP3AA between 2130-2230 G.M.T. All these reports confirm the fact that 7 Mc. would be an ideal band for DX if more stations used it for DX communication and *refrained* from using telephony for *local* contacts when the band is open. G5FA appeals to all users of " 40 meter 'phone "

to use judgment in choosing their hours of operation.

Before we leave the L.F. bands we must mention the unusual reception of British 3.5 Mc. 'phones by Tan bin Hussain, Magistracy, Ipoh, F.M.S. He writes to us and requests all stations operating on this band to enunciate their calls with care, as he hears many stations in G, EI, GI, but cannot decipher their correct letters. All stations heard will receive a report from Malaya.

14 Mc. continues to bear the brunt of our DX work. VK9 has come into greater prominence during the month and a few contacts are recorded, notably by G2IG and 3BS, who raised VK9XX 14296, G5BD and G2FT with VK9BW 14386. G5BD is now credited with the first contact between New Guinea and Great Britain and not G6GH. G8AP is to be congratulated in giving VK4HN in Papua his first G QSO; he is to be found on 14300 at 1140 G.M.T., but G8LT actually holds the record for the first two-way with VK4KC in Papua, so it would appear that G8AP is No. 2—up the G8s!

Miles W. Weeks, W1WV, has now had 2,015 G QSOs, including 1,022 different British stations in all but six counties of England and Wales. He is wondering if he can claim the first W-G3 and W-G4 contacts; G3BS was his first on December 15, 1937, at 1741 G.M.T. and G4AP on January 12, 1939, at 2022 G.M.T. He was one of the lucky ones to work ZB2A in Gibraltar on September 30, the only other Ws being W2KL, W1FH and W2GT.

Eric Trebilcock is with us again, and threatens to take out a VK8 call soon. On 7 Mc. he received K6OOR, K6QMC, K6DV, KA3RA, and on 14 Mc. CR6AI, FB8AE, FM8AD, HC1FG, HR7WC, I1NZ, KF6DHW, ST6KR, VP6TR, VQ4RHL, XU1HV and XU9FS (57, Suchow Road, Hweiyang, China). VR1SS is a VK on board a freighter bound for G, so we should soon begin to hear his signals; KD6CKM replaces K6TE on Wake I. BERS195 received 77 *different* ZSs during December, and asks us if we can clear the mystery of those VP1ZA, 2ZA, etc., calls. We have been informed that the suffix "ZA" is used by an operator on a British ship sailing in West Indian waters and the prefix is changed to suit the country he visits, or to which he is nearest.

From another part of the Empire we hear from VU2EU, who is now at the W.E.S., c/o Peshawar Dist. Sigs., Peshawar, N.W.F.P., and all communications should therefore be sent to this address. He is unable to transmit at present from this QTH, but tells us that a card was received from J2XA giving the following address:—Dr. Susumu Takasaki, 106 Tomita. Asc-cho, Ibaraki-ken, Japan, but cards should only be sent *via* JARL. Latest VUs to receive licences include VU2MA, R. Marrack, Officers' Mess, R.A.F., Risalpur, N.W.F.P., and VU2HU, who should be QSL'd c/o VU2EU. Both VU2FO and 2EU request that cards for *all* VUs should be sent direct as far as possible. We are pleased to learn that FN1C and AC4YN are very active at present at 1430 G.M.T. daily, while XU7TH is operated by an American-born Chinese at Tsinghua University, Kunming, Yunnan—Zone 24. VU2FO tells us that there is a bogus AC4YN operating on 14,300 with a T9 note, as he worked nim and proved the point to his satisfaction. (*American Journals, please note*). Best DX at VU2FO during late part of December and early January included HI6Q, VE4RO, NY1AD, XU7TS, 8NR, 9WW, LU1CA, CX1BG, VS6AO and VS6BH between 14250 and 14400, from 1600-2000 G.M.T.

ZC6RP tells us that he and ZC6AA are the only licensed stations at present in Palestine, by which we presume that ZC6AQ has left. Others known to be active include ZC6RL, ZC6AC, ZC6EC, but the latter is expected to leave in the middle of February for G. The frequency of 6RP is 7,221, while 6AA uses one around 7,020 kc. ST6KR is now the only amateur left in Sudan; he sends a long letter in which he says that WAC was made on Christmas Day with OQ5AV, ZC6EC, W5QL, VK2AEZ, HA3A and PY2BB. He reminds all stations worked that a card has been sent for every new contact *via* the respective bureaux of the country concerned. He keeps a record in special columns of his log, of cards sent and received, and mentions that only half the space marked "received" is full. If this continues he threatens to send a card only after one is received. And while mentioning QSL cards we learn that G6IA in the Isle of Man does not consider that it should count as a separate country and is not interested in receiving cards. G3QF has now left the Island and is living in London.

ST2CM is now in Cairo and hopes to commence transmissions under an SU call shortly. SU5BO (Suez) has just obtained his licence and is ex-G5BO, ex-ZB1T. VE5ZM and his brother, VE5AAD, have been concentrating on placing VE5 on the map as far as the British Empire is concerned. So successful have been their efforts, that 350 Empire stations have been contacted since last year, many of which were first VE5 QSOs. It is possible that VE5ZM may be coming to London for a honeymoon visit during the summer—a welcome awaits him!

We learn from G2ZQ that two B.B.C. stations will commence Indian transmissions from GSU, 7,240, and GSW, 7,260, in September. Times of these programmes will be between 1300 to 1700, and we understand the B.B.C. will keep their 7 Mc. radiations out of the busy periods of evening working by amateurs. The power in each case will be 100 kW. and crystal control will be used.

We have some interesting news from W. E. Davey, a member of the Radio Club GI6YM in Belfast. He tells us that the only two active stations in Uganda are VQ5EJT (GM8NT), J. Thompson, P.O., Entebbe, and VQ5ELD, L. Durham, at the same address. The frequencies of 5EJT are 14,046 and 14,140 for 'phone and C.W., while that of 5ELD is 14,046 on C.W. only. VQ5KLB is at present inactive as he is at Butiaba on Lake Albert, and although he will return to Entebbe he is uncertain about future operation. Both 5ELD and 5EJT are on the station staff of Aeradio VQQ.

Like BERS195, 2AOU in Jersey hopes to apply for his ticket after the B.E.R.U. contests. His best "catches" for the month included ZD2KM (14,180 T5 1700), OQ5AV (14090, 1640), K7ETS (14320 0930), VU7BR (14350 1700), VO6J (14395 1940), XU8NR (14290 T6 0930), VO5BA (14120 1900), and LB4A, but G2ZQ assures us that LB is the portable prefix for Norway. 2AOU has now heard all continents on 28, 14 and 7 Mc., with 3 on 1.7 and 3.5 Mc. respectively. G3JR reports his usual rare contacts with W6QAP (Ariz. 14070

0230), VQ3ALT (14055 1630), HH2MC (14310 2040), HH3L (same), CS2V (experimental station in Lisbon anxious for 56 Mc. contacts), OQ5AV (14060 2000), and CR7AG (14310 1800), the latter making his 72nd country with a maximum input of 10 watts. His 28 Mc. *debut* produced contacts with FB8AA (28000 1630), VK6WZ (28200 1215), LU9AX (28250 1645), and all districts U.S.A. except W7. Another "little marvel" on 28 Mc. 'phone is G3DO; with 25 watts he only needs New Mexico for W.A.S., but with W5ZA and W5GGX about he shouldn't be long. He has added recently W6OJK (Ariz), W7ACD (Idaho), W9ZNA (Neb), W9EOZ, 9RGT (N.D.), W9USI, 9WZH (S.D.), W1DQK (Vt.), and W5EB (La), using a Johnson "Q" beam aerial giving a 6 db. gain in its forward direction pointing to U.S.A.

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

Call.	*Dominion Districts.*	*Colonies.*	*Total.*
G6XL ...	25	13	38
G8IG ...	23	13	36
ZS6BT ...	18	16	34
G5ND ...	24	10	34
G6ZO ...	21	13	34
G3BI ...	24	10	34
GM8HA ...	22	11	33
G3BS ...	23	9	32
G2GK ...	23	7	30
G8KP ...	23	7	30

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

G6ZO has added K6QIU and VU7BR for new countries, and worked K7FNE (14365 0900), K7ETS (14365 1045), K7FST (14390 1000). CS2V apparently uses a 56 Mc. transceiver for 14 Mc. work, and will call "CQ G under the call CS3VA on 56 Mc." ZO heard VK7CM, 7GJ, 7KR all around 14,350, and VS6BE (14,280 1400). If you hear U1DN on 7 Mc. with a chirpy T6 note do not forget that he is at Murmansk, well inside the Arctic Circle. G3BI supplies us with the QRA of VQ4RHL —Box 103, Nairobi. G3BS reports contacts with VP7NT, VP4TP and K7HAR, while G8RL has been concentrating on 7 Mc. and was rewarded with all districts U.S.A. (except W6), VO1W and 1T, PY4AT, KA1AX, VU2AN, FA8BG, SU1NH, ZC6EC, who should be QSL'd *via* the R.S.G.B. G3CY worked ZS1T on 'phone using 10 watts suppressor grid modulation. By the way, "TI1N" reported last month should read I1TN with a shaky fist! G3TX supplied the answer.

The G4s are entitled to their own paragraph, and great things are being done by them. G4AR worked 25 countries in four continents during his first three weeks on the air, including SV1KE and CS2V. His first QSO was with W2 and his second evening produced W7MB. F5FG was heard calling a long CQ and details are required. G4AJ is on 7 Mc. and produced replies from YI2BA (7080 1620), ZC6RL (7045 1845), W1 and W8.

G8MF in the Channel Islands, although much sought after, is now doing the sorting for himself! Contacts were made with OY4C, CR6AI, VE5ZM, VU7BR and ZS6DY (phone). F8ZF is very active at present and reports working VS6BE, on C.W. and FB8AH, K6OQE on 'phone. 2DQS heard CM2AD on 7, and VP3AA, FB8AH and UK1CC on 14 Mc. 'phone, while U9MI was received on C.W. BRS3319 in Thurnby, Leics., reports reception of 14 Mc. 'phones: LX1AI, TF3C, CO2HY and OH2OI.

THE 28 Mc. BAND

By NELLY CORRY (G2YL).

DURING January signals were heard from nearly 60 countries in all continents, and conditions were very similar to those of the previous month. As usual at this time of year, Oceanic stations were best heard around mid-day. They included about a dozen VKs, one ZL, and three PK 'phones, viz., 1VM, 1VY, and 2WL. G6YL heard K6PSP, but signals from K6 rarely seem to reach Europe, and one would imagine that very few were active on 28 Mc., if it were not that BERS195 reports hearing many in Northern Australia. At the beginning of the month, BERS195 heard more signals from Europe than any other continent, including about twenty C.W. stations on January 1 between 0930 and 1130. Among the best G signals were G2ZP, 3CN, 5BY, 6DH, and 8RQ.

In Asia VU2AN is still far the most active station on the band and others, viz., VU2CQ, VU2FO, VS6AF and XZ2EX were only heard spasmodically. Thirty-six African stations were reported during the month, including 6 CNs, 6 FAs, 5 SUs, 2 VQ2s, 3 ZEs, and 13 ZSs. BRS3003 heard VQ2FJ and VQ2GW about mid-day on January 24 and 25 respectively.

Activity in South America has apparently diminished considerably since the autumn, or else conditions are to blame, as during January the only stations reported were LU1DA, PY2CK, and VP3AA. 'Phone signals from Central America and the West Indies were heard regularly, from CM, HI, HR, K4, K5, TG, TI, VP6, and XE. North American stations came through every afternoon, and all districts of U.S.A. were worked from G. G8DM worked W8DST nearly every day, and on January 8 they had a four-way, four continent, 'phone QSO with SU1MW and VP3AA.

PA0FB reports that, using 50 watts 'phone, and a 20 metre Zepp, he has recently had 24 contacts with PK2WL. His aerial runs N.E.—S.W., and the height is 27 feet at the feeder end, and only six feet at the free end! During the first two weeks of January, his 'phone contacts included six with VK3HK, 3SG, 3XP and 3ZD, and three with PK1VM.

Many thanks to the following for their reports: G3BI, 6QZ, 6YL, 8DM, BRS3003, 3179, BERS195, I1ER, and PA9FB.

* * *

VU2AN asks VE stations to look out for him daily from February 20 to March 15, 1230—1330 G.M.T., on 28,160 kc. He wants a VE contact for 28 Mc.W.B.E. and will be glad to arrange skeds at any time.

Summer Tests on 28 Mc.

Transmitting and receiving members who wish to take part in the 28 Mc. Summer Tests, 1939, are requested to communicate with Mr. W. N. Craig (GM6JJ). An early response is desired, as it is necessary to make advance arrangements with overseas stations if the scheme is to be a success.

THE 56 Mc. BAND

By J. M. R. Sutton (GW2NG)

THIS month there are four reports from stations in this country together with two fine International Contest logs, covering the whole of 1938. These logs are of great interest and congratulations are due to their compilers on the care and enthusiasm with which they have been written. They represent real research work and definitely add to our knowledge of the higher frequencies.

There is also a large amount of data from Mr. W. Conklin, ex-W9FM, now W9BNX. Mr. Conklin is Associate Editor of the well-known American publication, *Radio*, and we record, with pleasure, that an arrangement has been devised for exchange of 56 Mc. information between W9BNX and the writer. Close liaison between this country and the U.S.A. with respect to 56 Mc. research is an admirable aim, especially as activity on even higher-frequency bands is increasing rapidly over there.

All material of general interest will be set out concisely here or in short articles such as the one entitled "Inter-Band Relationship" which appeared last month. It is hoped that such information will keep British U.H.F. workers in close touch with American research. Sincere thanks are due to Miss N. Cory, G2YL, who has not only received and circulated the information from W9BNX to various E.S. groups, but has now arranged the present exchange of information.

British Reports

G6YL after 15 months on the band has heard no DX or any recognisable amateur signal except G5QY (25 miles). Their 101st QSO took place on December 13. During this 15 months some European commercial harmonics were heard in the spring and contacts with 5QY have always been possible at all hours of the day and night. The signals appear to be ground-wave, although a range of hills intervenes. Strengths vary from day to day but there is no QSB. 5QY and 6YL are the only two stations active in their locality but 6YL hopes to contact 8NM of Barnsley, Yorks, who is the next nearest station (128 miles). CW schedules are being arranged in the spring. 6YL's locality is bad, as the Lammermuir Hills intervene between her QRA and that of GM6SR (QRB 100 miles), while the Pennines bar the line to the Lancashire stations. On December 31 at 11.45 and 12.23 G.M.T., on 28 Mc., a 2/3 2/3 9x signal was heard calling "Test Five de OH5OD." Although 6YL listened immediately on 56 Mc. until 13.00 the band was dead.

G8LY wishes it to be known that she will be inactive on 56 Mc. for a while owing to a rebuild, mainly for portable work on that band. Her last report in the International Contest shows almost the same stations contacted and heard as in previous months. G2OD was heard consistently communicating with 6DH, and 5BY was heard for the first time on December 12 at 22.05 G.M.T. There was very bad QSB on signals during this month, including 8LY's signals at 2DUT's station. Conditions became very poor towards the end of the year, when the cold spell, with snow, occurred. In saying "Au revoir," please accept our sincere thanks for your consistent reports submitted under very discouraging conditions.

BRS 2601 is still keeping watch on the band. He is one of the exponents of the "contrasting weather conditions" theory. Conditions in December seem to have been fairly good for semi-DX. Transmitting activity was low and so full advantage was not taken of these conditions. He thinks the contrasting weather conditions (warm-cold) are responsible for the continued 2OD-6DH, 5BY-6FO contacts. 6DH was heard on December 7, 12, 14 and also on November 21 and 28. His signals averaged 559 with deep QSB. The time was 22.00 to 23.00 G.M.T. 6FO (118 miles) was heard on December 16, 17, 19, 23 and 24 with signals varying between 568 and 328, with only very slight QSB as a rule. The time was again 22.00 to 23.00 G.M.T. The best night was December 23, when 6FO was 568, but only two other stations were heard.

Contest Logs

W9NY submits his last report. During December he worked one more DX station, bringing his total points to 40. He was operating every day during the month and on 338 days during the year, a wonderful record for 56 Mc. As a matter of interest, he operated at the exact commencement and the exact conclusion of the contest. His major disappointment was the failure to contact a British station, but he still believes this to be possible during the peak of the present sunspot cycle. He says that the contest has stimulated 56 Mc. construction and operation of better equipment. It has also resulted in a better knowledge of propagation conditions by keeping a number of stations active throughout the year.

His total contacts over 200 miles were 42 and the points claimed were 40, two contacts being eliminated by the rules of the contest. The total contacts less than 200 miles were 73. Stations were worked in W1, 2, 3, 5, 8 and 9, while W9NY heard a station in W4 and was reported as heard in W4.

Two remarkable full contest logs for 1938 have been received from G8LY and BRS2601. It is impossible to do more than mention the salient points in each log but it is hoped to publish an abstract of the more important observations when the contest is reported. Considering that the power supply at 8LY consists of 300 volts of H.T. accumulators, it was no mean feat to run a C.C. transmitter throughout the year. The stations contacted were G8MG (22), 2MV (48), 2XC (28), 5MAP (10), 5NF (17), 6XM (19), 2OD (25), 8DF (9) and 2GG (14). The figures refer to distances in miles. 542 test calls were put out on CW during the year. 8LY's signals were reported by many stations during the year at distances up to 50 miles. The most distant station heard at 8LY was 6FO (85 miles) and this was the first report from the SE received by 6FO. The log includes an interesting scale map of aerial radiations, many accurately drawn contour diagrams of the country between stations with whom contact has been made, an analysis of aerial systems, both for transmitting and receiving and much other data of value and interest.

8LY intends to try portable work in 1939 in order to discover whether the QRA is really bad for 56 Mc. work owing to the nature of the surrounding hilly country.

Housed in two books, the log and technical data of BRS 2601 shows patient observation and accurate work over the whole of 1938. This log will be invaluable to transmitting stations requiring reports of their signals over an extended period. Besides being a record of signals it contains much other valuable information as to conditions, weather, etc.

Turning to the records of apparatus, results and conclusions, there is information on receiver lay-out, aerials and aerial-systems, with methods of coupling to the receiver, and aerial directivity. Other detailed notes refer to periods for best reception, background noise variations, fading, echoes, static, ignition interference and fade-outs. The most interesting discussion is the connection between signal strength and contrasting weather conditions This theory is illustrated by a series of well-drawn graphs and, although there has been only a very short time for examination of these before this goes to press, there appears to be a distinct connection between the two sets of observations. Space forbids more detailed discussion, but BRS 2601 should be complimented on a very fine piece of work.

General Comments

Examination of W9NY's remarks and also of activities on the 56 Mc. band during the year show that there has been a distinct advance in our knowledge of U.H.F. apparatus and propagation conditions during the year. The International Contest has been instrumental in improving apparatus and in furthering this increased knowledge. It is hoped that 1939 will see a further increase in stabilised transmissions and, more important still, *more* CW. Please, *do* stabilise, and *key* that transmitter!

Contemporary Literature

By L. Fryer (GM2FR).

"Mystery" Control. *Radio and Television* (Amer.) January, 1939.

A description of the new "Philco" remote control system. Briefly the control consists of a small battery-operated transmitter using a Type 30 valve, which sends out impulse waves which are received by the special unit on the normal broadcast receiver, this in turn operates a stepping relay controlling the tuning switches and volume control of the broadcast receiver.

* * *

Increase Your DX with This Pre-Amplifier. H. G. McEntee (W2FHP). *Radio and Television* (Amer.), January, 1939.

The author describes a self-contained two-stage preselector using two 956 acorn valves and a 5Z4 in the power supply. Full constructional details of the unit are given, the tuning range being 7 to 200 metres.

* * *

A De Luxe Desk Transmitter. Alvin Abrams (W2DTT). *Radio and Television*, January, 1939.

This article presents the first part of a description of a 13-valve transmitter for phone or C.W. on 14 and 28 Mc. The exciter consists of a 6A6 dual triode in a Gunn oscillator circuit operating on 14 Mc. capacity, coupled to a 6L6 which acts as a neutralised amplifier on 14, or as a doubler on 28 Mc. The D.C. input on C.W. is 120 watts and the output approximately 80 watts. On phone the input is reduced to 80 watts, the output being approximately 50 watts.

The 6L6 is in turn capacity coupled to a pair of 807s in push-pull.

The modulator line-up consists of a 6J7 input for crystal mike, followed by a 6N7 phase inverter capacity coupled to a pair of 6J5s in push-pull, which are transformer coupled to a pair of 6L6's operating class AB.

Sufficient audio power is available to modulate 100 watts of R.F. input power. The transmitter is of rack and panel construction, and measures 35¼ ins. high, 19⅛ ins. wide and 14½ ins. deep, and is adapted for remote control.

* * *

A Band Spread 1 Tube Receiver. Herman Yellin (W2AJL). *Radio and Television*, January, 1939.

The writer describes an up-to-date receiver using a type 6P7g valve, which contains a separate pentode and triode elements in one envelope.

The pentode section being operated as a three circuit regenerative detector and the triode section as a single stage of audio amplification.

The set is arranged to work from mains, vibrator type eliminator or batteries, and in the original model was built into a metal cabinet measuring 9¼ ins. by 6¼ ins. by 4⅞ ins.

* * *

Two Tube Portable Transmitter. Herman Yellin (W2AJL). *Radio and Television*, January, 1939.

A very complete description of a compact crystal controlled transmitter which can be operated from a built-in Vibrapack, which gives an input of 25 to 30 watts to the final amplifier, or, from an external power pack, particulars of which are given when inputs up to 60 watts are possible.

The transmitter uses a 6L6g as crystal oscillator capacity coupled to an RK39 amplifier, and is built on a 6½ in. by 6½ in. by 1½ in. chassis. The chassis is mounted in the upper portion of a portable 12 in. by 7⅞ in. by 6½ in. cabinet, the lower part of the cabinet being used for the Vibrapack and its filter.

* * *

An Improved U.H.F. Receiver. Grote Reber (W9GFZ) and E. H. Conklin. *Radio*, January, 1939.

An interesting article describing a concentric line multi-stage 155 Mc. receiver using RCA 956 acorn valves in the radio-frequency stages and a 955 diode connected in the detector circuit. A suggested layout for a five metre preselector or convertor is included in the article, which gives very full data and is well illustrated.

West London Goes Gay

The Park Royal Hotel was the scene on January 7 of one of the most successful hamfests held in recent years, when more than a hundred members and their guests gathered for District Fifteen's Third Annual Dinner and Dance.

The history of this function is one which should inspire other Districts to attempt something on similar lines, for it began in a very small way in 1937, with about 30 members dining in an Ealing hotel. Last year more than 70 were present, ladies having been invited, and this year's organiser, Mr. Peter Bradley, G8KZ, had the satisfaction of seeing another big increase in attendance. Although there is no truth in the rumour that the Albert Hall is to be booked for 1940, there seems little doubt that Mr. Bradley and his able assistants, Messrs. H. B. Crowe, G6CO, and Leslie Wilkins, G6RW, will have to provide for an even larger attendance next January.

Photo by "Illustrated Photocraft," 32, Bruton Way, W.13.

West London Annual Dinner and Social evening held on January 7, 1939, at the Park Royal Hotel, with H. V. Wilkins, G6WN, in the chair.

The toast of the Society was ably proposed by "Uncle Vic" Corsham (G2UV), who, in speaking of his long career as an amateur, told us how the rather frigid atmosphere of the old Wireless Society of London had gradually warmed into what we now know as the "ham spirit." Our Secretary, Mr. John Clarricoats, G6CL, in his reply, pointed out that the present time was a critical one for amateur radio and said that if amateur activities were not to be curtailed seriously much hard work had to be done.

During his speech G6CL paid a tribute to the D.R., Mr. Harold Wilkins, G6WN, mentioning that in years of service he was the senior D.R. of the country.

Mr. Peter Bradley, in proposing "The Visitors," expressed his pleasure at seeing so many friends present. It was, he said, a matter for regret that Mrs. G6CL had been unable to attend through illness. Brief responses came from Mr. Wedderspoon (who said he was following advice given to him as a schoolboy—"Stand up, speak up and shut up!") and from Mrs. Richards (who spoke of the trials of being the mother of a "ham").

Mr. "Dud" Charman, G6CJ, in giving the toast "District 15," made special reference to the work the District had done over a period of years in N.F.D. In thanking members for their help, he expressed the hope that 1939 would see the N.F.D. trophy back in its original and rightful home! Mr. Harold Wilkins, in his reply, gave a summary of activity in the area. He criticised certain 'phone operators for announcing their call signs badly and appealed for an effort from these members to give a better impression to B.C.L.'s than they do at present.

Mr. Bradley was M.C. at the dance which followed and he also compered the "swindle" which the kindness of a number of donors had made possible, notably Mr. G. Carpenter, G8ZD, of Hamrad Wholesale, and Mr. John McClure. The organisers and the District are to be heartily congratulated on their efforts. G5JL.

New Osram Valve

A new Osram indirectly-heated power amplifying tetrode, known as type KT 61, has just been released on the market by *The General Electric Co., Ltd.*

The valve is intended for use in the output stage of an A.C. mains-operated radio receiver or an L.F. amplifier. Thus the designer of a receiver using 6.3 volt "octal" base valves now has available a high sensitivity output valve of the same heater voltage and the same type of base.

Its sensitivity makes it particularly suitable for operation from a diode detector, although undesirable for employment in amplifiers which already have a high order of low frequency amplification.

Its mutual conductance is rated at 10 mA/volt with maximum anode and screen voltages of 250, and an anode current of 40 milliamperes. A seven-pin "octal" base is fitted.

HEADQUARTERS CALLING

Minutes of the Adjourned Annual General Meeting

Minutes of the adjourned annual general meeting held at 6.40 p.m. on Friday, January 27, 1939, at the Institution of Electrical Engineers, London.

In the chair, Mr. A. D. Gay (Executive Vice-President). Present: Messrs. A. O. Milne, H. A. M. Clark, F. Charman, H. C. Page, E. D. Ostermeyer, J. W. Mathews (Members of Council, 1938), J. Clarricoats (Secretary-Editor) and about 50 members.

The Chairman, after calling upon the Secretary-Editor to read the notice convening the meeting, announced the result of the election of seven members to serve on Council for 1939.

The following were elected :—

Mr. F. Charman (G6CJ)	448	votes
Mr. H. A. M. Clark (G6OT)	444	,,
Mr. D. N. Corfield (G5CD)	431	,,
Mr. J. D. Chisholm (G2CX)	408	,,
Mr. J. W. Mathews (G6LL)	388	,,
Mr. E. A. Dedman (G2NH)	338	,,
Mr. H. V. Wilkins (G6WN)	316	,,

Mr. W. H. Allen (G2UJ), 277 votes, and Mr. J. B. Kershaw (G2WV), 240 votes, were unsuccessful candidates for election.

Mr. Gay announced that 470 ballot papers were accepted and 22 rejected for the following reasons: 15 received too late, 2 sent in ½d. stamped envelopes, 1 sent with QSL cards, 1 envelope not signed, 3 more than two names deleted.

Mr. Gay stated that he had been asked by the President to record the thanks of the retiring Council to the Secretary-Editor and members of his staff.

The meeting then terminated.

I.E.E. Meeting

At the February meeting to be held on the 24th at the Institution of Electrical Engineers, Dr. George Bloomfield will deliver a lecture on "Insulating Materials for the Higher Frequencies." Dr. Bloomfield has carried out important research on many insulating materials, including Trolitul, and the information he will give should prove of very great value to all members interested in ultra high frequency work.

The meeting will commence at 6.45 p.m. and tea will be served free of charge from 6 p.m. The I.E.E. will be open for informal discussions from 5 p.m.

North-Eastern P.D.M.

It has been decided to bring forward the date fixed for the North Eastern P.D.M. by one week. The meeting will now take place on Sunday, April 16, and will, as last year, be held at The Windmill Hotel, Blossom Street, York.

Bulletin Features Competition

Last year we sponsored a Popular Features Competition in order to obtain the views of members concerning the type of article which has the widest appeal. The time seems ripe to again invite members to give us their opinions.

The rules for the competition are simple :—

1. Write down the titles of the ten features or articles which interested you most in the issues from July, 1938, to January, 1939. Quote the page number and name of author.
2. Send your list to Headquarters to arrive not later than February 28, 1939.

A copy of *The Amateur Radio Handbook* will be sent to the member whose list most closely coincides with the majority views.

Sectional Committees

Council has appointed the following members to serve as Section Managers or on Sectional Committees :—

Tests Committee: Chairman, Mr. T. A. St. Johnston, G6UT; Messrs. W. H. Allen, G2UJ; C. J. Greenaway, G2LC; J. M. Kirk, G6ZO; W. H. Matthews, G2CD; A. O. Milne, G2MI; and J. M. S. Watson, G6CT.

Calibration Section Manager: Mr. A. D. Gay, G6NF.

QRA Section Manager: Mr. H. A. M. Whyte, G6WY.

Experimental Section Manager: Capt. A. H. M. Fergus, G2ZC.

Band Occupancy Section Manager: Mr. L. Hill, G5WI.

Notice to D.R.'s, T.R.'s and Scribes

As from the next issue we shall cease to publish lists of members present at local meetings. Whilst appreciating that members like to see their names in print, we feel that no useful purpose is served by continuing this practice.

International 56 Mc. Contest

Members are reminded that entries for the International 56 Mc. Contest, which ended on December 31, 1938, must reach Headquarters not later than February 28, 1939.

Summer Portables

Members who wish to be granted permission to operate 5-metre portable stations during the coming summer must apply to Headquarters not later than *March* 25, 1939.

This facility will only be granted to those already holding 5-metre permits. It is probable that permission will be restricted to operation within the band 58.5 to 60 Mc.

An assurance must be given that frequency stabilised apparatus will be used.

W.B.E. and H.B.E. Certificates

The following W.B.E. and H.B.E. certificates have been issued to members :—

Name.	*Call sign.*	*Date.*
	W.B.E.	
H. A. G. Shepherd	G8II	December 5, 1938
E. Bonamy	F8RR	,, 14 ,,
T. T. Parker	G8FL	,, 21 ,,
R. Frew	GM8FR	,, 31 ,,
J. W. Marlow	G2FT	January 4, 1939
K. B. Wilson	G8OW	,, 12 ,,
D. J. Shaw	GM3RL	,, 12 ,,
F. de B. Whyte	EI8G	,, 13 ,,
H. Atthill	G8CV	,, 18 ,,
J. D. Wightman	G3AH	,, 25 ,,
H. T. Littlewood	G2XY	,, 26 ,,
G. E. Holmberg	W9UBB	,, 30 ,,
	Telephony	
W. H. Heathcote	ZS6CS (ex-ZT6X)	December 29, 1938
H. Atthill	G8CV	January 18, 1939
H. H. Brokate	W8AJJ	,, 31 ,,
	28 Mc.	
J. A. Davanzo (Telephony)	W2KHR	December 14, 1938
H. Atthill	G8CV	January 18, 1939
S. W. P. Henton	G5VU	,, 19 ,,
G. H. Grossin	F8RJ	,, 20 ,,
	H.B.E.	
E. Butcher	G5AN	January 18, 1939
E. W. Price	G8UD	,, 18 ,,
H. S. Chadwick	BRS1340 2BIC G8ON	,, 18 ,,

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).

	G.M.T.	kc.	Station	Location
Sundays	0900	1755	G8NF	Manchester
	0900	1865	G3LP	Cheltenham
	0930	1792	G8AB	Loughton
	1000	1800	G8PR	Staffordshire
	1015	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

NEW MEMBERS

HOME CORPORATES.

R. C. RICHARDS (G2RR), 44, Eccleston Crescent, Romford, Essex.
F. G. H. JONES (GW3CF), 15, Park Drive, Rhyl, N. Wales.
G. F. SHEPHERD (G3CZ), 287, Wragby Road, Lincoln.
R. C. E. BEARDOW (G3FT), 3, Geneva Gardens, Whalebone Lane, Chadwell Heath, Essex.
N. L. COLE (G3HL), "Tregear," Sunnydale, Hinckley, Leics.
C. L. HESSING (G3GT), 11, Tachbrook Road, Leamington Spa, Warwickshire.
W. J. PAGE (G3PA), 172, Venner Road, Sydenham, London, S.E. 26.
R. F. BORRILL (G3TZ), 3, Melbourne Avenue, Grimsby, Lincs.
R. H. SMALE (GW3UO), "Seacombe," Mayhill Road, Mayhill, Swansea, Glam.
J. E. APPLETON (G3VF), 28, Glentrees Road, West Derby, Liverpool, 12, Lancs.
F. C. TURNER (G3VI), 40, Queen Street, Hitchin, Herts.
F. C. WHITE (G3XP), 175, Henley Road, Caversham, Reading, Berks.
L. H. LEE (G5FH), "Edendene," Knottsall Lane, Langley, Oldbury, Worcs.
T. L. FRANKLIN (G5HO), Blairgowrie, Station Road, Broxbourne, Herts.
J. A. PHILPOT (G5PL), 21, Casino Av., Herne Hill, London, S.E.24.
W. J. MUNT (G6MU), 11, Bailey Road, Colliers Wood, Merton, London, S.W.19.
W. JAMES (G6XM), 36, Elm Grove Road, Farnborough, Hants.
W. A. HOSKINS (G8LU), 46, Woodside Green, London, S.E.25.
E. G. STARES (G8TV), 19, Dunton Road, Romford, Essex.
A. C. MARSHALL (2AOM), 8, Police Quarters, Lees Lane, Gosport, Hants.
T. O. G. TALBOYS (2ATK), 14, Victoria Road, Erdington, Birmingham, Warwickshire.
J. POLLARD (2BCK), 37, Ducie Street, Manchester, Lancs.
P. H. WADE (2BPJ), 277, Otley Road, Leeds, 6, Yorks.
E. BANKS (2CNC), 14, Byron Road, St. Helier, Jersey, C.I.
G. E. PARTINGTON (2DBL), 33, Shrubland's Close, Chelmsford, Essex.
P. HARRIS (2DFI), Basildon, Pyrford Road, West Byfleet, Surrey.
E. ROBINSON (2DHR), 25, Manor Court, York Way, Whetstone, London, N.20.
E. W. CLOWES (2DWR), 66, Frank Webb Avenue, Crewe, Cheshire.
A. PALFREEMAN (2FNR), 72, Stokesley Crescent, Billingham-on-Tees, Durham.
J. D. CAIRNS (2FOV), The Bungalow, Sunnylaw Road, Bridge of Allan.
J. NEILSON (2FVY), 31, Crombie Terrace, Craigiebank, Dundee, Scotland.
A. J. WYLIE (2FZN), 62, Mains Drive, Dundee, Angus, Scotland.
N. LUSHER (BRS3498), 5, Lynton Gardens, Harrogate, Yorks.
W. S. RODGER (BRS3499), 98, Balgarvie Crescent, Cupar, Fife, Scotland.
A. WHITWAM (BRS3500), 62, Kingsfield Drive, Didsbury, Manchester, 20, Lancs.
A. F. BARTLETT (BRS3501), 47, Sharrard Grove, Intake, Sheffield, 2, Yorks.
WM. TOZER (BRS3502), 63, Rhodeswell Road, London, E.14.
W. TATE (BRS3503), 20, Princess St., Chapel Lane, Wigan, Lancs.
B. H. SMITH (BRS3504), Southdown Cottage, Medstead, Hants.
R. W. SAWYER (BRS3505), Silver Street, Ilminster, Som.
W. C. RITSON (BRS3506), 36, Orchardhead Road, Edinburgh, 9, Scotland.
H. NIGHTINGALE (BRS3507), 436, Wilbraham Road, Chorlton-cum-Hardy, Manchester, 21.
E. R. NICHOLAS (BRS3508), 1, Station Cottages, Mildenhall, Suffolk.

D. V. Ivins (BRS3509), 88, Vine Lane, Hillingdon, Middlesex.
H. W. A. Holloway (BRS3510), 141, Eleanor Cross Road, Waltham New Town, Waltham Cross, Herts.
H. N. Holbrook (BRS3511), 1, Croft Avenue, West Wickham, Kent.
S. Higson (BRS3512), The White House, Sandycove, Kinnel Bay, N. Wales.
H. T. Evens (BRS3513), "Broadlands," Hockley Rise, Hockley, Essex.
H. Cemm (BRS3514), Lower Abbott House, Osbaldeston, Blackburn, Lancs.
T. S. Bell (BRS3515), 15, West End Park Street, Glasgow, C.3.
A. R. Stott (BRS3516), Hillcrest, Cowdenbeath, Fife, Scotland.

DOMINION AND FOREIGN.

P. Ramond (CN8BA), Boite-Postale 127, Rabat (French Morocco).
J. M. G. Ramond (F8VC), 224, Boulevard Voltaire, Paris, France.
E. S. Early (F8ZF), 119, rue D'Isly, Boulogne-sur-Mer, France.
G. H. B. Gray (VK4JP), 18, Henry Street, Ascot, N.E.2, Queensland, Australia.
J. W. Gady (VP9G), P.O. Box 404, Hamilton, Bermuda.
W. Allison (W5VV), P.O. Box 347, Austin, Texas, U.S.A.
H. H. Brokate (W8AAJ), 217, Washington Street, Port Clinton, Ohio, U.S.A.
H. E. Holmberg (W9UBB), Box 312, Bisbee, N. Dakota, U.S.A.
M. A. Sira, Jun. (YV5AK), Sur 3, No. 133, Caracas-Venezuela, S. America.
R. Lyall (ZC6RL), c/o 8th Divisional Signals, Haifa, Palestine.
W. Thompson (BERS459), Main W/T Station, Air Headquarters, Habbaniya, Iraq.
S. S. Peter (BERS450), c/o P. Isaac, 62, Government Hospital Road, West Gate, Madura, S. India.
W. E. Pearson (BERS461), Fleswick, Escombe, Natal, South Africa.
W. A. North (BERS462), P.O. Box 1, Thomsons Falls, Kenya Colony.
A. W. Gibson (BERS463), 92, Adelaide Street, Brisbane, Queensland, Australia.
A. I. Breen (BERS464), 68, Pine Hill Terrace, Dunedin, N.E.1, New Zealand.

R.A.F. Civilian Appointments

We have been informed by the Air Ministry that vacancies exist at certain R.A.F. Stations for civilian wireless operators and civilian wireless electrical mechanics. The present weekly rates of pay offered are 57s. 9d. to 67s. 3d. for wireless operators, and 67s. 3d. to 76s. 10d. for wireless electrical mechanics, but it is understood that these rates will shortly be increased.

The appointments are termed "temporary," but a proportion of suitable applicants are likely to be retained for some years.

Those accepted will qualify for holidays with pay, a period of 18 days being the general allowance.

In view of their civilian character, travelling allowances, accommodation, food and clothing are not provided in these appointments.

Members interested in this project should write to the Air Ministry (S5F), London, W.C.2, for a copy of the official application form.

The opening afforded by these civilian appointments should provide valuable experience in aeronautical communications, and in the operation and maintenance of modern R.A.F. apparatus for those who are selected.

We are of the opinion that the proposition may appeal to certain of our members who at present are engaged on radio service and maintenance work. In addition, those with good operating ability may find an opening for talents which may be cramped by their present employment.

We shall be pleased to hear from all members who make a successful application for one of the appointments mentioned.

Reports Wanted

G3ZI (New Malden), on his 7,038 and 7,216 kc. c.w. and telephony transmissions. All reports will be acknowledged.

First Class Operators

CLUB NOTES

By R. Webster (G5BW)

Acknowledgment of Receipt

The acknowledgment of receipt of a message or transmission is given by the letter R, the official meaning of which is "Transmission (or message) received correctly." In the case of a specific message receipt is given by the signal R followed by the number of the message. Thus: R 1, R 7, R 19, etc. From this it follows that any qualification of the signal R is both misleading and superfluous. Such expressions as "R OK Solid," "R part OK," "R most OK," etc., are quite incorrect, although they are in all-too-common use. The point to be borne in mind is that until a transmission has been received "solid" the receiving station should not make use of the signal R. Where a transmission, or parts of it, or isolated words have been missed the receiving station should ask for an RQ and make use of the official abbreviations AA, AB, AL, BN, WA or WB. (See P.O. Handbook.)

Long QSOs

When two or more stations who are mutually acquainted get into contact there is an excusable tendency for them to prolong the QSO beyond normal limits. QSOs lasting half an hour are very common, but when one hears stations boasting of "ragchews" lasting 2-2½ hours on 7 Mc., then surely the time has come to call a halt. We are not opposed to long QSOs (or ragchewing) on principle so long as they do not cause unnecessary interference, but we do think that those engaged in them should comply with the terms of their licences and call QRZ? every 10-15 minutes. This would enable any station who was experiencing interference to make known the fact, or any station wishing to break into the QSO could do so. Another feature of these long QSOs is the tendency for the participants to terminate the contact and close down immediately they have finished. This means that any unfortunate station, who may have been waiting half an hour or more to contact one of them, suddenly realises that it has been so much time wasted. We appeal to all stations to call QRZ? and search the band before closing down. Even if there is no time for a QSO, a "sked" can be fixed for some future date. In the case of C.W. stations the procedure might well take the following form: "QRZ? de G1AA QRU? (or QHL) then QRT AR K."

Members elected during the month are G8PF, G3BQ and G3DT, the total membership now being 58.

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

British Calls Heard

VP4TO (D. G. Bagg, ex G6BD), Pointe à Pierre, Trinidad, B.W.I., from November 28 to December 31, 1938.

14 *Mc.*: g2ft, lu, xs.; g6td; 8oh, gm8sv, gi8ts.

7 *Mc.*: g3sd.

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 (GI6TB), 22, Stranmillis Gardens, Belfast.

New Members are cordially invited to write to their local District Representative.

DISTRICT 1 (North-Western).

Birkenhead.—Congratulations are extended to G2FZ, who has cards for B.E.R.T.A. and to 2AHG, who is now G4AS. No other reports are to hand, but the following are known to be active: 2FZ, 3QX, 6GL, 6HQ, 3CK, 8NH, and 4AS. We are pleased to hear that Mr. S. Higson, ex 2RV, is thinking of starting up again. 6CX, who is working at high pressure to complete his rebuilding programme, reports loss of his new aerial in a recent gale. Several members express the hope that the suggested 1.7 Mc. *Telephony* Contest will *not* materialise.

Blackburn.—About 18 members attended the January meeting, when it was agreed that a week-end in March should be allocated to the testing of Field Day apparatus under actual N.F.D. conditions.

A cordial welcome is extended to G3HI, who has taken up residence here, and the T.R., on behalf of 6WH, 8JA, and himself, thanks 3HI and his wife for their hospitality on the occasion of their recent visit to his station.

The following are active: G2HW, 2PB, 3TU, 3LR, 3VV, 6BH, 6WH, 8JA, 8LZ, and 8FI. The T.R. thanks all members who helped him to make the Blackburn Group's first year a great success.

Blackpool.—The Blackpool and Fylde Radio Transmitters' Society invites all R.S.G.B. members who live in the area, but who do not at present attend meetings, to come and meet the rest of the local members. The Society is affiliated to R.S.G.B. and the majority of the members are also R.S.G.B. members.

Meetings are held on the first Thursday of each month at the "Lido," Blackpool, S.S. If sufficient support is obtainable, it is hoped to arrange trips

to local power stations and similar visits.

Individual active stations include: G3KL, 3JY, 6MI, 5VQ, 8AK, 8GG, but no direct reports have been received.

Burnley.—Reports have been received from G3VO, 8TD, 3SJ, 3HK, 5ZN, 2BFB, 3WU, 3RB, 8UA, 3IY, 3KT and 2FBI, all of whom give details of their work.

Bury.—Four members participated in the 1.7 Mc. C.W. contest, namely, G2GA, 3ZN, 8NF, and 8NL. Congratulations are offered to 8NF, who raised a good score despite ill-luck at the beginning of the contest, due to faulty relays.

A party of 24, including G3CJ, 3ZN, 8NF, 8NL, 8QS and BRS3008, visited the North Regional Headquarters on January 10, and were shown over the control room, studios, etc. Thanks are extended to 8NL, who arranged the visit, and to Mr. Jardine, one of the B.B.C. engineers, who kindly gave up a free evening to assist in showing the party round. Before his removal to Manchester, Mr. Jardine was the operator at 5XS, and he hopes to be on the air soon from his own station in Manchester.

A number of members recently visited the Rochdale Fire Station and the projection room of the Empire Cinema, after which the party inspected G6QA, the station of the Rochdale T.R. Considerable interest was shown in the latest type of mains-operated relays used for a complete change-over from a transmitting to a receiving position by the flick of a switch. R.S.G.B. members present included 3BN, 6QA, 8NF, 8NL, 8QS, and about 15 members of the North Manchester Radio Society.

The monthly meeting was held on January 17, and the date of the Group "Hamfest" was provisionally fixed for Sunday, March 12, at the "Elsinore" Café, Bury. It is hoped that members residing in other districts will support this event. After the meeting, station G3YJ was visited. The T.R. was unfortunately unable to attend these events owing to illness, but he hopes to be back in harness again soon.

Congratulations to ex-2BGF, who is rewarded for his keenness and patience by receiving the call G3ZN. He is active on 1.7 Mc. C.W. and telephony and reports will be welcomed. 8NL is experimenting with counterpoises, much to the regret of 3ZN, who has trouble with the ground wave on 1.7 Mc., 3CJ, 2GA, 8QS, 2BDA, and BRS3008 are also active.

Liverpool.—Twenty-two members attended the January meeting. Following a discussion on the proposed new club, and on the frequency to be used at N.F.D., members listened to a talk by Mr. Jones (G2JT). He dealt with "Oscillators," and discussed a special exciter unit using three valves, each screened, and working as Triode Oscillator (self-excited), pentode "isolator" valve, and pentode amplifier respectively. To aid in the description, he brought along a unit in the course of construction, together with diagrams. Members were very much indebted to him for the talk.

A welcome is extended to G6PM (from London), 3VF, and 4BA, the last two members being introduced by 5MQ. 5MQ has kindly promised to furnish the N.F.D. transmitter and generator, for which offer all members are very grateful to him.

Manchester.—Despite very bad weather, an attendance of 18 was recorded at the last meeting. It was agreed that in fairness to all sections of No. 1 District, the four frequencies used in the N.F.D. contests should be drawn for, thus giving each section a fair chance.

Local funds are mounting through the junk sales, and subscriptions, and some very fine apparatus is disposed of at the meetings. A series of talks have been arranged for the summer months.

The following report active: 2WQ, 2BDA, 2FMG, 2DRR, 2BZX, 2LK, 2DH, 2HW, 2ARC, 2OI, 2RA, 3BY, 3SP, 3LX, 3PM, 3WI, 3AH, 3SR, 3MR, 3AO, 3HZ, 3IR, 3ZJ, 3DA, 3OL, 5WR, 5HF, 5YD, 6OM, 6TL, 6GD, 8BI, and 8JS.

Oldham.—The T.R. suggests that stations using the 1.7 Mc. band should sign more frequently and give their frequency so that intending purchasers of crystals will have some idea of local frequencies in use. Suggestions for a gathering of Oldham members would be appreciated; please write or call on the T.R. As a number of local members are interested in 58 Mc. work, it is proposed to get ready for the summer. Stations active are G2BK, 3JB, 3PD, 5XJ, 2DJV.

Rochdale.—Reports of activity have been received from G3BN, 5XF, and 6QA.

DISTRICT 2 (North-Eastern)

The T.R.s in most towns are now established and are asked to make a point of sending in to the scribe each month a short report of activities, if only to confirm that the area is active. This will enable us to give a comprehensive report of the district.

Barnsley.—Mr. Beaumont, of Ambassador Radio, recently gave an interesting lecture on the Commercial Design of Short-wave Receivers. The following are active on 1.7 Mc. on Sunday mornings: G2BH, 2WX, 5IV, 6LZ, 6PY, 8IJ, 8WF.

Bradford.—At a recent meeting, G6KU gave a lecture on "Quartz Crystals" at the Bradford Radio Society. Most stations are active and several new calls are expected in the near future. Following a change of QRA, 5TQ is now on the air again, and an old call, G6NP, has made a re-appearance on 1.7 Mc.

Doncaster.—A meeting-place is now available at Chamber's Café, Waterdale, Doncaster, and meetings are held each Thursday at 7 p.m. Morse classes are to commence immediately and the co-operation of everyone is sought. There is much interest in 56 Mc., G3NJ and BRS193 being very active on this band. The following report active: G3NJ, 3VG, 2BBJ, 2BCQ, 2FJO, 2FTO, BRS193, 3494.

Huddersfield.—The month's meeting held at G8TM was attended by G5VD, 6RO, 8GD, 8GU, 8VF, 8VK, 3GT and 3UR.

The visit to Barnsley has been postponed to February 16.

G3GT and 3UR are welcomed to membership, which now totals 18.

DISTRICT 3 (West Midlands).

Staffordshire.—G6SW active on 14 Mc. is getting good results with a low aerial. 2YV is building for 1.7 Mc. and altering his present rig to a Jones Exciter for 14 Mc. 2FAP and 2 FAH have taken their Morse test and hope to have permits soon. A local crystal register has been compiled.

Shrewsbury.—Fortnightly meetings are now held, and general activity is taking place on 1.7 Mc., although a certain amount of work is being done on the higher frequencies.

Rugby.—The local monthly meetings have been suspended owing to lack of support. On January 11 members of the B.T.H. Radio Club visited several stations and spent an interesting evening. G8RL has W.A.C. on 7 Mc. 3IS and 8VN would like reports on their 1.7 Mc. phone and C.W.; 2JN is rebuilding; 3DI is using W3EDP aerial and notes general improvement in reports. 3FQ is active on 7 Mc. phone and C.W.

Members are reminded that reports—which are sadly lacking—should reach their respective T.R.'s before the 25th of each month.

DISTRICT 4 (East Midlands)

There is a welcome increase in the number of reports received this month, although one or two areas still remain silent. Will members who have items of interest to report please write to their T.R. by the 25th of the month?

There were 35 members present at the January District Meeting held at Derby. After tea, an N.F.D. plan was evolved which received the unanimous support of the meeting. It was decided to put four stations on the air, to be allocated as follows: Leicester, 1.7 Mc.; Ilkeston area, 3.5 Mc.; Mansfield, 7 Mc.; Nottingham, 14 Mc.

Preliminary arrangements were made for the supply and construction of gear. The question of 56 Mc. work was raised, and in order to give those who intend building new gear an opportunity to get in touch with other stations working on this band, it was decided to fix Wednesdays, 7 to 7.30 p.m., as a time for all 56 Mc. stations to take part in co-operative tests. Members can, therefore, be fairly certain of hearing stations in operation at this time, and reports from all listening stations will be welcome. Already the schedule is being kept by G6CW, 8JV, and 2WS, and it is hoped that many others will follow.

The next District Meeting will take place at the Trent Bridge Hotel, Trent Bridge, Nottingham, on Sunday, February 19, at 3.30 p.m. The T.R., G8DZ, is arranging a talk and surprise item. A sale of junk will take place afterwards.

Leicester.—The T.R. has at last received a report! This comes from 2FNW, who is facing the problem of efficient transmitter design without mains. Please let there be no mistake (as in the past), says 6VD, that the T.R. invites *all* local members to take an active part in N.F.D. this year, and he invites them to get in touch with him by the end of March at the latest. No other notice will be given.

The weekly Friday meetings still continue at 53, Cedar Road, Leicester, at 8 p.m. Members who support these meetings find it the best way of keeping in touch with local activities. The 1.7 Mc. contest was supported by G2IX, 2RI, 5GN, 3BU, and 6VD, the highest score being 5VD's 52.

Mansfield.—Ten members attended the local meeting on January 1, when ideas on N.F.D. were exchanged. Local activity centres round 7 Mc. The T.R. is busy compiling a crystal register.

Worksop and Retford.—The T.R., G6ON, reports increased membership in both towns, and considerable activity on 7 and 28 Mc. Ultra-QRP tests are being carried out, and arrangements are in hand for a North Notts 7 Mc. QRP contest with 5 watts maximum input, and operation from 2200 Saturday to 1000 G.M.T. Sunday. If someone will offer a trophy, the T.R. will fix the date!

DISTRICT 5 (Western)

Bristol.—The first meeting of the New Year was held on January 5, Mr. H. Gratton (G6GN), the new T.R., being in the chair. An attendance of about 30 was recorded. The feature of the evening was a talk by the D.R. (G5JU) on aerials, his description of many different types being followed by an interesting discussion.

It was decided to go ahead with the formation of a Crystal Register, and all local members are requested to supply the T.R. with necessary particulars.

The 1.7 Mc. Contest was well supported, whilst a number of members have been successful in working DX on 7 Mc. Active stations include G6RB, 6VK, 6BW, 6GN, 6VF, 5UH, 5WI, 5JU, 8TC, 8PH, 3RQ, 3YH, 3HN, 2FKK, 2FBV, 2FHP and 2BAR.

Bath.—G8JQ's rotary 28 Mc. aerial is proving most effective and activity is mainly confined to that band. G2BI, of Calne, is transmitting regularly on 56,360 kc. from 15.00 to 15.30 weekdays and 12.00 to 13.00 Sundays.

Cheltenham.—The Cheltenham programme for the major part of the year has already been formed and makes allowance for the "high-lights," such as P.D.M., N.F.D., and Convention. G5BM did well in the 1.7 Mc. Contest, whilst general activity is maintained at a high level. The D.R. hopes to have the pleasure of being present at the meeting on February 17.

DISTRICT 6 (South Western)

Torquay.—There were 23 present at a highly successful combined meeting of Torquay and Exeter members, held at G5SY on January 19. We were very pleased to welcome as a visitor G2YL, who was staying in Torquay at the time. The latest R.S.G.B. films were shown, and were much appreciated. Informal discussion followed, and as a climax to the evening G3JD showed one of the many ways of disposing of an unwanted 56 Mc. receiver.

North Devon.—Arranged by G3GH, a Hamfest was held at her QRA on January 4, and a very enjoyable evening spent. G6GM, 8US and 3GH took part in the recent 1.7 Mc. C.W. Contest. The former worked VE1EA at 0717 G.M.T. on January 15 on that band. G3GH has received her 3.5 Mc. permit. All stations report active.

Taunton.—The January meeting took the form of a Junk Sale at Steyning Café, Bridgwater. Congratulations to G3DR and 4BN on obtaining their full permits.

Plymouth.—January meetings were held at G2HX and G3TX. At the former meeting the prevalent weather supplied the topic of wrecked aerials and masts, and a discussion on propagation led 2FKO to give a brief but interesting description of "scrambled" telephony. G3TX is working ZS consistently; 2HX is building separate finals for each band; 8HF is having an entire rebuild; 8PN has erected his second mast, which withstood a gale the same evening, but 2CYJ lost his, which is of the A.R.R.L. type. Congratulations to 2CJB on obtaining his call.

Exeter.—At a meeting held on January 13, there was a total attendance of fourteen. Morse classes were held as usual until 9.15 p.m., and a discussion followed. Will members please note that G2SH is leaving Exeter for Bristol.

DISTRICT 7 (Southern).

The attendance at the January meeting held at Farnborough was very small, due to bad travelling conditions. At the February meeting, which took place at Southsea, 36 members attended to discuss N.F.D. and other district matters. Some confusion has arisen because these meetings have in the past been referred to as *District* meetings, instead of Surrey and North Hants meetings. This has been due to the fact that they have been carried on from the old district meetings before the T.R. scheme was instituted. To avoid confusion, notice of future meetings of this nature will not be given in District Notes, but will be inserted as usual in the District Calendar.

Reading.—At the January meeting of the R.T. and R.S. some twenty members were present. We welcome to the district G3HD and 2CXT, and congratulate 2BGB (G3XP) and 2DKQ (G4AB) on their full calls. BRS3480 is now 2FZI. G6CU has erected a semi-rotary three-element beam for 28 Mc. and has worked 120 stations in all W districts and all VE (except five) in nine weeks. 2AWJ and 2DBU have passed their morse test and are awaiting full calls. G6KB has received reports from U.S.A. on his 7 Mc. 'phone when using 7.5 watts. G2YB has worked VU7BR, Bahrein. Most members report active on one or more bands.

Kingston.—The T.R. has been QRT through a curious fault which has baffled those who have kindly offered their help. Already three transformers have been rewound, and test sets available in the vicinity have failed to reveal the trouble. As other local members had transformer trouble at the same time, it is possible that it was due to the recent breakdown at the Kingston power station.

The following are known to be active: G2NH, 3DZ, 3NF, 3OR, 3VK, 5MA, 6KP, 6MB, 6ZI, 8HY, 8SM, 8TX, 2DLX, 2DOK.

G6MB contacted a portable station in Honolulu on 'phone.

FORTHCOMING EVENTS

Feb.	15	District 1 (Liverpool Section), 8 p.m. at 56, Whitechapel, Liverpool. Discussion on N.F.D.
,,	16	District 6 (Torquay Section), 8 p.m. at G5SY, "Sherrington," Cleveland Road, Torquay.
,,	17	District 12, 7.30 p.m., at the Orpheum Cinema. Talk by Mr. J. Mathews (G6LI.) on "Amateur Radio through the Ages."
,,	17	Southend Radio Society. Lecturer, Mr. R. M. Chamney, of the G.P.O.
,,	19*	District 4, 3.30 p.m. at Trent Bridge Hotel, Trent Bridge, Nottingham.
,,	20	District 6 (Plymouth Section), 7.30 p.m., at G8PN, 26, Moor Lane, St. Budeaux.
,,	22	District 14 (East Essex Section), 8 p.m. at 2CYC, 46, Woodfield Road, Leigh-on-Sea.
,,	22	Scotland "A" District, 7.30 p.m., in Room "A," Institution of Engineers and Shipbuilders, 39, Elmbank Crescent, Glasgow.
,,	22	Scotland "H" District, 7.30 p.m., in District Shack, Bank Street, Kirkcaldy.
,,	23	District 6 (Exeter Section), 8 p.m., at Y.W.C.A.
,,	23	R.T.U.N.I., 7.30 p.m., at Presbyterian Hostel, Howard Street, Belfast. Lecture by Dr. R. H. Sloan (Queen's University, Belfast).
,,	23	District 13 (Central Areas), 8 p.m., at Brotherhood Hall, West Norwood.
,,	23	District 13 (Woolwich Area), 8 p.m. at Memorial Hospital Hall, Calderwood Street (opposite Woolwich Polytechnic).
Feb.	24	London Meeting at I.E.E. Commence 6.45 p.m. Tea from 6 p.m. Lecture by Dr. G. Bloomfield on "Insulating Materials for the Higher Frequencies."
,,	26	District 11, 6.30 p.m., at GW6AA, "The Flagstaff," Colwyn Bay. (The second in a series of talks on Elementary A.C. Theory, by Mr. C. Oliver).
,,	27	District 13 (Wimbledon Area), 8 p.m. at Raynes Park Co-operative Hall, Raynes Park, S.W.20.
,,	28	District 14 (East London Section), 7.30 p.m. at G8AB, "Tree Tops," Priory Road, Loughton.
Mar.	1	S.L.D.R.T.S., 8 p.m., at Brotherhood Hall, West Norwood.
,,	1*	District 1 (Manchester Section), Meeting at Brookes Café, 1, Hilton Street, off Oldham Street, Manchester. Talk by G6OM or 5YD.
,,	2	District 6 (Exeter Section), 8 p.m. at Y.W.C.A.
,,	2	District 14 (Colchester Section), 7.30 p.m. at G8PZ, 19-21, Artillery Street, Colchester.
,,	3	Southend Radio Society. Debate on C.W. versus Phone.
,,	5	District 7 (Surrey Section), 2.30 p.m. at Royal Hotel, Stoughton, Guildford.
,,	6	District 14 (Chelmsford Section), 8 p.m. at G2KG, "Manton," Sandford Road, Chelmsford.
,,	8	Scotland "H" District, details as above.
,,	16	District 6 (Torquay Section), 8 p.m. at G5SY, "Sherrington," Cleveland Road, Torquay.
,,	17	Southend Radio Society. Exhibition of Apparatus.

* Sale of disused apparatus at these meetings.

Croydon.—Although the membership in this town exceeds 50 not one report has reached G5XH, the new T.R. From personal observations the following are known to be active: G2FI, who has managed to clear up his signals with mutual satisfaction to all concerned; 5XH, who raised VE1EA during the 1.7 Mc. Contest; 6NF, who is on aerial experiments; and 6SW, who is putting out excellent 'phone.

The recent annual supper of the Surrey Radio Contact Club was attended by about 50 members and friends. The organisers were G3IC and 5XH. Meetings of this Club are held at 79, George Street, Croydon, on the first Tuesday in each month. The next is fixed for March 1. The meeting-place is opposite St. Matthews Church, near East Croydon station.

G5XH asks for reports by the 25th, please.

DISTRICT 8 (Home Counties).

Owing to very adverse weather conditions, the attendance at the District Meeting, held in Cambridge on January 6, was almost the lowest on record. A rather lengthy agenda had to be postponed, and the mere half-dozen who had braved the elements gathered round the fire for a "rag-chew."

Cambridge.—Local stations seem to be still marking time, awaiting DX conditions, although G2XV, 5BQ, 5DQ, 5DR and 5JO have been heard occasionally. Congratulations to G5DR, who has acquired W.A.C. ('phone and C.W.), W.B.E., and B.E.R.T.A.—a fine performance. 5DQ has worked VP2AT, ZC6RL and ZC6EC on 7 Mc. with 10 watts. 5JO worked VE1EA and W1BKL on 1.7 Mc. during the recent contest.

Bedford.—G5FO is on 7 and 14 Mc. but hopes to cover all bands with a new transmitter nearing completion. 6HB is active, using an indoor aerial, between trips to VK. Intent on improving quality, 5PA is experimenting with microphones and modulators on 7 Mc. 2BFN finds "sky-rods" an improvement for short-wave reception. 2CAP is busy with Morse. Will other Bedford members please report to 5FO?

Other Areas.—G3JU, who rather bemoans his isolated position at Tetworth (Beds.) is doing good QRP work, which has earned him a lengthy write-up in the Bedfordshire Press. G2NJ (Peterborough) hopes to be on the air again shortly from his new QRA, but has reason to anticipate machinery interference. G3BK (March) is active on 14 Mc., while 3WW is getting out well on 7 Mc. 'phone. 3DY (Whittlesey) is working U.S.A. on 14 Mc.

The D.R. would like to hear from Luton and St. Ives (Hunts). Will T.R.'s please note?

DISTRICT 9 (East Anglia).

A District meeting will be held on Sunday, February 26, at the Savoy Hotel, Regent Road, Great Yarmouth, at 3.30 p.m., tea following. National Field Day films for 1938 will be shown and N.F.D. plans for this year will be formulated. It is hoped that as many District members as possible will attend; T.R.'s are requested to inform the D.R. by February 22 as to numbers coming.

Ipswich.—Activity seems to lie chiefly in construction or reconstruction. G8KB is getting ready for 'phone after a long spell on C.W.; 8AN having completed his 1.7 Mc. transmitter is receiving good reports; 8IS, 6TI and 3OJ are experiencing trouble with mains transformers; 8AG is still persevering with his receiver; 2AN having rebuilt his exciter again has started on a 56 Mc. final.

G2JD is waiting for two cards for a 10 watts W.A.C. and W.B.E. (congratulations, O.M.); 8MU has further improved his W6AM 28 Mc. beam and now receives S9 reports from W on 23 watts into an RK34; 3XT, of Stratford, is using an input of 1 watt from one 150 volt dry battery on 7 Mc.; 8WI, of Orford, is active.

Norwich.—G8VW is on 14 Mc. 5LW and 6UA have rejoined the Society, whilst 2FLC has applied for membership; 6QZ is working DX on 28 Mc. and is busy designing a new superhet all-band receiver. A very successful meeting was held on January 25.

Great Yarmouth.—G3RW is re-designing his transmitter for operation on 1.7 and 7 Mc.; 2FAO will shortly be active; BRS3256 awaits his A.A. call, and BRS3434 has applied for his full call. BRS3366, 3468 and 2999 report.

Lowestoft.—G5QO records an increasing amount of interest in amateur radio in this town. Mr. G. Lumsden, BRS3489, is welcomed to membership. 3RK (Beccles) is building a field strength meter; 3UT (Bungay) is active on 7 Mc.

Other Areas.—G8FL (North Walsham) is looking for a South American contact to enable him to obtain his W.A.C.; he is also getting out well on 1.7 Mc. using a 14 Mc. Zepp, and planning a new beam for use on 14 Mc.

DISTRICT 11 (North Wales)

A highly successful meeting took place on January 22 at GW3GL, Conway. There were 17 members present, which is a record number for a District 11 meeting! Everyone greatly appreciated the most interesting and instructive lecture on Elementary A.C. Theory given by Mr. Charles Oliver, Chief Instructor of the North Wales Wireless College.

A crystal-frequency register for the 1.7 Mc. band has been commenced, and now includes practically every crystal in the District, also several in District 1. If any member is about to purchase a new crystal, or to re-grind his present one, he is advised to write to the D.R., who will be pleased to inform him if the proposed new frequency is already occupied, or to suggest a vacant frequency. This offer is also extended to District 1 members, and it is hoped that members of that District will co-operate in the scheme by sending in their present crystal frequencies. Only crystals for which certificates are held can be registered.

A letter budget is in full swing, and is proving a great success. If you would like to receive, and contribute to it, please write to GW6AA.

The following stations are active: 1.7 Mc.: GW2GV, 3GL, 3KY, 5FU, 5OD, 5TC, 6AA, 6OK, 6KY, 8JY. 7 Mc.: 3GL, 3JI, 3KY, 3WY, 3YP. 14 Mc.: 3GL, 3JI, 3KY, 3QN, 3WY, 3YP.

DISTRICT 12 (London North and Hertford)

North London.—At the January meeting, held at The Orpheum Cinema, Temple Fortune, N.F.D. plans were discussed. It was agreed that in principle the chief operators at each station should be persons thoroughly conversant with the band

on which their station would operate. After discussion the D.R. nominated the following to act as chief operators :—J. Hum (G5UM) (1.7 Mc.), P. Carment (G5WW) (3.5 Mc.), P. Solder (G5FA) (7 Mc.), and J. Kirk (G6ZO) (14 Mc.). One additional name was submitted for the 7 Mc. station, but on a vote being taken G5FA was selected. Offers of help made by G6PI and 3HT on behalf of the Kentish Town and Edgware Societies were accepted with thanks.

During the evening G6CL asked members for suggestions concerning N.F.D. Rules. Arising therefrom G6LL, 6OT and 5CD led a discussion which culminated in a proposal being made that N.F.D. should be run as a National competition confined to the British Isles, and that only the two low-frequency bands be used. The proposal was put to the meeting and lost.

A committee comprising G8TY, 5FA and 2YD was appointed to arrange a District dinner on April 21. Subsequently it was decided (not without argument !) to open the dinner to ladies.

At the next meeting G6LL will open a discussion on " Amateur Radio Through the Ages." It is hoped that as many old timers as possible will attend to contribute to the discussion. The meeting will take place at The Orpheum on Friday, February 17.

Local activities are reported on all bands.

DISTRICT 13 (London South)

Wimbledon Area.—An area meeting took place at Raynes Park on January 24, and was attended by 18 members. The chair was taken by the T.R., Mr. Blaber (2BMH), who was very pleased to welcome Mr. Clarricoats, who had made a special journey to address the meeting. In his talk G6CL pointed out the opportunities of the members to create a very successful area within South London, and went on to give one of his most interesting talks on the various aspects of Society activities. It was suggested that it might be possible for the Wimbledon and Wandsworth areas to co-operate and hold joint meetings which would be to the advantage of all. The D.R. welcomed the meeting, and wished all those concerned the best of luck, with a special word of thanks to Mr. Blaber for his hard work. A hearty vote of thanks was given to the Secretary as an appreciation of his presence there, and the meeting then went on to discuss N.F.D. and other District matters.

Central Areas.—An area meeting took place at West Norwood on January 19, and was well attended. N.F.D. was discussed and many useful suggestions were made. G5ZD, formerly 6BB, of Dulwich, is now active in Streatham. He suggests that a list of " cautions " be circulated to all those wishing to use the tritet circuit, as he has had the misfortune to crack two crystals. All reports on his transmissions will be welcomed.

Wandsworth Area.—G2RC is active, and took part in the 1.7 Mc. contest during which he contacted VE1. 3TA and 6KM are active, but no report has been received from 6GQ. 2RC would very much like to hear from any member in his area with whom he is not acquainted.

Woolwich Area.—Congratulations to 2DNA, who is the first G4 in the District—G4AU. He would appreciate reports on his transmissions on the 1.7 Mc. band, and all such reports will be acknowledged. 2ZJ has been experimenting with a W3EDP aerial, and has come to the conclusion that on the 1.7 Mc. band a counterpoise 84 ft. long is more efficient than the usual one of 17 ft. BRS3472 has applied for his licence, whilst 3CT is preparing his transmitter for use on the 28 Mc. band. 8LN is welcomed back to radio. 2CHR and 2DPN are active. Will any member in this area who has not heard from the T.R. please communicate with him ? A local meeting for February 23 has been arranged and will be held at the Memorial Hospital Hall, Calderwood Street, Woolwich (opposite Woolwich Polytechnic), and it is hoped that all local members will make a special effort to be present. The D.R. hopes to attend. A visit is being arranged to the printing works of the *Daily Herald*, and any interested member should write to 3ZJ—the party is limited to twelve in number.

Any member wishing to take part in N.F.D. should communicate at once either with his T.R. or direct to the D.R. It is hoped to run four very efficient stations this year, and early application is therefore essential. The complete list of operators, station sites, etc., will be drawn up early in March. Will everyone please note this fact. In conclusion the D.R. would like to remind all the T.R.'s that reports should be forwarded to him not later than the 25th of the month. It is gratifying to see such a budget this month, and the T.R.'s are thanked for their work. Please keep it up.

A report of the highly successful S.L.D.R.T.S. annual dinner appears elsewhere in this issue.

DISTRICT 14 (Eastern)

District Representative.—T. A. St. Johnston (G6UT), " Normandale," Little Hallingbury, Essex. Tel. : Bishops Stortford 785.

Town Representatives :—

Brentwood.—G. Turner (G3LA), " Avalon," Crow Green Road, Pilgrim's Hatch, Brentwood.

Chelmsford.—R. L. Varney (G5RV), "Arvika," Halleywood Road, Chelmsford.

East Essex.—B. C. Leefe (G5XI), 16, Carlton Road, Leigh-on-Sea.

East Essex.—The first meeting of the year, which was held at The Smack Inn, Leigh-on-Sea, took the form of a hamfest. Twenty-two people attended, including the D.R. and six from the Chelmsford area. The meeting was the first of its kind in this town and requests for more have been made. The result of the QRP Transmitting Contest held in December, 1938, was announced, the winner being G2KH with a score of 260 points, 5XI was second and 2LC third. G2KH receives the challenge cup presented by G5UK.

Only two stations managed to take part in the 1.7 Mc. Contest—G2SO and 6CT. Many, however, have suggested that another contest be held about April.

On January 6 the Southend Radio Society held its A.G.M. Officers for the coming year were elected and a report on the Society's activities during 1938 was read by the hon. secretary (G6CT). After the meeting a paper on R.A.F. C.W.R. was read. At a later meeting a lecture was given by 2BQN on the design of modern transmitters. This proved interesting and helpful to transmitting members.

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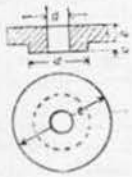

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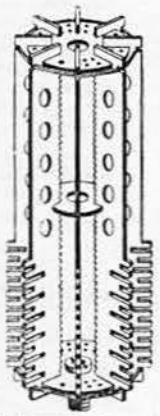

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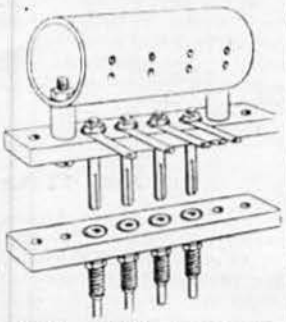

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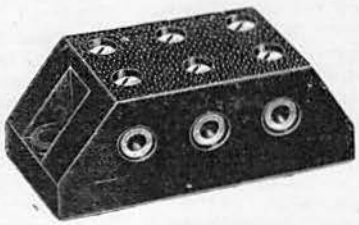

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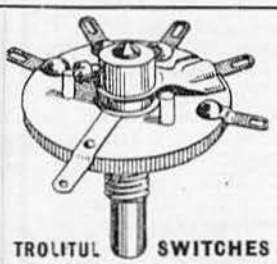

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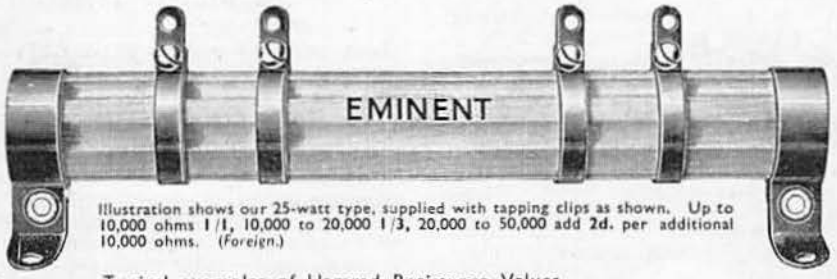

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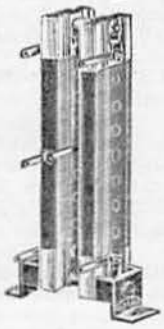

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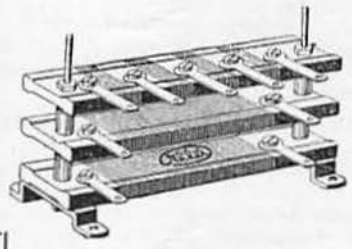

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N.E. AREA
R. W. Stewart (G3LS), 8, East View Terrace, Seaton Carew, West Hartlepool.

Colchester.—The attendance at the January meeting was small. G3VM, G3WP and G8PZ are operating on 7 Mc.

Chelmsford.—G6LB is reassembling his gear at a new QRA. 3BS has entered the "Radio" DX Marathon and is taking it seriously, keen local competition being provided by 2KG. 5RW is putting out a good C.W. signal on 3.5 Mc. 2GN finds the 1.7 Mc. band interesting despite B.C.I. trouble. 4AC (Mr. Postons) is heartily welcomed to the ranks of the local transmitters. 3OX is active on 56 Mc. 3SI is active but has not reported. 2SA has modernised his drive unit with the aid of a KT63 CO and has just made his W.A.C. on a maximum of 25 watts, S. America having eluded him for years! 8PB and the Witham Group have not reported but are active. 5RV continues to chase new countries and has added a few more to his total.

East London.—The January meeting arranged at G6AH, Seven Kings, was abandoned owing to the severe weather conditions. 2DHD, of Highams Park, has passed his morse test and awaits his full call. The following took part in the 1.7 Mc. C.W. Contest: G2CD, 2XP, 6UT, 8AB, 8JM and 3XS. G6AH tried out a vertical radiator for the B.E.R.U. Contest.

DISTRICT 15 (London West, Middlesex and Buckinghamshire).

The high-light of the month was the District Dinner and Social, reported elsewhere in these pages. Great credit is due to those responsible for the organisation, and thanks are recorded to those who presented the many prizes. The latter include G8ZD, 6JM, 8KZ, Mrs. Bradley, and Mr. and Mrs. Werschker. Mr. Bradley (G8KZ) is congratulated for the amount of work which he himself put into the event.

Although the worst night in memory was chosen for the January meeting, a total of ten members ventured forth into the blizzard. It was decided to discuss the N.F.D. stations at the next meeting.

The D.R. has made arrangements with G5SR to act as T.R. for the Harrow, Wembley, Greenford and Perivale section, whilst G3HT has consented to take over that part of Middlesex around Edgware. Both these members would like to receive reports by the 20th of the month. Other sections will be fixed up with T.R.'s in the near future, but in the meantime, those members who would like to contribute to the letter budget should send letters direct to the D.R. by the 25th. G2NN has resigned as T.R. for Twickenham, and 2BVX for High Wycombe. Both have done splendid work for the district during their term of office, and we thank them for their efforts. New T.R.'s will be appointed.

Those members who can help in any way during N.F.D. are asked to notify the D.R. of their intentions, stating which stations they wish to attend and the hours available. This will help considerably.

Congratulations to 2ADC, who becomes G4AR, and to BRS3020, who is now 2FXU.

West London.—Active: G3AR, 3UQ, 3YM, 6CO, 8KZ, 2DRF, and 2BQT, who has applied for full licence.

South Middlesex.—G2NN and 3JG report, the former having his Johnson "Q" wrecked recently.

Bucks.—G6JK, 8JK, 8VZ, 2AKZ and 2BAO are active. 2FXU has erected a 28 Mc. directional array.

West Middlesex.—G5JL entered 1.7 Mc. contest. 6VP still works DX on 14 Mc.

Wembley.—Both G5SR and 6WN are active in spite of losing masts the same night.

DISTRICT 16 (South Eastern)

Ashford.—G8RK is welcomed as the new T.R. Local members wish to thank G2JV for his past services as T.R. Active:—G2JV, 2QT, 3SL, 6SY, 8RK and 2CJT.

Brighton and Hove.—At the January meeting G6CY gave an interesting lecture on Valves, beginning with fundamentals, for the benefit of newcomers. A debate followed. G6CY is building a superhet incorporating an "Evrizone" tuning unit. Active:—G2RU, 3JF, 3WR, 3YY, 6RM, 8AC, 8OQ and all BRS and A.A. members.

Eastbourne.—G2AO contacted VE1 on 1.7 Mc. (RST 339) on January 22. Active:—3AT, 3CX, and 5IH. 3CX reports that his call is being pirated.

Gravesend.—Meetings and lectures:—January 2, *Marconiphone Co.* on "Amateur Television." The lecturer showed how a comparatively cheap magnetically controlled C/R tube could be incorporated in gear of amateur design. The fact that the majority of his apparatus consisted of old components of the "junk box" variety much impressed members. A demonstration was given of the whole process of building up a picture on the C/R tube screen.

January 9.—Annual general meeting.—Mr. Targett, G6PG, who has put in so much hard work in getting G3GP, the club portable, in working order, was elected chairman in place of Mr. Ingleton, G5IL, who has resigned. The latter is now vice-chairman. (Congratulations, 5IL, on your good work in the past for Gravesend, and good luck to 6PG, who will continue, we feel sure, to keep the Group on the map.—D.R.). The retiring chairman reported the club to be in a flourishing condition both from an activity and financial standpoint.

January 16.—The lecture given by Dr. F. C. Stephan, of *T.C.C.*, on "Condensers Generally and Electrolytic Types in Particular," was much appreciated.

G2IZ, 5IL, 6BQ and 6VC took part in the 1.7 Mc. contest, during which 6BQ worked FA8BG.

Maidstone.—Mr. G. S. Taylor recently gave a lecture to the M.A.R.S. on "Some Stepping Stones to Loud Speaker Progress."

A "Ham Evening" is arranged for Wednesday, March 29, at the Clubroom, 244, Upper Fant Road, when Mr. Clarricoats, G6CL, will be present to give a talk on "The Amateur Radio Movement To-day and To-morrow." It is hoped that as many amateurs as possible will make an effort to attend. The Club has been granted the call G3WM. Mr. S. Cook, G5XB, is the new Club President. Active:—G5XB, 8UC, 2BXW and BRS2834.

Tunbridge Wells.—Local members visited the B.B.C. Receiving Station at Tatsfield on January 7. Great interest was shown in the many types of receivers in use, and also in the frequency-measuring set, one of the most accurate in the country. Everything was most lucidly explained by Mr. Griffiths, G6FF (engineer-in-charge), and his colleagues

who went out of their way to make the visitors welcome. Despite the fog which obscured all view of the extensive aerial system, the visit was well attended and voted a great success.

G8NO, of Tonbridge, has W.A.C. and W.B.E. from his improved QRA with the aid of a W8JK beam aerial, and now awaits the cards. 2UJ and 5KV took part in the 1.7 Mc. contest. The former, and 5OQ both use ECO on this band and are very satisfied with it, stability being as good as crystal control, even when the transmitter is modulated. 6ML is on 1.7, 14 and 28 Mc. A new self-supporting 14 Mc. beam made of steel conduit is giving good results. Congratulations to 2DIC, now G4AY, who has lost no time in working a crop of stations using a PP 6A6 CO.

West Sussex.—The Sussex Short Wave and Television Club had a lecture by *Standard Telephones and Cables* on "Ultra-Short-Wave Valve Design" on December 20. On February 24 Mr. F. Charman, G6CJ, accompanied by the President, G2NM, will visit the Club to give a lecture on Aerials. A cordial invitation is extended to any R.S.G.B. members to attend. If those interested will send a card to G2ZV, "Aubretia," Seafield Road, Rustington, they will be notified of the time and place.

Congratulations to BRS3028 on becoming 2DSP. G2ZV and 2DDD are still engaged in work on UHF receivers. The former is on 28 Mc. 'phone, and on January 7 worked all W districts in 80 minutes. Active :—2BAG, 2BGH, 2CDR and BRS2881.

DISTRICT 17 (Mid-East).

Rutland.—We are pleased to receive the first report from G3FW, who claims to be the only licensed station in this county. He sends along a full description of his station and would like to contact other members in District 17.

Brigg.—G8AP is experimenting with indoor aerials for 28 Mc., also Doublet aerials with Reflectors for 14 Mc.

Sleaford.—G8GI, who is active on all bands, would appreciate contacts with Grimsby members.

Boston.—All stations report active with the exception of 6LH, who, we regret to hear, may have to close down altogether owing to pressure of work. 6GH was surprised to contact VE1 during the 1.7 Mc. Contest. C.W.R. exercises continue to be well supported in this area.

Lincoln.—We welcome 2DZR to the district. 2CFT and BRS2527 are active.

Mablethorpe and Sutton.—G5BD, 5CY, 2FT and 5LL report active. 5BD and 2FT have been doing remarkably well for some time and both should have put up good scores in B.E.R.U.

Grimsby.—The Grimsby and District Short Wave Society continues to make good progress and a series of technical talks given by G6LI will be a welcome addition to the existing programme. The Society are holding their annual dinner on February 25 and all T.R.s will be notified regarding the venue, etc.

The following report active : G2VY, 3ZG, 5GS, 6AK, 8VI, 8CI, 8PV and 8JN.

DISTRICT 18 (North and East Yorkshire)

Scarborough.—Meetings continue on Monday nights at the Scarborough Short-Wave Club. On January 16 the D.R., G5MV, gave a short talk on his experiences with the Collins Aerial Coupler, which he uses exclusively. The following N.F.D. arrangements have been made to date : Hull Group 14 Mc., Scarborough 7 Mc. and 1.7 Mc.

G8KU suggested a low-power contest, restricted to one 120-volt dry battery for plate supply, and the D.R. offered to link up the whole district in the scheme if other towns wish to join.

G2CP has been testing grid-modulated phone in order to take part in the Friday evening local rag-chews. Previously he was the sole "C.W. only" station in Scarborough. 6SO is testing centre-fed dipoles on 7 Mc., and is experiencing trouble due to weather affecting the feeders. Reports are one to two S strengths down on a wet day. 5GI has built a single unit very compact CO-PA and power pack for 7 Mc., and is keeping his main rig on 14 and 28 Mc. 6TG has now worked all W. districts on 28 Mc. phone, and is on 56 Mc. phone most nights at 2200-2230 G.M.T. Reports are requested. 6CP and 8BB are also radiating on this band.

The Scarborough Short-wave Club is now licensed under the call G4BP. The transmitter is at present CO-PA, 6L6G, and RCA809. Aerial experiments are being carried out, and reports requested.

G2TK has the latest 438 Model Howard receiver on the way, and is obtaining a 40 ft. pole for the top of the 100 ft. hillside behind his house. Congratulations to 2AHN on passing his morse test. It is expected that he will have his call by the time these notes appear.

Hull.—There are forty members residing in or near Hull, yet only sixteen took the trouble to attend the January meeting, when the Society's films and a selection of talkie films were shown. The reason for this apathy on the part of so many members is difficult to understand, and those responsible for the welfare of the Society in Hull are not encouraged by the continued reluctance of so many to attend meetings, which, after all, are only held once each month. It is useless contemplating more ambitious plans until more members take an interest in their own welfare.

No reports have been received, but the following are known to be active : G2FS, 2KM, 2OO, 2XA, 3IU, 3PL, 5MN, 6OS, 6UV, 8IM, and 8UL.

York.—In spite of the fact that G5HB and 2DZR have left the city, hopes are high that activity is to be commenced in earnest very soon. 2CNR, recovered from illness, is devoting his spare time to amateur radio again, and 2CBT is considering going on 56 Mc. A new member in Mr. R. W. Hall is welcomed.

Driffield.—G6UJ is active on 3.5 Mc. phone, and 2KO is on 14, 7, and 3.5 Mc. He uses separate aerial systems on each band, and is especially successful on 7 Mc., on which he keeps regular phone skeds with VP6MR.

Thirsk.—G3NY has had QSO's with K7 and ZL, and is erecting a half-wave doublet. 3MB is active on 7 and 14 Mc., and is considering applying for other bands.

All Towns.—Please note that the York P.D.M. has been put forward by one week, and is now fixed for the first Sunday after Easter.

DISTRICT 19 (North-Eastern)

News has been very scarce for the past two months, although many stations are known to be active. The D.R. would again urge members to

report regularly in order that these notes may be kept going.

South Shields.—Members are asked to please note that the new address of the T.R. is 60, Sunderland Road, South Shields. All stations other than that of the T.R. are active and there seems to be a general move to 7 Mc. in search of DX. Local meetings are temporarily suspended until the T.R. gets settled in his new home.

Newcastle.—G5RI and 5QY are active on 1.7 Mc. and have both raised W. During the 1.7 Mc. Contest 5QY added two more wires to his counterpoise and raised 2 Ws VE, FA8 and an OZ!

Stockton-on-Tees.—G5XT and 5QJ are active on 3.5 Mc. phone. 3KY is trying to cure spurious oscillations in his pentode PA. 2FO testing aerial systems on 1.7 Mc. 8CL and 6OR are known to be active. 2CZO is at present getting over the effects of a rather serious operation and we all wish him a speedy recovery.

Northern Ireland

The quarterly meeting of the Northern Ireland District was held in Belfast on January 13, when 15 members attended.

After tea and general discussion, a ballot was held in which those present wrote questions of interest on slips, which each, in turn, drew from a hat and endeavoured to answer. Good-humoured amusement was caused by the many who were "stuck" and were helped out by the others. The writer of a facetious question was bitten by drawing his own slip, but the draw circulated a good deal of useful information. Afterwards GI6TK passed round a well-constructed single-valve "midget" CC transmitter with separate power pack, which interested many members.

A fair number of GI's report active, but with no outstanding news. GI5SJ has obtained a remarkable input power from 220-volt D.C. mains and has worked VU2AM on 3.5 Mc. 6TK's 'phone has been reported heard in the Federated Malay States. 8UW has rebuilt and is getting out well to U.S.A. on 'phone, using a vertical dipole. 8PA, who is under way on 90 centimetres, finds no difficulty in regard to the oscillator, but has not yet succeeded in making a receiver behave properly. 5QX will be glad to check local frequencies at any time by arrangement or when he is on the air. His *National* wavemeter, which covers the amateur bands from 3,500 to 28,800 kc., will check crystals to within 2 kc.

Will R.T.U.N.I. members please note that the meeting at 7.30 p.m. on Thursday, February 23, will be held at the Presbyterian Hostel, Howard Street, Belfast, when Dr. R. H. Sloane, Lecturer in Physics at Queen's University, will speak on "Some Unusual Thermionic Applications." It is hoped that members will turn out in force and show their appreciation of Dr. Sloane's kindness. The R.S.N.I. have accepted a cordial invitation to join in this meeting.

Scotland

"*A*" *District.*—At the January meeting the new D.O., Mr. J. B. Duncan (GM6JD), discussed various proposals which had been made. In order to regularise the financial position, it was intimated that a bank account is being opened in the name of the District. At the end of the year a statement showing income and expenditure will be issued. Several excellent and interesting suggestions have been submitted for local contests and a committee was appointed to draw up a programme. It was agreed that some procedure should be arranged for introducing new members at meetings. It was also arranged to hold a "Problem Night" in order to give assistance to newer members.

An appeal is made to members to give lectures of a practical nature with demonstrations.

There are three reports to hand, GM8MJ reporting W.A.C. and GM8FR W.A.C. and W.B.E. GM6WD reports testing two half-waves in phase aerial, results indicating a big improvement in low-angle radiation, K6, W7 and ZS's being worked on telephony. He reports an unexpected personal QSO with ZL2JQ, who was encountered taking a ciné film of the Glasgow Charities Day procession. Mr. J. D. Gillies (BRS3414) is now 2FZT and Mr. A. K. McAuslan is now 2DOC.

"*B*" *District.*—The regular District meetings were resumed on January 10 when GM2OX gave a talk and demonstration on portable apparatus. The apparatus on view was a Receiver, Modulator and Transmitter built on a chassis 19 ins. by 8 ins. The receiver being O-V-2, the transmitter a crystal-controlled oscillator and the modulator a class B unit. Transmissions with this gear have proved very successful on 1.7 Mc. After the talk, suggestions were made by members present as to improvements, and as a result of this a three-valve superhet receiver is to be tried in place of the O-V-2. Three stations entered for the 1.7 Mc. Contest, but only GM8SV finished, GM2OX and GM6IZ having retired after two hours of unsuccessful operating.

An interesting debate was on the agenda for the meeting on January 20, the motion being "That this Society favours the use of Quartz Crystals for proper frequency control of Amateur Transmitters." The speaker for the motion was J. D. Shaw (GM3RL) and A. Reid (GM5YN) opposed. Both speakers put forward a very good argument and the result was a complete majority for crystal control, although it was agreed by most that a carefully

Scottish H District Dinner held in Kirkcaldy on January 21, 1939

Front row, left to right. GM6NO, BRS.209, GM6ZV (Hon. Scottish Records Officer), 2NQ (the D.O.), 6SR, 8CF

designed Electron-Coupled Oscillator in the hands of an experienced operator could be most useful.

Activity in the District has been fairly good of late, several stations who have been off the air for some time having been heard again.

"*C*" *District.*—Nine members attended the District meeting at Broughty Ferry on January 10. Mr. Neilson was welcomed as a new member, bringing the strength up to 35. GM5SC and the D.O. (GM8CF) were guests of the "H" District at their annual dinner at Kirkcaldy on the 21st. The hospitality of "H" is well known, and this year's function was thoroughly enjoyed by all present. GM3KU is splitting the kilocycle with a new frequency meter, 8HM continues to work J, and 5SC tests beam aerial.

"*D*" *District.*—Meetings resumed on January 11 and will continue fortnightly thereafter at 15, Royal Terrace, Edinburgh. Congratulations to GM3UM and GM3YN on obtaining full calls. The best wishes of the District go to GM3BA, who has left for Daventry, while we welcome GM8HA from England. 6SR is active on 1.7 and 3.5 Mc., while 5YX reports good results with new transmitter, having worked all continents. He is now on A.C. 5GK reports.

"*E*" *District.*—The usual monthly meeting was held on January 18, when Mr. H. McConnell (2ACQ) gave a short talk on the HRO receiver, dealing briefly with its outstanding features. The morse class resumed on the 25th and weekly meetings are again to be held. Mr. Gray (GM6DG) has promised to give a lecture in the near future. Reports have been received from GM2UU, 2CUV and BRS1295. 2CUV bemoans the fact that he is "cut off" from his fellow-hams on the mainland—he lives on the Island of Arran.

"*F*" *District.*—The last meeting held at GM3OM took the form of a junk sale, which was much enjoyed by those present. GM6RV experiments with E.C.O., 6XW is on 28 and 56 Mc., 8HP is testing aerials, and 2UD is completing a new shack devoted entirely to radio.

"*G*" *District.*—At the meeting held on January 15, Mr. S. Young (G2YY), "B" Controller, addressed the members on C.W.R. A very interesting discussion followed. GM3ZH, 5FT, 8NW and 8RV are active.

"*H*" *District.*—All stations are active, but individual reports are few. The D.O. again requests members to let him have news regularly each month. GM8KR finds DX on 7 Mc. good, and also reports working W as late as 10.45 a.m., when G phone is coming in at S9 plus. 8MQ states that owing to mast difficulties his proposed experimental work on a rotary beam aerial is in abeyance. BRS3331 and 3305 are 2FWN and 2APA respectively, while 2ANL has at long last relinquished that familiar call and is now GM2NQ. 6JJ is licensed for 1.7 Mc., and is active on that band. 3ND is also on 1.7 Mc., but asks that the pirate using his call shall obtain a licence of his own.

"H" District annual dinner, now recognised as one of the Society's premier functions in Scotland, was again very successful, and the D.O. wishes to thank all those who assisted. The company regretted that Mr. A. M. Houston Fergus (G2ZC) was prevented by illness from attending at the last moment. A letter conveying greetings and best wishes was received from Mr. Arthur Watts, and greetings telegrams were read from Headquarters and from GM3NI, D.O. for "G" District. Members present expressed their warm thanks for these communications. GM6XV, who was present, records his thanks to the District for making his week-end so enjoyable.

BRITISH EMPIRE NEWS

Australia (Western)

By VK6WZ

DECEMBER-JANUARY saw fair activity in VK6, mainly on 7 and 14 Mc. As far as is known, no stations here are working on 1.7 or 3.5 Mc.

The W.I.A. headquarters station in this Division (VK6WI) is now on regular schedule from 9.30 a.m. to 10 a.m. each Sunday morning with slow C.W. telegraphy, comprising a bulletin of news and announcements concerning the Institute.

Among those known to be active are: VK6GB (14 Mc.), 6FL (7 and 14 Mc.), 6LJ (7 and 14 Mc.), 6HT (14 Mc.) and 6AF. 6WZ has been on 7 Mc. occasionally.

Stations contacting "VK6BK" (crystal note about 7,040 kc.) are asked to request his QTH! He now calls "CQ DX" at nights!

Malta

By ZB1E

By the time these notes appear in print the B.E.R.U. contests will have come and gone, but if the present very poor conditions persist, little credit can be expected to come the way of ZB1.

Last month peculiar conditions obtained on 14 Mc. during the hours between 19.00 and 21.00 G.M.T., when the only signals audible were PY's. All attempts for a contact, however, were futile. After this the band went dead until around 23.30, when the more powerful W's started to come in. The 28 Mc. band, during the periods the writer could make observations, has been silent.

Although activity is not lacking there is nothing of interest to report.

Malaya and Borneo

By VS1AA

VS2AS reports working VS6, KA1, VK3, etc., on 28 Mc., but states that the band is very variable, with short skip prominent.

Archie Brown, better known as GM6ZX, is now in Singapore, and both he and VK5FB have called upon the writer in recent weeks. Our Australian friend, who is on the S.S. Merkur, has a very fine collection of photographs.

We understand VS1AI has left Malaya for good. Further pirate calls are 1AR, 2A and 3KX.

Northern India

By VU2LJ.

The writer wishes to thank VU2AN for the excellent way in which he kept the B.E.R.U. VU Group going during his leave in Britain.

Many new stations have been licensed during the last year, and one of the loudest signals is that from

2FO (ex G2DC), who is using 9 watts to a single 6L6 ECO with a rotary 8JK beam, 70 ft. above ground. 2BG is also experimenting with beams, and putting an excellent signal into the East coast of America. He is going on six months' leave this year, and hopes to meet many G amateurs. 2LJ is back on the air, but, owing to pressure of work, operating hours are very restricted. Grid modulation is being used successfully on 14 Mc.

The QSL Bureau does not seem to be functioning too well, but it is hoped to get this cleared up shortly.

Reseau Belge QSL Bureau

We understand from M. Anthierens (ON4AP), Hon. Secretary R.B., that Madame la Baronne Bonaert de la Roche has consented to take charge of the Reseau Belge QSL Bureau, so ably conducted until his recent death, by her husband Baron Boneart de la Roche (ON4HM). Cards for Belgium should therefore be sent to Chateau de Marchiennes, Harvengt lez Mons.

South London's Night Out

On January 26 "The Sliders," or to give them their correct title "members of the South London and District Radio Transmitters Society," met for their annual dinner at the Half Moon Hotel, Herne Hill.

Under the chairmanship of Mr. E. A. Dedman, G2NH, the company, numbering 50 members and guests, had the pleasure of learning that Mr. Bevan Swift (Past President R.S.G.B.) had accepted the Presidency of the S.L.D.R.T.S. In a typical "Tock I" speech, Mr. Swift recalled incidents of the early days in the electrical industry and paid a warm tribute to the late Sir Phillip Dawson, past President of the South London Society.

Replying to the toast to "The R.S.G.B." proposed by Mr. H. A. M. Whyte, G6WY, Mr. J. Clarricoats, G6CL, pleaded for more inter-district personal contacts between London members and suggested that the old London "hamfests" be revised. He spoke also of the difficulties facing the amateur movement and assured the company that the new Council would spare no effort to protect to the uttermost limit the rights of all British amateurs.

Fun and games followed the dinner, and much amusement was caused in the general knowledge test when a certain well-known "Ham" could not remember the prefix for Tristan da Cunha. Someone cruelly suggested that perhaps he had not worked that one yet!

The evening concluded with a "W.A.Z. Darts Contest." To QSO all Zones in half an hour is a big thrill.

S. H. C.

INDEX TO DISPLAYED ADVERTISEMENTS

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

G2SJ.—K. N. FRANKLIN, 152, Longcroft Lane, Welwyn Garden City, Herts.
G2UO.—W. H. G. DAVY, "Mount Royal," St. Marychurch Road, Torquay, Devon.
G3AH.—J. D. WIGHTMAN, 45, Davyhulme Road, Urmston, Manchester.
G3JV.—E. J. F. PENROSE, 2, Coopersale Road, Homerton, London, E.9.
G3KK.—H. GRANT, 19, Palmerston Road, Chatham, Kent.
GM3KU.—E. T. RITCHIE, "Cobetleu," 5, Camphill Road, Broughty Ferry, Angus.
G3MY.—G. M. KING, 51, Springfield Road, Millhouse, Sheffield, 7.
G3NQ.—W. J. BARKER, 18, Cherry Close, Carshalton, Surrey.
G3OF.—Rev. E. D. GEDDES, St. Stephen's Vicarage, St. Stephen's Terrace, South Lambeth, London, S.W.8.
GM3SF.—J. HOLDEN, 3, Urquhart Place, Aberdeen.
G3SP.—J. MACHENT, 17, Lincoln Avenue, Levenshulme, Manchester.
G3TN.—T. NOBLET, 23, Woodside Avenue, Preston, Lancs.
G3TW.—J. WITHERS, Wynberg, Harborough Road, Oadby, near Leicester.
G3UF.—H. V. PRINCE, 408, Willow Field, Burnley Road, Halifax, Yorks.
G3VI.—F. C. TURNER, 40, Queen Street, Hitchin, Herts.
GW3WY.—R. V. BEEKAN, Bryneglwys, Llangwstenin, near Llandudno Junction.
G3XP.—F. C. WHITE, 175, Henley Road, Caversham, Reading, Berks.
G3YH.—L. J. STEVENS, 24, Hall Street, Bristol, 3. (Incorrect in January BULLETIN.)
G3YL.—Miss R. JEBB, The Lyth, Ellesmere, Salop.
G3YP.—K. R. WILKINSON, 88, Talbot Road, Roundhay, Leeds, 8.
G3YT.—L. TOGHILL, 64, York Road, Montpelier, Bristol, 6.
G3YU.—T. J. S. COLE, "Bearsden," Linkside, Hindhead, Surrey.
GM3YV.—J. HAGGART, c/o 60, Fauldshead Road, Renfrew, Renfrewshire.
G3YY.—C. T. Fairchild, 1A, Dover Road, Brighton, 6.
G3YZ.—D. G. PRICE, 1, Atlas Cottage, Ryeworth Road, Cheltenham, Glos.
G3ZI.—G. S. WOOLLATT, 252, South Lane, New Malden, Surrey.
G3ZO.—S. WILKINSON, The Bungalow, Bentham, Lancaster, Lancs.
G4AC.—E. L. POSTANS, "Swytes," Kingston Crescent, Chelmsford Essex.
G4AD.—W. RIPLEY, 7, Stonegate Terrace, Meanwood, Leeds, 7.
G4AL.—G. R. COX, 35, Victoria Street, New Sawley, Long Eaton, Notts.
G4AP.—J. G. ROOKE, East Horsley Garage, East Horsley, Leatherhead, Surrey.
G4AR.—A. E. DOWDESWELL, 111, St. Mark's Road, North Kensington, London, W.10.
G4AS.—J. F. HOLDING, "Hacienda," Abbey Road, West Kirby, Cheshire.
G4AU.—A. W. GOVER, 11, Rolfe Road, Charlton, London, S.E.7.
G4AY.—R. L. PLUCK, 9, Prospect Road, Southborough, Tunbridge Wells, Kent.
G4BA.—D. SCOTT-JOP, 13, Mayfields Close, Wembley Park, Middlesex.
G4BN.—F. LEAMON, 5, Wellington New Road, Taunton, Som.
G4BO.—Dr. J. S. W. NUTTALL, 24, Ballantrae Road, Allerton, Liverpool, 18.
G4BW.—H. L. WILLIAMS, 162, Whyteleafe Road, Caterham, Surrey.
G5HB.—H. BILTCLIFFE, 31, Willow Crescent, Five Lane Ends, Bradford, Yorks.
G5LN.—C. R. GREEN, 1, Ladbroke Gardens, London, W.11.
G5WZ.—W. SMITH, 60, Sunderland Road, South Shields, Co. Durham.
G5YA.—A. M. LEITCH, Broadmead House, Send, near Woking, Surrey.
GW5YB.—R. ASHTON, "Rhos," Llangoed, Beaumaris, Anglesey.
G5ZD (ex G6BB).—H. BRABROOK, 12, Romeyn Road, Streatham, London, S.W.16.
G6BM.—D. W. MILNE, Junr., 26, Dale Drive, Pooltown Road, Whitby, Wirral, Cheshire.
G6CP.—J. COOPER, 24, Prospect Crescent, Scarborough, Yorks.
GM6LG.—T. LAING, 27, Viewfield Crescent, Aberdeen.
G6PM.—P. MODRIDGE, "Craigmore," Bluebell Lane, Huton, Liverpool.
G6NZ.—L. E. NEWNHAM, B.Sc., 99, Grantham Road, Sleaford, Lincs.
G6XM.—WM. JAMES, 36, Elm Grove Road, Farnborough, Hants.
G8CB.—H. CREWE, 31, Tennyson Street, Lee Mount, Halifax, Yorks.
G8QY.—G. H. STANTON, 71, Coverdale Road, Sheldon, Birmingham, 26.
G8VK.—A. ROEBUCK, 79, Balmoral Avenue, Crosland Moor, Huddersfield, Yorks.
G8ZD.—G. J. CARPENTER, 6, Ashdown Road, Long Lane, Hillingdon, Middlesex.
2ACU.—F. C. MARCHANT, 42, Holmes Avenue, Hove, 4, Sussex.
2ARU.—R. A. LOVELAND, "Waverley," Crockford Park Road, Addlestone, Surrey.
2BAH.—L. S. GUMBRILL, 108, Sandgate Road, Brighton, 6, Sussex.
2BAW.—J. V. BATTERSBY, "Brainton," Oakleigh Avenue, Whetstone, London, N.20.
2CGP.—WM. DALL, c/o Mrs. Young, 1, Forebank Terrace, Forebank Road, Dundee.
2CJC.—F. M. M. BEERLING, "Manyweathers," Salisbury Road, St. Margarets-at-Cliffe, near Dover, Kent.
2CWA.—H. G. MEPHAM, c/o Mrs. Pape, 51, Belvoir Street, Prince's Avenue, Hull, Yorks.
2DPN.—F. BARNARD, 30, The Village, Charlton, London, S.E.7.
2DSF.—N. BOOTH, 81, Albert Road, Levenshulme, Manchester, 19.
2DWM.—G. YALE, 40, Raeburn Road, Edgware, Middlesex.
2FOP.—C. FORBES, 10, St. Peter's Buildings, Gilmore Place, Edinburgh.
2FPO.—S. G. OAKLEY, "Northleigh," White Hart Lane, Portchester, Fareham, Hants.
2FWV.—P. H. SMITH, "Harefield," Westerham Hill, Kent.
2FXU.—P. MEDCALFE, The Gables, 123, Wendover Road, Aylesbury Bucks.
2FYT.—F. H. CHAMBERS, 185, Birchfield Road, Redditch, Worcs.
2FZL.—F. HILL, Dingley, Oxford Road, Tilehurst-on-Thames, Berks.
G3RW.—D. E. DAVY, 59, East Road, Maygrove, Great Yarmouth, Norfolk. (This was reported correctly in October BULLETIN and incorrectly in December BULLETIN.)

Cancelled—G2JO, G2NR, G2TD, G2ZN, G5DP, G5GD, G5LQ, G6XK, G8PQ, G8RN, 2ADC, 2AHG, 2AHV, 2AVM, 2AXG, 2BBJ, 2BGG, 2BHI, 2BNT, 2BOX, 2BYX, 2CMA, 2CNG, 2CQF, 2CRS, 2CTU, 2CVU, 2CWP, 2CYU, 2DBB, 2DBW, 2DFJ, 2DFK, 2DGB, 2DGV, 2DHC, 2DNA, 2DOV, 2DQK, 2DST, 2DVN, 2DZI, 2FBC.

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 responsibility for any loss or breakage 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.

THE UTILITY A.C./D.C. TRANSMITTER—

(*Continued from page* 455)

giving parallel push-pull operation. To ensure adequate excitation, it will be desirable to add another stage to follow the oscillator, and this could well consist of another KT33 triode connected (*i.e.*, screen and anode strapped) and neutralised. This would allow the stage to be used either as a buffer or as a doubler, and, incidentally, would permit of the transmitter being operated on 28 Mc.

To avoid complicating matters unduly, the oscillator stage could then employ two pin coils similar to the cathode coils, with capacity coupling to the buffer valve. Owing to the increased capacity placed across L_2 by the addition of the extra valves, the number of turns in this coil would require reducing by an amount best determined by experiment.

When additional valves are to be included, the voltage to be dropped by the Barretter will alter, and allowance must be made for this circumstance. If eight valves are used, as in the final suggestion (four in the P.A., one buffer, one oscillator, and two rectifiers) the Barretter may be omitted.

Conclusion

The transmitter has given a good account of itself on the air, and has proved very stable, both as regards output and constancy of frequency. It makes a valuable addition to any amateur station, and is indispensable where only D.C. mains are available.

BOOK REVIEWS—

(*Continued from page* 462)

cabinets appearing cheek by jowl with one on the C.R. tube as a servicing tool.

Tracing hum, testing components and coils lead to a chapter dealing with commercial receivers. Second-channel interference, performance checks, and loudspeaker faults conclude the treatment of troubles.

The book finishes with suggestions for the equipment of a service workshop, simple calculations and formulæ, and information as to colour-codes, valve bases, etc. Incidentally, the values of the constant C_0 in the H.F. stability formula require amendment.

The text is simple in style, extremely practical, and the illustrations are numerous and helpful.

The book is very good value and should interest amateurs and service-men alike. T.P.A.

HANDBOOK OF TECHNICAL INSTRUCTION FOR WIRELESS TELEGRAPHISTS. (Sixth Edition.) By H. M. Dowsett, M.I.E.E., F.Inst.P., M.Inst. R.E. 644 pages and 578 illustrations. Published by Iliffe & Sons, Ltd., London. Price 21s.; by post 21s. 6d.; by foreign post, 22s.

This book and its author are too well known to need any introduction to wireless engineers and operators, but a younger generation of operators, prospective or actual, is always arriving. They should find this book even more valuable than did their predecessors.

The first edition appeared in 1913 under the authorship of J. C. Hawkhead, and the present author undertook the first revision in 1915. Since then, in its various editions, it has been the *vade mecum* of the operator.

The book forms a complete course for the theory side of the P.M.G. Certificate, but is even more than that. It is a valuable handbook for all operators, amateur or professional, though naturally being mostly concerned with marine apparatus.

The first fifteen chapters may be grouped together as a course in electrical theory, ranging from fundamental principles to 3-phase alternators, and not forgetting a simple treatment of vectors and curve-plotting. The remaining seventeen chapters deal with the radio-engineering theory and practice, and give copious details of the latest gear for ships. In addition to the subjects normally found under this heading, there are chapters on depth-sounding, short-wave aerials and apparatus, marine audio relay services, lifeboat and emergency outfits. A special chapter is devoted to the short-medium wave equipment of trawlers, and the whale-fishing fleet. Much useful information on maintenance of plant is given in a final chapter.

The theoretical treatment is followed everywhere by examples of specific apparatus, with all the sets in general use at sea included, and there is a wealth of illustration.

The writer knows no book more suited to the needs of the prospective operator than this, and older operators will find it very valuable in keeping them up to date with new apparatus and principles. The style is admirable and the illustrations, like those in the last book from the same publishers, are exceptionally good.

T.P.A.

New Mullard Valves

The *Mullard* "Amerty" Range of American type Valves has been augmented by a "U.X." Series.

The following fourteen types are now available from stock:—

Type.	*Description.*
6A7	Heptode Frequency Changer.
6C6	H.F. Pentode.
6D6	Vari-mu H.F. Pentode.
24A	H.F. Tetrode.
25Z5	A.C./D.C. Rectifier.
36	H.F. Tetrode.
39/44	H.F. Pentode.
42	Power Pentode.
43	A.C./D.C. Power Pentode.
47	Power Pentode.
75	Double Diode Triode.
77	H.F. Pentode.
78	Vari-mu H.F. Pentode.
80	Rectifier.

All these valves are directly interchangeable with American equivalents and can be used for replacement purposes in all American and American style receivers.

Mullard's announce that a Rectifier, type CY2 has been added to the "E" Series. This valve i, identical with the present UR3, which will evensually be superseded in the D.C./A.C. range.

2BIB

Mr. I. B. Clark asks us to mention that his call sign 2BIB has not been cancelled.

EXCHANGE AND MART.

RATES.

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BARGAINS FOR A.A. AND B.R.S.—Variable Condensers from 9d., Slow-motion and Straight Dials from 6d., Coils and Formers from 2d., Fixed Condensers 3d., Fixed and Variable Resistors from 3d., H.F. Chokes 3d., L.F. Transformers 1s., 2-v. Valves from 1s. 6d., 4-v. and 6-v. Valves 9d., Valve-holders (4 and 5-pin) 2d. Also some bargains left. See advert. January BULLETIN. Write for List.—HALL, 11, The Inlands, Daventry, Northants.

DB20 Preselector, condition perfect, £8.—L. GREGORY, 71, Uphill Grove, Mill Hill, N.W.7.

EVRIZONE Super Tuner, 5-190 metres, for use with RF 1st Detector and oscillator stages, as new, used few weeks, only 55s. Also Super-Het Receiver with plug in coils for 40 and 20 M. All good components, includes 5 valves, requires power supply; details on application; 60s.—HARTLAND, New Drive, Totteridge, High Wycombe.

FOR SALE, Hallicrafter Sky Challenger, crystal gate, new condition, guaranteed perfect working order, £14, or nearest.—WILKINSON, The Bungalow, Bentham, Lancaster.

FOR SALE.—Commercial pattern 10/60-watt fone 11-tube Transmitter, M/C Meters, Xtal Mike, complete £15.—G6PC, New Road Corner, Aldridge, Staffordshire.

FOR SALE.—Two Jones Preselectors, complete with new tube: eliminates second channel; guaranteed 12 months; £1 each. Ideal for "Sky Champion" or "Buddy."—CARTER, 5, Waterloo Street, Thornes Lane, Wakefield.

FOR SALE.—Haynes "1939 Super Clipper" Receiver, 3 to 550 metres, brand new, not been used. Unwanted gift. List price £12 12s., accept £8 8s.—PRIOR, Carlton Cinema, Essex Road, Islington, London, N.1.

FORD 8, 17,000 miles, 1936 model, £40. 2DTU going QRT; 45 ft. mast; £3. Two band transmitter, complete tubes, coils and power pack, £4 10s. Send stamp for list.—2DTU, 41, Willoughby Road, Boston, Lincs.

G5KT.—Outstanding QSLs. Trial order will convince you cannot do better. Samples. State AA, G, BRS, SWL, 33, Howard Road, Westbury Park, Bristol, 6.

G6DS.—Known the world over for quality. QSL Cards and Log Books. Send for samples.—QRA, 14, Lambley Avenue, Mapperley, Nottingham.

"HAM-AIDS" for colourful design in QSL cards; samples. — G6XT, TILLOTSON BROTHERS, Commercial Street, Morley, Yorks. (State G or BRS, etc.)

MICROPHONES WANTED.—Moving Coil, Crystal, Reiss, reasonable, cash; also Multi-range Meter and other measuring instruments. Sale: Double-button W/E Mike, 10s. Mains Transformers wanted. Write details: BROWN (5BK), 200, Prestbury Road, Cheltenham.

MORSE code easily learnt by gramophone records. All speeds. Particulars, stamps, Masters, Orchard House, Wokingham.

OFFERS wanted. National 81X and DB20 preselector. Owner buying set covering intermediate frequencies. Will sell separately if wanted. GM3ZH, Forbes Adam, The Elms, Galashiels.

OLDTIMER G6MN for 1st. grade QSL's and Log Books. Send for Samples.—G,AA,BRS, G6MN, Worksop.

PRECISION "Side-Swiper" Keys, plated contacts, superb action, 10s. Owners call on base 2s. 6d. extra.—G6RS, 81, The Avenue, Sunbury, Middlesex.

QSL's.—250, 4s. 6d. 1,000, 9s. Post free. Samples gratis. State whether BRS, AA.—G. ATKINSON BROS., Printers, Elland.

SURPLUS GEAR CHEAP.—Stamp for Complete List. All-metal Portable Receiver, Transmitter and Modulator (April issue BULLETIN), with Modulator, Siemens Microphone, Brown Key, three Weston Meters and Aerial Meter, £10; 56 Mc. Transreceiver, telescopic aerial for car and meter, 50s.; 56 Mc. HF-DET-LF Receiver with batteries, 40s.; RK20 and Filament Transformer, 30s.; Oscilloscope with linear time base, amplifiers, etc., £5. Many other Valves and Components.—G5UK, 19, Meadway, Westcliff-on-Sea.

TWO VACANCIES OCCUR with a West End house.
(*a*) Counter sales. Must possess good knowledge short wave equipment, active transmitter preferred.
(*b*) Man with technical abilities to take charge mail order correspondence and despatch. Box: 86 "Parrs" 121, Kingsway, London, W.C.2.

WANTED.—Communication Receiver, S-meter, Xtal gate, good condition essential. State lowest cash price.—Write G3XS, 23, Mornington Road, Chingford, London, E.4.

WANTED.—Communication Type Receiver; good condition essential. State lowest for cash.—Write, 55, Angus Street, New Cross, London, S.E.

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