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THE T. & R. BULLETIN

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DEVOTED TO THE SCIENCE AND ADVANCEMENT OF AMATEUR RADIO

Hon. Editor: H. BEVAN SWIFT. Secretary-Editor: JOHN CLARRICOATS

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A FAREWELL MESSAGE

IN 1933, I, as the then retiring President, monopolised the December Editorial with farewell greetings to my readers. This year I, as your Honorary Editor, have again come into print, this time also with a farewell message. This is the last issue which will bear my name in that capacity, and perhaps I may be forgiven if, for once, I strike a personal note.

In giving up the post, I am relinquising the last of a continuous series of offices which I have held since 1923. True, for many past issues of THE BULLETIN I have taken little or no active part, the main work of Editorship having been so ably handled by our capable General Editor and Secretary. This has been due largely to that failing energy which comes with advancing years, and naturally I have felt some pangs of conscience in holding an office where I am unable to give any material service. I have therefore placed my resignation before the Council, and am delighted to hear that the post has been taken over by Mr. A. O. Milne. No better member could have been found for the task, for his long association with THE BULLETIN as its draughtsman and with other spheres of Society activity are well known. I am sure every reader will join with me in wishing him success in his new duties.

Since the day when I wrote the opening sentence of our first issue in July, 1925, to the present time is a far cry. From a twelve-page issue we have progressed to a 60-80-page monthly magazine. We cannot but feel some pride in the achievement, especially when so much doubt was expressed, when we started the project, of the feasibility of publishing a journal devoted to the interest of amateur radio enthusiasts.

In the success, I have to thank all those who have assisted in the great work of running our Journal. Especially must I mention Mr. J. A. C. Cooper, the original Editor, Mr. G. W. Thomas, who did valuable work in years now gone by, and our present General Editor, Mr. J. Clarricoats. To mention the names of all who have given so generously of their best in the furtherance of THE BULLETIN would be impossible, and I can only thank everyone in general terms for their work.

While I am relinquishing active participation in the conduct of this publication, I shall greet each issue which comes to my hands with the same interest and enthusiasm, and hope that the support which I have enjoyed in respect of contributions and assistance generally will be maintained.

H. BEVAN SWIFT.

Rotatable Array Design

By Bryan Groom (GM6RG).

THE 28 Mc. rotatable array used at GM6RG, and recently described in this journal, has now been superseded by another. As the results have shown so great an improvement, and have so closely followed those aimed at, a description of the new array is now offered for publication.

After the old rotary had been put into commission it was found that, although the original design had been adopted with the intention of obtaining a very narrow angle of radiation, this condition had not quite been met. Results were very good, but since one of the points which it was desired to investigate was the effect on fading of a restricted vertical coverage, such tests were not possible. Added to this, there was a severe storm in Galashiels some months ago, and although the rotary was not damaged, it offered such a large surface area to the gale that it was tossed about in the most violent manner. As a consequence it was decided forthwith to make alterations. All the wooden lattice beams were removed except the heavy top central beam, which is enormously strong, and which, without the other lighter beams hanging on to it and being blown about, would presumably have stood the most severe weather. Along this top central beam have been erected nine self-supporting tubular elements, which compose the new array.

The particular design used has been adopted in order to radiate an extremely restricted signal at an angle of about 8°, with a minimum in every other direction. There is one driven element, six directors, and two reflectors, all at a height above ground of 48 feet, or nearly 1.5 wavelengths.

The Tuning-up Process

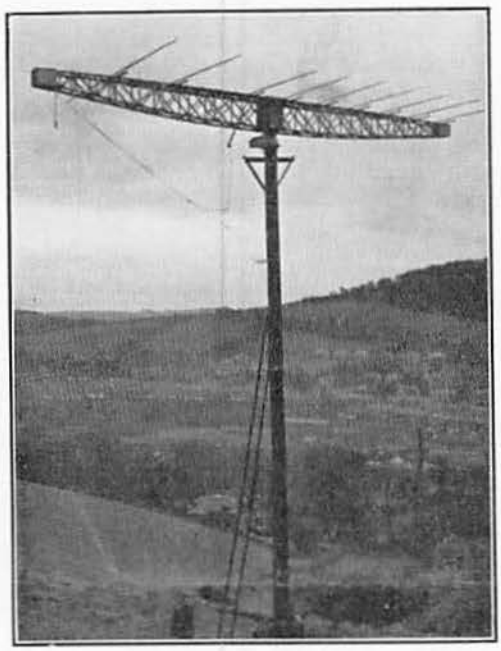
The tuning-up of such an array is one of the major difficulties encountered, and in the writer's case it was overcome by erecting a gangway under the main beam, the staying being carried out by ropes in order to avoid detuning of the aerial system. This can be clearly seen in the photograph. The centre 14 ft. of each of the nine elements was fixed securely in its correct position; then telescopic end sections were placed in the driven element as well as in the nearer of the two reflectors, and each adjusted to an approximate position. The feed line was coupled to the aerial, standing waves cleared, and the link at the transmitter end set to draw a given amount of power.

The beam was then turned to aim at GM5FT, situated four miles away in Selkirk, and who, with his HRO, gave all the readings from which adjustments were made. With Mr. Blair's aid, the aerial was brought exactly to tune, after which standing waves were checked, the link reset, and a first trial adjustment made of No. 1 reflector. Following each adjustment of all the parasitic elements, the aerial was rechecked, as were the input, and the transmission line. In that manner, rather gradually, was found the exact position of *maximum gain forward* of the nearer reflector, the driven element, and the first and second directors. Since these latter two were found to be the same length, the remaining directors were made the same length, and the array was complete except for reflector No. 2. This was separately adjusted to the point of minimum rear signal, everything else being ignored. This reflector had a very considerable effect on the rear radiation, but only gave the slightest help forward, as subsequent measurements showed.

Dimensions and Feed Line

The lengths of the various elements for a working frequency of 28,460 kc are as follows:—

Directors, 15 ft. 4 in.; driven element, 16 ft. 6 in.; nearer reflector, 17 ft.; further reflector, 17 ft. 1 in. The spacing is 3 ft. 6 in. between all directors, and between the driven element and the first director, 7 ft. between driven element and nearer reflector, and 5 ft. between the near and more distant reflectors. The feed to the aerial is made by open 470 ohm line, and "Y" match, with a rather complicated system of wooden arms and insulators, which do, however, keep the line absolutely matched in whatever position the beam may be. It has been found much more satisfactory with very high-Q arrays, such as this one, to feed with a "Y" match and open line rather than by the more usual method of breaking the centre of the aerial. With the latter method it is impossible to keep the feed system clear of standing waves during tuning, and hence all the adjustments must contain a fair amount of guesswork.



The top central beam, showing the nine self-supporting tubular elements which comprise the new rotating beam at GM6RG. Left to right: Six Directors, Driven Element, two Reflectors.

Practical Results

Having thus made sure that everything in the array was, as nearly as possible, in absolute tune, the first test call was made. It was soon found that the signal given to nearer DX, such as W1, 2, 3, was much the same as with the old array, which came as a pleasant surprise, but at more distant stations, such as those in W4, 5, 6, 7, 9, ZE and ZS, there was an astonishing improvement, the signal reaching a peak at about 5,000 miles. It is of interest to record that a ZE and a W5 commented on the fact that our transmission was practically steady, whereas other signals were fading normally, whilst in contact with ZE1JA, he stated that our variation was between 63dB and 66dB on his RME69, whilst his signals were fading from S7 to S2 on the HRO scale, using a long-wire aerial for reception.

Two other interesting tests may be mentioned which refer to the horizontal coverage of the beam.

(*a*) GM5FT had a length of wire in use as his aerial which gave a reading of two points in excess of S9 on his receiver, yet he could not copy speech with the beam aimed away from him. The signal dropped to S3 with the beam 22½° away either side, and disappeared out altogether as far as a reading was concerned at 30°, although speech could still be followed with the gain wide open. On further rotation away he could only faintly hear a signal with the beat oscillator in his receiver switched on.

(*b*) W2JCY could copy signals from GM6RG at a minimum of S4 with the beam turned in any direction, and at two points beyond S9 when it was aimed at him, the drop to S4 occurring in about 20°.

The writer has his own ideas on a possible explanation of this effect, which are not unconnected with his recent article "Round the World on 28 Mc." But perhaps there are others.

Future Programme

It is proposed to continue the tests and tabulate the results with some care, as it is felt that some interesting observations may be made during the next few months. The tests so far seem to confirm, what has long been the writer's opinion, that with a really restricted vertical coverage—ignoring altogether at what angle this may occur—fading is much less at the particular distance which this angle suits at the time of the test than with a wide vertical pattern. It is now up to some mechanical genius, with a very deep pocket, to set up some such array as the one just described, with means for *tilting the system as a whole*, when an optimum signal could be put into any area, the tilt being varied to suit the distance and skip, the latter partly dependent on the time of day.

For ourselves, since it is not possible to tilt the array, we are automatically confined to the very low angle, but this is most suitable for the tests, as it favours far DX, where fading is at its worst, and hence where any improvement is most noticeable.

Beating the Fade-out

Another result of this very low angle of radiation is the extraordinary manner in which it is possible to keep in contact with DX stations long after other Europeans have faded out altogether, always assuming that the station being received is also radiating at a low angle. One rather interesting example of this occurred during a contact with W1ELR, who uses a vertical aerial suspended from a 60-foot pole, and with whom contacts have been maintained until very late in the evening. When he finally started to fade out—the last of the W1 stations to do so—he still reported GM6RG as S9+.

It thus appears obvious that some effort should be made to restrict the vertical pattern of the radiated signal. This is not difficult to do on the higher frequencies, since rather more elaborate than usual aerial systems do not occupy much space. We might refer further in this direction to W2JCY, who uses a vertical system incorporating a single parasitic director, at a considerable height. His signal is also of the "first to appear, last to disappear" variety.

We are aware that certain U.S.A. stations use small arrays which can be tilted, but in the writer's opinion no benefit can be expected from this facility unless the *whole array* is remote from the ground, and is composed of a considerable number of elements.

The Editor and Headquarters Staff take this opportunity of wishing all members a Merry Christmas and a Happy New Year

An A.C. Bridge for Resistance, Capacity, and Mutual Conductance Measurements

By L. FRATER (2AZR).

IT is not the intention of the writer, in this article, to probe into the theory of the A.C. bridge, but to show how with simple tools and a little material and patience, an instrument which will be an invaluable addition to any station may be constructed.

Theoretical Considerations

By consideration of Fig. 1 (*a*) it can be seen that if we have a resistance network, consisting of a potentiometer R, a resistance R_3 of known value and an unknown resistance Rx, arranged as shown, and we apply a small A.C. voltage at, say, 1,000 cycles to A and B, a point S on the potentiometer will be reached where no sound will be audible in a pair of headphones, connected between S and the junction of R_3 - Rx. This silent point is very clearly defined, and under these conditions

$$\frac{R_1}{R_2} = \frac{R_3}{R_x} \text{ or}$$

$$R_x = R_3 \times \frac{R_2}{R_1}$$

It follows from this that, as we are aware of the value of R_3 (if the ratio of R_1 to R_2 can be determined) we can easily calculate the value of R_x. A large number of points or settings of the potentiometer can be found, corresponding to definite ratios, with nothing more complicated than a well-made voltmeter and a dry battery. Even these can be dispensed with by marking off a circular scale into a number of equal divisions, when, providing the change of resistance is equal for each division, the different ratios can easily be worked out. If, instead of resistances R_3 and R_x, we substitute C_1 and C_x as shown in Fig. 1 (*b*), the same calculations apply, and with the aid of the ratios already found, and a condenser C_1 of known value, the value of the unknown C_x can quickly be found. Here one pitfall will be noticed, namely, that the reactance of a condenser increases with a decrease in capacity, hence the scale will read the opposite way to that for resistance measurements. Furthermore, it may be found that the silent point is not very marked, due to a difference in power factor—*i.e.*, the unknown condenser may have greater or smaller losses than the one against which comparison is being made. However, this in practice is seldom a serious matter, and it is quite sufficient to adjust for minimum sound in the headphones.

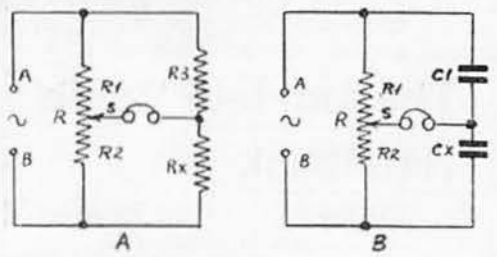
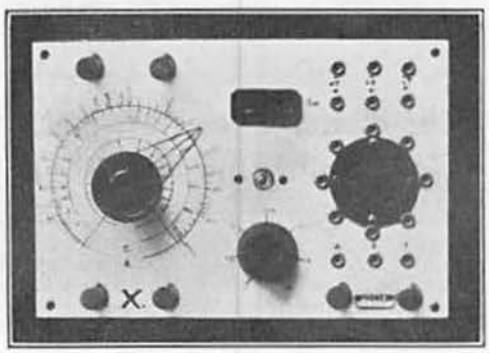


Fig. 1.
(a) Fundamental circuit for measurement of resistance.
(b) Fundamental circuit for measurement of conductance.

Inductance measurements can, of course, be made in the same manner, but, owing to the bulk of standard inductances, and other complications, it was decided not to incorporate any means to this end other than to provide a pair of terminals for the attachment of external standards if desired. By altering the circuit to that shown in Fig. 2, and applying a small A.C. voltage to A and B, a point on R can again be found where no sound is heard in the headphones. Under these conditions it can be shown that, provided R_3 is low in comparison with the anode impedence of the valve under test,

$$\text{Mutual Conductance } G_m = \frac{R_2}{R_1 \times R_3}$$



Front view of the A.C. bridge described.

Therefore if we know the total resistance of R, that is to say R_1 plus R_2, and the resistance of R_3, a series of values of G_m can be worked out for different ratios of R_1 to R_2. With this rather sketchy outline of the theory involved, an attempt will be made to describe an instrument on these lines which has been in use by the writer for over a year, and has amply repaid him for the work expended in its construction.

Practical Example

A glance at Fig. 3 will show the circuit of the completed instrument with a triode valve connected for test. Before any measurements of R and C are taken, all batteries, etc., connected with Gm measurements must be removed, otherwise large errors will occur. On the left is the valve oscillator which provides the necessary A.C. voltage for the operation of the bridge. This consists of a two-volt battery valve of practically any type, a small power valve giving excellent results, a centre tapped transformer made by rewinding a small *Igranic* "Parvo" choke with about 3,000 turns, centre tapped, and about 1,000 turns of 42 S.W.G. enamelled wire as the primary and secondary respectively, a grid condenser .01 μF, a grid leak having a value of 100,000 ohms, and a small pilot

lamp to suit the valve in use, this could be adjusted by trial with a small shunt resistance. It would be as well to mention here that almost any Class B output transformer will be found to function quite effectively. The only batteries required for the oscillator consist of a 9-volt grid bias battery which is used for H.T. supply and a three-volt bell battery for L.T. supply. Next we have to consider the actual bridge and its switching to alter the circuit and range. R_S is a seven-point rotary stud switch for changing the value of the internal standards. This connects to one side of the headphones, first one of the terminals for an external standard, and then in sequence, 100, 1,000 and 100,000 ohms, and .0001, .001 and 1 μF respectively. The various switches marked S are, in

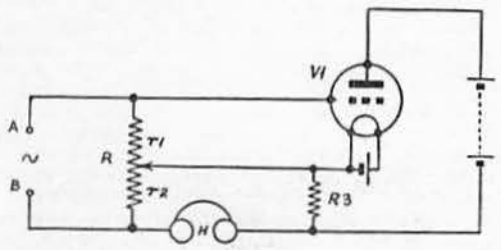


Fig. 2.
Fundamental circuit for measurement of mutual conductance.

reality one switch, and this, a four-pole double-throw, serves to effect the circuit changes from R and C measurements to these required for the measurement of G_M, and at the same time switch the oscillator on and off. R is the potentiometer which is carefully calibrated in ratios. The one used by the writer is an early type of *Burndept*, having a value of 1,200 ohms, but any good make would be suitable if near the same value and provided it is not a logarithmic or volume control type having special characteristics. The value stated may appear to be on the low side, and it is readily admitted that it curtails the range of measurements possible, but it was found that if a higher value such as 20,000 ohms was used, it was more suitable for R and C measurements, but G_M tests were useless at zero grid volts owing to grid current. R_M is a resistance having the same value as R—*i.e.*, 1,200 ohms, which is in circuit when G_M tests are being made, and serves to open out the scale. R_L is 10,000 ohms, its purpose being to stabilise the load on the L.F. oscillator, and also to keep the note steady when R is varied. The 9-pin valve holder shown was fitted with a view to flexibility, all sockets excepting the filament being connected to separate terminals, which consist of small sockets, so that with the aid of a *Bulgin* valve adaptor and jumper conections, any type of valve can be arranged for test, with the addition of external power supply. It should be mentioned here that, in the case of a SG. or Pentode valve, the screen must be supplied by separate H.T. battery or adequately de-coupled to the filament or cathode in order to affect the anode circuit as little as possible. This applies to any multi-electrode valve.

Construction

The complete unit is housed in a polished wooden box measuring 9 ins. by 6 ins. by 4 ins. The top panel is of ¼-in. ebonite covered with a sheet of ivorine on which the three direct reading scales are marked. These scales, the largest of which is for resistance measurements, are made by scribing three circles respectively 5 ins., 4½ ins. and 4 ins. in diameter round the potentiometer knob, and carefully marking with a sharp scriber small indicating lines about ¼-in. in length. These should then be carefully marked with small figure punches or neat figuring, and the figures and lines filled in with Indian ink. It should be noted that only three scales are really needed, and by numbering the range switch with appropriate multipliers, one resistance scale will cover the three ranges. The pointers consist of a strip of celluloid fixed to the bottom of the ebonite knobs with a thin line scratched along the middle and filled in with Indian ink. All the components are mounted on the panel, leaving only the batteries, which are mounted on the bottom

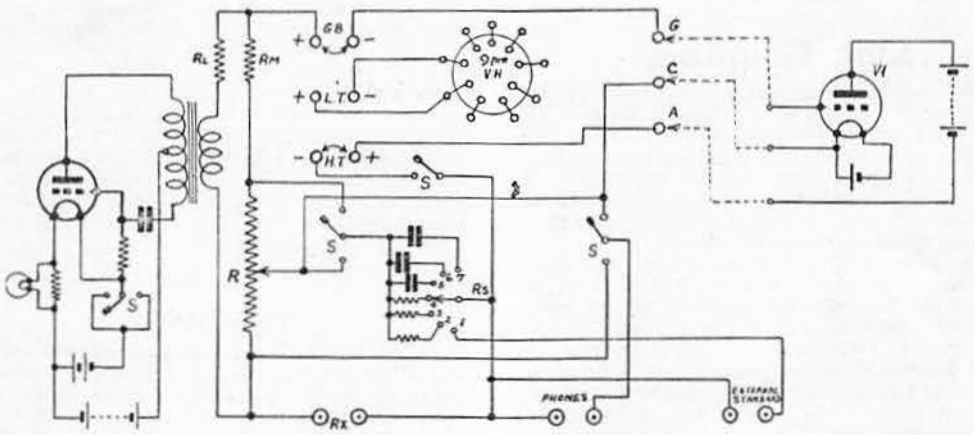
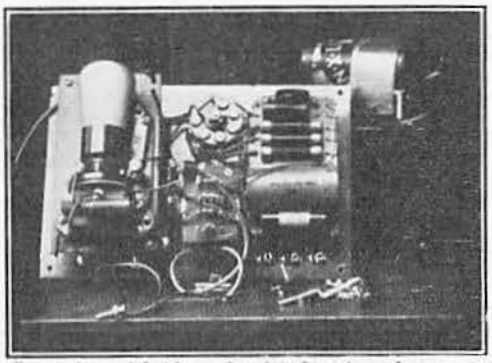


Fig 3.
Circuit and skeleton wiring diagram of the author's bridge set up for measuring the mutual conductance of the valve V1.

of the box. This is removable, connections being made by means of flex leads, an arrangement which makes for easy wiring, as the whole assembly can be turned face downward on the bench and connections made with ease. The resistors and condensers to R_x are mounted on a strip of paxolin and supported below the various switches by 1½-in. 4 BA B.A. screws. The L.F. oscillator is mounted in a



Rear view of bridge, showing location of parts and wiring.

similar fashion. This method of mounting components on sub-panels is very useful, especially when space is limited.

Capabilities of Instrument

The following measurements can be made with a degree of accuracy more than sufficient for amateur requirements.

Resistance : 2 to 500,000 ohms.
Capacity : .0004 to 50 μF.
Mutual Conductance : .02 to 10 milliamps per volt.

The capacity of dry electrolytic condensers can also be roughly measured if a polarising voltage is applied before connecting to the bridge.

Some technical readers may criticise the inclusion of G_m measurements, but the whole idea of this instrument was to make it cover a very wide field, keeping in mind that the cost of construction had to be kept down to a minimum.

Link Coupling

NOW that so much work is being done on the higher frequencies it seems strange that attention is seldom drawn to the benefits which accrue if really proper inter-stage coupling methods are used. The ubiquitous length of twisted flex is used in nearly all transmitters, regardless of frequency, with a childlike trust that it is doing a fine job of work.

Some time ago, when operation was first attempted on 56 Mc., it was found that adequate drive to the final simply could not be obtained, no matter what adjustments were made to the driver stage. Ultimately the short length of twisted flex was suspected and replaced by an open line. After various adjustments this was made to operate very satisfactorily, but since it has many disadvantages, which will be discussed later, this method cannot be considered as a good answer to the problem.

Completely ignoring previous experience, when building a new 28 Mc. transmitter, 18 ins. of twisted flex was used as the inter-stage coupling between an 807 doubler and an 808 buffer-amplifier. It was very soon ascertained that adequate drive could not be procured, no matter how much juggling was done with the link turns. Instead of the 30 mA. needed, 18 mA. was the maximum available. The grid leak was suspected, as were the 808, the grid coil and condenser, in fact everything except the twisted flex. Finally this was removed and other pieces were tried, but none showed any appreciable improvement.

The twisted flex was then taken out and two lengths of bare copper wire, covered with Systoflex, were twisted together, and connected into position. The drive at once increased to 32 mA., the 807 doubler being much more heavily loaded.

Now, even the manufacturers of Systoflex will admit, that for high-frequency work their excellent product is not absolutely ideal, so some other form of coupling was indicated, which would not require the use of separate insulation. The idea of open-line construction did not appeal, because the impedance is likely to change on turning sharp corners ; further, it can pick up on its own, whilst it is affected by the proximity of earthed metal. For these and other reasons it is open to criticism as an inter-stage coupling. The obvious answer was co-axial cable, and since some was to hand, a short length was fitted. The grid current went up to 45 mA. and a hurried adjustment was necessary to avoid damage to the 808. Subsequently the job was carried out properly, with the outer conductor earthed.

A more perfect link it is impossible to imagine, since it is subject to none of the faults of the open-line. The obvious moral is, pay more attention to the coupling used between the pick-up coils themselves, and start out by regarding all twisted flex as more than suspect. GM6RG

A 56/28 Mc. A.C. T.R.F. Receiver

Since publishing details of the above receiver in last month's BULLETIN, a further improvement has been effected by altering the control of reaction in the detector valve from plain series resistance to the potentiometer method. This could be done very simply by merely connecting the unused soldering tag on the variable resistance to the chassis, but this would result in both a coarse control and in unnecessarily high wattage dissipation. The method adopted was to connect a further resistance, which may be a *Polar* 25,000 ohm 2-watt type, between the tag on the potentiometer and the chassis. Reaction control then became exceptionally smooth, whilst the potentiometer only warmed up very slighty after a long period of use.

G5JU.

Trade Notice

Pilot Radio, Ltd., 87, Park Royal Road, London, N.W.10, will send a copy of their new Transatlantic Wave-length Chart to any interested reader. The chart is a novel device for selecting the most suitable broadcast frequency for transatlantic reception at any period of the year. The chart is based on one which appeared in *The Wireless World*.

Transmitter Theory Applied to Practice

Part II.—ELECTRON-COUPLED OSCILLATORS.

By S. O'Hagan (G2CR).

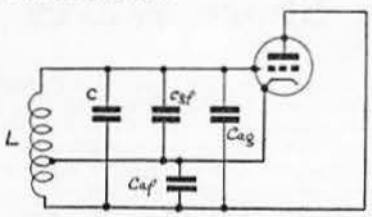
AN electron-coupled oscillator is a derivative of the Hartley circuit and, like it, is prone to parasitic oscillations. Thereon depends much of the well-merited criticism that it earns.

Since it is useful to have a continuously variable frequency, some tuned-circuit arrangement would appear imperative and the theoretical simplicity of the E.C.O. makes it attractive. All that remains is to devise ways and means of overcoming the incidental troubles which are encountered.

Components

The frequency and stability of an oscillator depend primarily upon the "goodness" and stability of the tuned circuit. It therefore behoves us to use the very best components. The "short-wave" types of variable condenser are frequently unsatisfactory, through side-play at the single bearing. In the writer's opinion the best condenser for the job is *Messrs. Cyldon's* Log mid-line type; in this, the frame is rigid and the vanes thick, and supported by two substantial bearings. The coil must also be the best obtainable. Thick wire, well secured on a low-loss former, is essential. For oscillators of frequency lower than 7 Mc., the use of Litz may be good. This has a much lower R.F. resistance than plain wire, but each strand must be soldered at every connection.

In order to prevent stray capacities having much effect and to minimise the effect of the temperature co-efficient of the inductance, there must be a high C/L ratio in the control circuit, whilst to enable accurate calibration and ease of band-spread, separate band-setting and band-spreading condensers should be used.



Basic Circuit of Hartley Oscillator.

Having devised a good, permanent, tuned circuit, wired up with rigid, non-vibrating wire, it must be kept in a state of oscillation, and this is done by means of a triode the grid of which is connected to one end of the tuned circuit and the plate to the other. The cathode is tapped part of the way up the inductance.

The valve is excited at the resonant frequency of the "tank" circuit, from which it takes energy on its grid, and in return it feeds back energy which is more or less correct in phase and amount, to maintain oscillation in the tank.

The valve has inter-electrode capacities which are effectively across the tuned circuit and its cathode tap, as shown in the diagram. But these may be neglected and compensated for by a reduction of the main tuning capacity, provided they are constant in amount. In addition, its grid losses, due to actual and virtual grid current, can be represented as a resistance, R_{gf} across the circuit between the cathode tap and the grid end.

General Considerations

The anode impedance of the valve shunts the lower portion of the tuned circuit between the cathode tap and the anode end of the tank, and also couples loss into the circuit. To minimise anode damping in the tuned circuit, the cathode tap should be as near the anode end of the coil as possible. The position of the tap controls the amount of feed-back to the tuned circuit, and a limit is reached, beyond which oscillation ceases, through the grid loss exceeding in amount the energy fedback. This limit can be retarded by reducing all the losses in the tuned circuit, *i.e.*, in condenser, coil, valve and grid leak. Even then maximum stability will occur when the circuit is only just oscillating.

The losses in the tuned circuit itself are fairly small if the coil and condenser are well made, but they can be greatly increased by using a low-resistance grid leak; hence it is desirable to make the grid resistance as high as possible. This, in turn, means that the circuit may "squegger" unless the grid condenser is correspondingly reduced.

If we then have a Hartley oscillator, with its damping reduced to a minimum and its feed-back correspondingly reduced to give fairly weak oscillation, maximum dynamic stability will be obtained.

The needs of mechanical stability are strong, short connections and small valve electrodes rigidly supported—the metal 6K7 and 6J7 valves are ideal.

For thermal stability, the whole system should rapidly become of stable temperature when first switched on, and the purist should also consider the temperature co-efficient of his coil and condenser, etc. This suggests that it would be good to leave the oscillator running throughout the operating periods and that an absolute minimum of power should be used in it.

Screening

Trouble is immediately encountered when we try to obtain power from a stable oscillator of this type, because coupling any other circuit to it will stop the oscillations unless feed-back is increased, in which case stability suffers. The electron-coupled oscillator minimises this trouble by utilising the excess electron stream of a screened-grid valve of which the screen is used as the anode of an earthed-plate Hartley. This is possible because the high magnification of such a valve requires only a very small grid-driving power.

In this circuit the screen is rendered at earth potential to R.F. voltages and thus screens the control grid and cathode, which take up a high R.F. potential, from the anode proper, which is also at high R.F. potential.

It is therefore desirable to use a valve with good

internal screening and to reinforce this with good *external* screening. Top-plate valves are convenient in this respect, but are not available in "metal," consequently their mechanical stability is inferior, as is also their thermal stability. If this screening is in any way imperfect, the tuning of the anode circuit will drag the oscillator frequency and will nullify any accurate calibration. This trouble can be partially overcome by extracting only harmonics from the anode circuit, but since they are all very weak when the oscillator amplitude is small, this results in low efficiency with resultant heating of electrodes. It is completely avoided by *choke-coupling a following screen-grid stage*, so that there is no tuned circuit in the oscillator's plate circuit. This gives a drive to the following stage which, although small in amplitude, is rich in harmonics, thus enabling this stage to give good harmonic output.

Desirable Features

Bearing these points in mind, an efficient E.C.O. drive unit must have at least two, and probably three, stages if it is to give output similar in power and stability to that of a crystal unit. It must have an excellent tuned circuit, rigid, and of high C and Q, not appreciably damped by the valve or external influences. This entails good rigid screening at a reasonable distance from all live parts. The oscillator is to be followed by a screen-grid isolator stage, giving a small output with excellent isolation and consistency from band to band. This in turn drives an amplifier comparable in rating with a crystal oscillator. Whilst choosing valves, it may be mentioned that the 6K7-6J7-6L6 combination is very good and will drive a P.P. final to well over 100 watts.

Power Supply and Regulations

The voltage regulation of the power supply to the E.C.O. is not so important as in the case of a simple Hartley oscillator, but nevertheless every effort should be made to stabilise it. This may be done by the use of a neon bulb without a stabilising resistor in its base, connected in parallel with the oscillator anode feed, and a resistor in series with the common H.T. feed to both. The anode supply for the isolator stage can be obtained from the higher voltage supply for the power amplifier stage, either with or without a dropping resistor.

Keying

Keying, if need be, can be performed in the oscillator common negative, but this tends to cause chirps and, by varying the heating of the electrodes, is likely to unstabilise the unit. It is not necessary to key the oscillator to work "break-in" because, in view of its low power, it may be effectively screened and allowed to run throughout the operating periods. Keying is then performed in the isolator or amplifier stages. Keying the suppressor grid of the isolator stage, although theoretically unsound (since it influences the anode load of the E.C.O.), is quite satisfactorily and will give clean keying, free from spacer, provided everything is well boxed up and all power leads filtered free of R.F.

Summary

From the above it will be obvious that the E.C.O. is not a "cheap way of saving a crystal," but rather a piece of precision apparatus which should only be built by those who are acquainted with the problems involved and are prepared to go to considerable trouble and expense in working out a design, and rigidly building to that design. When, however, it is properly built it can be relied upon to be as good as, or better than, the average amateur band crystal oscillator.

The author is at present working on a design which it is hoped to publish in the near future.

Reception Conditions on Short Waves

By G. S. Woollatt* (2DGB).

THE recent violent magnetic storms and the subsequent Dellinger effects have brought to light much valuable information from amateurs on the effects on short wave reception, and many interesting predictions and suppositions have been put forward. The writer, without any knowledge of these storms and of the theories relating to wireless reception, commenced, in January of this year, to draw up a series of charts on which curves were to be plotted, relative to various natural variations regarding the reception of amateur transmissions. The graphs were compiled from the following data :—

(*a*) Average S strength of received signals.
(*b*) Skip distance—in thousands of miles.
(*c*) Noise level—S strength.
(*d*) Barometric pressure in inches.
(*e*) Fading.

For the purpose of these experiments, the 14 Mc. band was chosen, this being the most consistent band for signals of some sort under practically any conditions. Set periods were chosen for the listening tests, viz., 9-10 p.m. and 7-7.30 a.m. in the winter months, and 10-11 p.m. and 7-7.30 a.m. in the summer months. Reception was first carried out on a home-built five-valve T.R.F., with two tuned R.F. stages, fully regenerative, and this proved to be very effective. A little difficulty was, however, found in correctly estimating the S strength of received signals. Subsequently an R.M.E. 69 with a D.B. 20 pre-selector has been in use, and the T.R.F. is now employed as a check receiver.

During the specified periods the band was searched very carefully and copious logs and notes made. The chart for the barometric pressure was filled in at the time of the checks and the notes and logs were gone through daily and entries made as follows :—The average S strength of the stations recorded in the log was taken as the S strength for the chart, care being taken to exclude in the calculation, any exceptional reception such as a ZL at S 2 appearing amongst, say, forty W stations at S 8-9. The whole system of the calculations is based on averages, and the writer has arrived at the conclusion that this is the best method to adopt.

The recording of the skip distance was simple, the exceptions again being excluded. In the case given above, no notice would have been taken of a 12,000 miles ZL signal and skip would have been put down as 3,000 or 6,000 miles, this depending

* Member R.E.S.

on the number of W6 stations heard. Again, a log showing SM, SP, CN, FA, SV and D would be charted as 1,000 mile skip.

Fading has been recorded fairly correctly by the non-use of the A.V.C. on the R.M.E. 69, and noise level and signal strength by the use of the R meter. Although 100 per cent. laboratory exactness is not claimed by the writer, the results appear sufficiently accurate to warrant a continuance of the records on a more ambitious scale for a further period.

Results

Let us now examine the results of four months observations. The most striking point is the very distinct relationship between the average signal strength, skip distance and barometric pressure. These three graphs follow each other in their ups and downs with fair accuracy and, allowing for a certain percentage of error in the collection and

collation of the relative data, it would appear that signal strength and skip, not taking into account exceptional reception, does really vary in sympathy with pressure. In other words, as the pressure rises, the reception improves and *vice versa*. The query arises here, why is reception better in winter than in summer? The answer is, that, during the summer there is another factor which governs the passage of radio frequency waves from point to point.

During the periods of Aurora Borealis and sun-spot activity the charts show a low reception level, high noise levels and, strange at first sight, a long skip distance in one instance. This was due to South American stations coming over very well when everything else was apparently dead. During periods of sun spot activity and magnetic storms, there should always be a chance of receiving South American stations in the British Isles, as the path taken by these signals is North and South and not in the vicinity of the Poles. Magnetic storms are centred near the Poles and consequently any radio frequency passing in the vicinity is greatly attenuated. Hence the complete fade out of the North American route.

Another point to consider is that transmission along a longitude is always more reliable than on a latitude, as the signal does not pass from day to night or *vice versa* as it does on East to West routes. No frequency has yet been found which is equally efficient under both conditions. The Heavyside layers in the region of the Poles during severe magnetic storms, undergo variations as yet unknown which considerably attenuate radio frequencies. During the summer months, the sun has a greater adverse effect on the ionised layers in the Heavyside region, and the attenuation of radio frequencies is always greater in summer than in winter. This is sufficient to show the very varied fields of research which are still open in this section of radio.

Another point which is brought out from a study of the charts, is that periods of minimum reception, with one exception occur at intervals of about 26-29 days. Allowing for small errors of cartography and recording, this would appear to follow the 27½ day cycle of the sun. If one assumes a group of spots on the face of the sun to maintain a definite effect on the Heavyside layer, it follows then, that the maximum activity of these spots will affect our reception when they appear on the face of the sun opposite the earth, this being every 27½ days (the time of rotation of this body). Additional sun spots will, of course, produce additional periods of poor reception and magnetic storms, but, generally speaking, the above appears to hold good.

In the original charts the writer marked the phases of the moon with a view to investigating

(*Continued on page* 378)

The Beam Aerial System at ZE1JA

By PHIL MOORES (ZE1JA)*

AS a result of employing a rather special type of bi-directional beam aerial the writer has been successful in obtaining consistently good telephony contacts with Great Britain on 14 Mc. using an input of around 35 watts. In view of the interest which has been shown, it has been decided to offer for publication this brief account of the array.

Before dealing with the more practical aspects, it is perhaps desirable to give some details of the site of ZE1JA, mentioning at the same time the more obvious difficulties which had to be surmounted.

The Site

The writer's station is located on property owned by *Messrs. Cable and Wireless, Ltd.*, at Salisbury, Southern Rhodesia which, as many readers know, is the site of one of the main Empire Beam stations. This station is located at a height of 5,000 feet above sea level, and directly *behind* the beam at a distance of 480 feet is the site of ZE1JA!

The Salisbury Beam, which is directed on Great Britain, consists of a curtain of vertical Franklin Uniform aerials 160 in number, over 1,300 feet long and supported by three steel lattice masts 260 feet high. Consequently, any transmission from ZE1JA to Great Britain must pass *through* this network if we assume that high angle rays passing *over* it would not give a consistently good field strength at such a distance.

Initial Experiments

Initial experiments were carried out with vertical aerials. The first, an inverted V, gave poor results on the Daventry short wave broadcasts, so that when the transmitter was ready for testing a half wave vertical was erected, and Zepp fed from the bottom. This type of aerial had given remarkably good results when the writer operated ZD8A at Ascension Island, but at Salisbury it proved a failure in so far as contacts with the British Isles were concerned.

As a result of these tests the conclusion was reached that *horizontally* polarised waves would undoubtedly stand a better chance of penetrating the Beam station curtain. Subsequent tests proved the truth of this contention. Various types of horizontal aerial systems were erected until finally the Beam array now to be described was put into service in December, 1937.

The Present Array

The array, which is approximately 100 feet long and 50 feet high, consists of two simple Franklin Uniform aerials in phase, centre fed and spaced a physical half wave length one above the other. The array is fed at the bottom for convenience, the feeders between the two elements being cross connected bottom to top in order to bring the elements into phase. There would, of course, be no objection to feeding from the centre point of the feeders connecting the elements, but bottom feed is invariably more easy to arrange.

* *P.O. Box* 1087, *Salisbury, S. Rhodesia.*

The array is similar to the H array of four half waves in phase, but no comparison with this array has yet been carried out, although this will follow in due course. It is believed, however, that some gain is likely to occur as the current in the Uniform aerial is constant over most of its length.

The standard Franklin Uniform aerial is invariably operated in a vertical plane, when the dimensions become very complicated, especially if it is to radiate its maximum lobe at the optimum angle in the vertical plane for long distance work. In the case of the horizontal Uniform aerial the dimensions are much simpler as the system is symmetrical with respect to ground.

The design of the Franklin aerial is dealt with by Ladner and Stoner in *Short Wave Wireless Communication*, but briefly it can be said that it attains almost to the ideal of a Uniform current aerial because the folded portion results in radiation over the whole length of the wire. Radiation from the tips of the folded or phasing portion cancels radiation from the tips of the adjacent wires, but this is not of consequence as maximum radiation occurs at current antinodes. Fig. 1 shows the current distribution ; the shaded portions mutually cancel.

The effect of this uniform current distribution appears to be to concentrate the radiation at right angles to the aerial which is, of course, an advantage.

Practical Details

Each element is folded as shown in Fig. 2 and cut to the dimension given. To the actual aerial are added make-up pieces of similar wire, but insulated from it. These make-up wires which are shown dotted in the diagram join up points BI, CH, etc. At the centre (point X) the wire is cut and a separator inserted. This is the feed point from the transmitter.

The array appears to work best with the spreaders lying in the horizontal plane.

Operation

The array is aperiodic over the 14 Mc. band working as well on 14,042 kc. as on 14,310 kc., but it does not appear to give good results on 28 Mc. Tests on 7 Mc. have yet to be conducted.

The beam is undoubtedly sharp, because stations 30° off the edge report a pronounced loss. It is

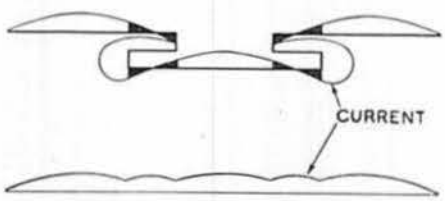


Fig. 1.

Current distribution in a 3λ/2 uniform aerial—upper diagram showing the current on the folded wire. The shaded portions cancel, giving the effect of the almost uniform current distribution shown below.

of course bi-directional without reflectors and appears to give a gain of about 10 dB along the beam, compared with a horizontal centre fed half-wave aerial.

Feeders and Coupling

The feeders from the array to the transmitter are about 80 feet in length. First experiments were made with direct connection, *i.e.*, no matching stub at the aerial end, but as it was found that neither series or parallel tuning at the transmitted

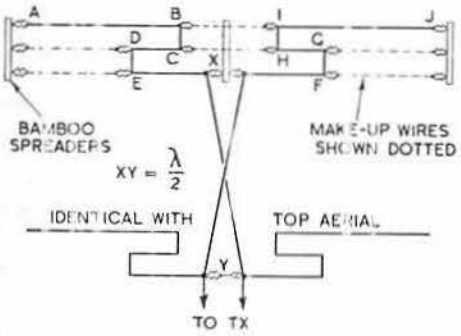


Fig. 2.
The assembly of the two 3λ/2 elements and method of feeding. Lengths are as follows:—

AB = IJ	*(½λ—2.5%)*	*= 1 foot*	*.69λ — 1 foot.*
CD = GH	*(½λ—2.5%)*	*= 2 feet*	*.21λ — 2 feet.*
EF =	*(½λ—2.5%)*	*= 2 feet*	*.71λ — 2 feet.*

BC, DE, FG, HI each 2 feet.
λ in feet may be taken as 984 ÷ frequency in Mc.

produced an optimum setting, it was decided to use a simple coupling coil. Tests with G6LL using the simpler method of coupling gave an increase in signal strength from S6 to S9.

Shortly afterwards it was decided to install a Collins Coupler in order to make loading more easy and to permit easier change-over to other aerials. This works very satisfactorily. As no definite current node exists on the feeders, the conclusion has been reached that the impedance at the feed point must be about 600 ohms. Probably with long feeders it would be advisable to eliminate any tendency towards standing waves by using a quarter-wave stub.

Conclusions

The writer would be most interested to hear from any reader who experiments with this type of array either as a single or multi-element. Further, he will be very glad to co-operate in tests.

F.O.C. NOTES

By K. Webster (G5BW)

It is evident from recent criticism that there is still misunderstanding in certain quarters concerning the constitution and operation of F.O.C., and for that reason we wish to make a few plain statements of fact covering the complaints.

At present there are fifty members of the Club, and of these about 90 per cent. are R.S.G.B. members. A considerable proportion are professional radio men, engineers, operators, or ex-operators, but this does not imply that it is an O.T.'s or professional's Club. Some of our members are not yet twenty years of age, but like all our members they have been elected solely on ability. First-class telephony stations are eligible for membership provided that they can comply with certain code qualifications, and do not operate exclusively on 'phone.

The most popular complaint is that we neglect experimental work for key pounding, but it is significant that none of our critics can name any specific cases. Many of our members are also members of R.E.S., and the fact that others are not, does not necessarily imply that they never do any experimental work. Several of our members have, in fact, done outstanding work in such fields as television, beam aerials, 56 Mc., etc. We are at present conducting a careful investigation into the experimental activities of our members, and so far, of the twenty cases dealt with, we find that eighteen are engaged on some definite line of experiment. The two exceptions are only temporary, and are due to special circumstances.

We are also accused of "cluttering up the bands" by giving "Morse lessons" over the air. Such being the case, we invite anyone to come forward and give full details of any example of this that may have come to their notice. We also particularly invite readers to note what response, if any, this challenge elicited! The fact is, of course, that we do *not* give "lessons" of any description over the air—advice may be given very briefly, but any "lessons" go *via* His Majesty's mails. If our correspondence is anything to go by, the information we impart is appreciated, and we are glad to note that already several amateurs have brought their operating technique up to first-class standard by acting upon it.

For the benefit of F.O.C. applicants who are unable, or find it inconvenient, to transmit on bands lower than 14 Mc. we have appointed a Committee Member abroad who will be pleased to work them on that band. The station in question is ZB1P, and the operator, Mr. C. J. Peach, who has had wide amateur and commercial experience, has the full confidence of our Executive. His address is Signal Section R.A.F., Hal Far, Malta.

By the time these notes appear in print the distribution of F.O.C. certificates should be completed. The engravers and printers have together made a good job of the finished article, and it is our sincere hope that they will adorn an increasingly large number of shacks in the future.

Members elected during the month are G6ZY and G6OI, and the total membership is now 50, a mistake having been made last month, when the total should have read 48.

Please address correspondence to Radio G5BW, Willingdon, Eastbourne.

Middlesex Association for the Blind

The above Association will be pleased to hear from any member living in the County of Middlesex who is willing to offer his or her services in connection with the repair and maintenance of wireless sets for blind persons.

All communications should be addressed to the Assistant Secretary, Middlesex Association for the Blind, 66, Victoria Street, London, S.W.1.

Reports Wanted

G2OB (Barnoldswick) on his 7,160 kc. C.W. transmissions.

Workshop Practice

PART 2.—DESIGN AND LAYOUT

By "Shack"

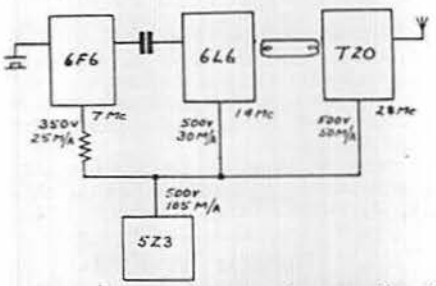
LIKE everything else in this life designing a piece of radio apparatus is a compromise between many factors, and to obtain the most successful result it is necessary to strike a balance between them. Radio circuits become more and more complicated every year till the average amateur despairs of ever keeping pace with developments and buys his apparatus ready made, losing all the joy of designing and building.

Modern circuit diagrams may be complicated, but they can be resolved into a number of simple sections each one performing its own function with respect to the remainder. Thus, to take the case of a four-valve B.C.L. superhet, the circuit might be a frequency changer, an I.F., a double-diode pentode and a full-wave rectifier. Draw out the basic circuit and it appears quite simple. Now add A.V.C., a tone control, coil switching for four wavebands, a gramophone pick-up and switching for an external speaker, and we have a formidable circuit diagram, but, knowing the functions of the various parts, we can dissect it easily. The various sets of coils round the frequency changer valve tell us that the receiver is intended to work on a number of wavebands, the gramophone pick-up and switching for the external speaker are obvious, but it might take longer to find the reason for the tone control and A.V.C. components.

The reverse process takes place when we start to design our own apparatus. We know what we want and we know, or should know, a good deal about the functions of the various components. Given a fairly good working knowledge of modern radio apparatus there is no reason why the home-made set should not compare very favourably with the purchased article, particularly transmitters.

The Basic Circuit and Components

In starting to build a new set the first thing necessary is to draw out the basic circuit diagram. Start with a block diagram—that is, show each valve as a square connected to the next square by the appropriate coupling symbol. Then add the type numbers of the valves, their filament, anode and screen voltages, and currents which it is estimated that they will require. From this diagram the full circuit diagram can be drawn and the power supplies estimated. Now comes the problem



When commencing to lay out a job start with a block diagram.

of fixing the sizes of the various components such as gridleaks, coupilng condensers, screen-dropping resistances or potential dividers and by-pass condensers. Some can be calculated from Ohm's Law, but in the case of screen-dropping resistances in transmitters where the current cannot be predicted accurately, resistors with an adjustable tap are advisable.

By-pass condenser values are often the cause of confusion even to old hands. The by-pass condenser is intended to remove the R.F. component in a circuit, leaving only the D.C., hence it should have a very low impedance to the frequency of the R.F. This naturally implies the largest capacity possible, but unfortunately all condensers have an inductive reactance besides the capacitative reactance, and this inductive reactance increases with the capacity. If too large a capacity were to be used then the inductive reactance would predominate, causing the impedance to rise, thus defeating the object of the condenser. A very interesting article describing some tests on by-pass condensers for 56 Mc. appeared in *The Wireless World* dated September 29, 1933, where it was shown that the most suitable size for this frequency is .0003 μF. For other frequencies the size should vary approximately inversely as the square of the frequency. This must be taken as a rough rule only and for lower frequencies the values can vary within relatively wide limits.

Transmitter gridleaks also vary in value, but should be higher if the valve is to be used as a frequency doubler than if it is to be operated as a straight amplifier. Here the value depends upon the valve and the amount of drive available, and is best determined finally by experiment.

Transmitter coupling condensers can usually be taken as about .0001 μF, although some designers use up to .001 μF.

Tuning circuit L/C ratios have been published in all the handbooks and do not need repeating here, but it is as well to emphasise that the capacity is the capacity of the whole circuit, including the valve, valve base, connecting wires, coil-holder, etc., and not just the capacity of the tuning condenser. This can make a considerable difference on 14 Mc. and higher frequencies where the stray capacities are apt to be large. Instead of calculating the capacity required it is better to design the inductance from a reliable formula such as "Radio Data Charts" by R. T. Beatty, M.A., B.E., D.Sc., and published by *The Wireless World*, or from the Abac given in *The Amateur Radio Handbook*. This will ensure that the L/C ratio is correct. In badly designed transmitters it is frequently impossible to make them operate above 14 Mc., when the only cure is a complete rebuild using more suitable components.

Before passing on to the actual layout it must be remembered that components are not selected to work as one item by themselves but as a part of the whole set. Thus a grid-coupling condenser in a speech amplifier must be considered in relation to

the anode resistance and the grid leak, which in turn depend upon the types of valves to be used, these in their turn being selected according to the gain required. Considerable latitude is usually permissible for most components, but in cases of doubt it is instructive to consult all the literature available dealing with the instrument under consideration, and to tabulate the values specified, taking careful note of the operating conditions.

Having settled upon the design of the set, draw out the full circuit in ink, adding the component values in red ink so that they can be seen easily. From this drawing an accurate estimate of the cost can be obtained, not forgetting such items as valve-holders, stand-off insulators, dials, knobs, terminal blocks etc.

Layout

Now comes the important matter of the actual layout on which success or failure so often depends. A word of sound advice—it pays to devote considerable time and care in determining the best position for every component. All too frequently the parts are grouped to give a nice symmetrical panel layout irrespective of the arrangement inside. A neat panel can accompany a sound electrical design but the chassis should receive first consideration.

If all the components are to hand spread them out on a sheet of drawing paper or piece of board slightly larger than the estimated chassis size. If the chassis is intended for a rack then mark two parallel lines to represent the ends. Play a game of chess with the components until all grid and plate leads are reasonably short, valves and condensers are out of the fields of coils, H.F. chokes are in safe positions. It will be necessary to play this "game" for the top of the chassis and also for the under side remembering that the latter will be of the opposite hand. This sounds very simple, but neither the first nor the second attempt is likely to be satisfactory. Light a pipe and sit down to consider the result, then sweep all the parts to one side and do it again without trying to remember the previous arrangement. It is surprising how many arrangements can be found, most of which appear quite good but usually have one or more bad points. Curing one poor arrangement often leads to other undesirable features, but it should be possible to get what is wanted with a little patience. If all the parts are not available use small objects of similar size like match boxes, wire spools or coins to represent the missing parts. Strong brown paper templates cut out to size are very useful, especially for the panel layout.

Before disturbing the "chess game," make a scale drawing, either full size or on squared paper, showing the positions of the large holes for valve-holders, dials, meters, coil holders, switches, outlines of transformers, valves, etc. Wiring holes should not be shown or the drawing will become too confusing. Coupling condensers, small resistors and by-pass condensers can be ignored, but they should not be forgotten.

To do the job properly two drawings should be prepared, first a plan showing all the components in outline and second a complete drilling plan, but these demand a certain amount of draughting skill. A celluloid stencil for 1-watt resistors, paper tubular condensers and R.F. chokes is easily cut with a sharp knife and can be very useful in drawing out a complicated circuit. It is possible to see at a glance whether or not an item will fit without drawing it. Finally, do not attempt to decide upon the chassis size or to drill a single hole until the drawing is complete otherwise it may be found that some vital component has been forgotten. Remember, it is very difficult to alter a metal chassis.

Wiring Up

Although, strictly speaking, wiring a set pertains to the actual construction rather than to the design the positions of the various wires must not be overlooked on the drawing. It is as well to start with the less important leads such as heater or filament, screen and suppressor-grid connections. These should be laid flat along the under side of the chassis if possible in the corners, where the capacity to the chassis will have no effect, leaving all the available room "up in the air" for the "hot" grid and plate leads. These latter should be as short and as direct as it is possible to make them. Further, they should have no more insulation, other than air, than is absolutely necessary. If insulation is essential, such as when passing through a panel, see that it is ample and of a suitable type if the conductor is to carry high frequencies. Small porcelain stand-off insulators make excellent feed through insulators if a hole is cut in the panel slightly larger than that in the base of the insulator, so that there is no chance of the wire touching the panel or chassis.

Circuit Details

An oscillatory circuit comprises only the coil and condenser, consequently it is very important that the connecting wires should not be smaller in cross-sectional area than that of the coil, otherwise the connections will introduce undesirable resistance into the circuit. The lead from the anode of the valve can be of thin rubber-covered flex, since it only carries the D.C. (plus the flick impulses) and not the very high oscillating currents of the tuned circuit. Further, if the anode lead is made the same size as the connecting wires, then it will impose an undue strain on the anode cap of the valve if a top anode valve is used.

It is very bad practice to wrap the connecting wires of the tuned circuit round the condenser terminals. Use soldering tags of ample size and see that the soldered joint is well done. Wires that are wrapped round terminals only present a line contact and will come loose in time, whereas a soldering tag which is properly tightened up will never come loose unless there is excessive vibration. The writer recently overhauled a transmitter which had been in continuous use for six years and found that practically all the terminal connections were quite loose, whereas the original soldered joints were in first-class condition.

R.F. Chokes

R.F. chokes should be placed outside the field of inductances and well away from each other, otherwise they are liable to cause magnetic coupling between two circuits, a fault which they are intended to prevent. If a choke has to be located near to a coil then see that it is at the centre and that their axes are at right angles. In modern practice with the coil mounted on top of the chassis the choke is best placed underneath where the chassis will act as an efficient screen.

Push-Pull R.F. Circuits

In order to function with the maximum efficiency a push-pull R.F. circuit must be arranged symmetrically, both with respect to earth and also with respect to the two halves of the circuit. This point is often overlooked and the majority of push-pull amplifiers are far from symmetrical. Draw a pencil line along the chassis and treat this as the datum point from which all components should be set off at equal distances both vertically and horizontally. The result will be a more efficient and a better looking set.

Condensers

In transmitters, small-sized mica moulded condensers can be suspended from the wiring, if care is taken to see that they are not liable to vibrate, but by-pass condensers are best screwed to the chassis. When metal-cased condensers are used for R.F. coupling they are best mounted on two small porcelain stand-off insulators, otherwise the capacity of the case to earth will by-pass a considerable proportion of the current. The small ceramic condensers recently introduced are particularly efficient at high frequencies and are excellent for coupling purposes. Curiously enough, they are not so efficient as mica at low frequencies so should not be used in audio amplifiers.

Ceramic condensers can be obtained in capacities up to about .001 μF with a test voltage of 1,500 volts A.C., so they should be quite capable of withstanding a working voltage of 500 volts. Either moulded mica or tubular paper condensers are quite suitable for screen by-pass condensers. Remember to keep all coupling condensers well away from the chassis or other connections. At least 1 in. spacing should be considered the bare minimum.

Resistors

Resistors should never be used in any circuit carrying an R.F. current without either a series R.F. choke or a by-pass condenser, or both, to divert the R.F. component away from the resistor. The writer once tried using a 3-watt carbon resistor as a grid stopper in a T61D circuit, but the resistor became nearly red-hot within a few minutes.

Transmitter gridleaks should have a good choke in series on the grid side otherwise the resistor will form a low impedance parallel path for the driving voltage, resulting in most of it being wasted. Further, the gridleak will overheat and possibly fail.

Switches

So far nothing has been said about switches in R.F. circuits, but as these aids to easy operating are becoming more common, a few words are perhaps advisable. All switches have some resistance, usually considerably greater than that of the connecting wire, and unless there is ample surface contact the losses will be very high indeed, resulting in low efficiency. Switch contacts will always oxidize, due to the moist atmosphere, and this oxide is a poor conductor, but if the switch is operated regularly the contacts will keep fairly clean. The insulation should be specially designed for high-frequency work, otherwise this will introduce further losses.

The small toggle switches which are designed as mains switches to carry about 3 amps. at 250 volts are quite unsuitable for R.F. switches. The contacts are much too small, the insulation is unsuitable and the capacity to earth is grossly excessive. Only the best switches, specially designed for the job, should be used.

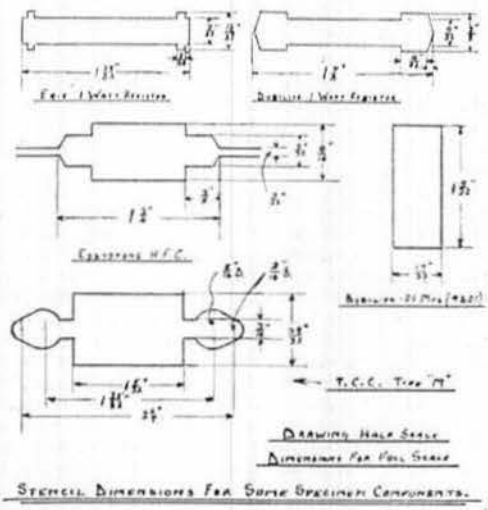
* * *

Finally, always keep a notebook handy and note down all calculations, diagrams and tests with full details, so they can be found instantly at a future date. It is surprising how useful these notes can be when some similar piece of apparatus is made later.

* * *

Stencil Cutting

To assist those who feel inclined to make stencils, dimensions of some popular components have been given in the drawing. These dimensions are the actual sizes to which the holes should be cut, as they are the size of the component plus 1/64 in. each way to compensate for the thickness of a sharp pencil point. Suitable thin, clear celluloid sheet



can be obtained from a coachbuilder. Mark the outline with a sharp scriber, drill the corner holes with a twist drill rotated between the thumb and first finger, cut the straight lines with a sharp penknife, and finish off with a small smooth file. In the drawing the wire leads have been omitted from the resistors, since these leads can be bent easily to any shape, but they have been shown on the H.F. choke. Also minor irregularities have in some cases been ignored.

British Isles Calls Heard

Eric W. Trebilcock (BERS195), Powell Creek North Australia. October 13-November 10, 1938.

14 *Mc. 'Phone:* g8cl, 8vc.

14 *Mc. CW.:* g2as, 2dh, 2dk, 2dx, 2gc, 2hw, 2la, 2lb, 2ma, 2mi, 2xw, 3bi, 3bs, 3dh, 3ih, 3jr, 3pg, 3ps, 5bd, 5il, 5kg, 5lp, 5my, 5rv, 5ug, 6gl, 6gn, 6mk, 6td, 6vx, 6wo, 6wy, 8bq, 8cv, 8ii, 8it, 8iw, 8jb, 8jo, 8kp, 8mf, 8tc, 8ud, 8wp, 8wv, Gi5ur, 6tk, 6yw, gm3ba, 5rh, 5sc, 5wt, 6iz, 8hm, gw3ax, ei4j.

28 *Mc. 'Phone:* g2hk, 2zv, 6dh, 8dm, 8uv.

28 *Mc. CW.:* g2cr, 2lb, 2mv, 2ws, 2xc, 2zv, 5ov, 5sr, 6cl, 6dh, 6dp, 6ks, 6nf, 6qx, 6wy, 6xl, 6yl, 8jv, 8mh, gm6xw, 8fr, 8mj, 8sv, ei5f.

Soliloquies from the Shack

By Uncle Tom

The worn-rimmed poodle's bark seems a little more hoarse, if anything, since it is awakening from a year or two of deep sleep. As for his bite—perhaps he'll catch a fish or two this time.)

Well, well, nephews and nieces and all the little triplets (I mean the G3's): it you aren't all there still doing much about the same old things and making the same old noises! It's about a year ago that I put the 'phones down and decided to give radio for a bit and now I pick them up again, and what do I find? Why, scores of G3's everywhere. A year ago there wasn't such an animal and now every other signal I hear on the old crystal set seems to be one. And one of them, let me tell you, can teach some of the Old Timers how to behave. We all know that little children should be obscene and not heard, but the G3's *are* heard and no mistake.

(And I hope nothing in the above paragraph has put anybody's back up, because the first paragraph of my new outbreak would be rather *early* to start, don't you think? I don't give a darn what happens in the second or third.)

Well as you have gathered, all the big noises of American Radio have put their heads together and out of that welter of grey matter has come only one red brain-wave, to this effect: "What we need is another dose of kick-in-the pants from Uncle Tom because the bands seem to be getting a bit dusty again." So here I am, a hired slave, commissioned to do a bit of rough stuff with all who do anything that is C.S.A.R. (Translation: "Contrary to the Spirit of Amateur Radio.") Hence forth, anyone heard modulating to the extent of 150 per cent. or calling test for five minutes, or talking balderdash on the air, or committing any of the other 777 deadly sins, will be duly declared a "Ceasar," or Member of the C.S.A.R. Club. F.O.C.'s only rival, and never the twain shall meet.

The first batch of members consists of G2 * *, heard at 1 ST 592 (or 591), asking another G whether his note was quite pure and steady; G6 * * who broke the test call record with 6½ minutes on the stop-watch; G5 * *, who called NST 4 times and signed three times with a different call-sign each time; and G8 * *, who made some remark about "another two volts on the microphone"—Old Timers will remember what is wrong about that. Sorry there isn't a G3 to complete the list but there soon will be, dads, there soon will be!

Everything on the old bands seems much the same as ever. I suppose we are all cranks in our particular category. I've heard and noted the QSL-maniacs, the new-country maniacs, the YL-phone-party maniacs, the 25 w.p.m.-of-nobody's-business-on-a-home-made-bug maniacs and all the rest of them. And don't imagine that your old Uncle sets himself up as the One Sane Man, because he's been absolutely crackers ever since the radio bug first bit him in 1922.

But he is *not* a member of the C.S.A.R. Club and he will continue to seize every possible opportunity of tearing the pants off those who are and those who aim at joining. Certificates of membership will be printed on asbestos and signed with human blood (if you can call my first victim human, which I doubt)

Speaking seriously for a minute, I might put on an infallible tone of voice and say that my job is going to be more difficult nowadays because the miscreants are less numerous. Several of the old nitwits seem to have learnt to operate since I last heard them and many G stations even go as far as to use "BK" and "QLH," "QHL," etc., which are signs of the birth of a microscopic intelligence. If there's any chewing up to be done this month, I am afraid it will have to be reserved for French "spitcat" stations (still pretty numerous), all Spanish commercials and quasi-commercials who sit on 7 Mc., and local BCL's who interfere with my humble 10 watts by sticking like glue to unselective receivers that ought to have been buried on the end of an earth lead years ago.

Talking of French and other Continental "spitcat," may I blow my own trumpet and declare myself the original inventor of that word? It seems to have got into the international vocabulary—if it ever gets into a dictionary I shall die happy. What a word

And now for details of the rig here. It consists of an egg-timer, a stop-watch which automatically carries on when the 3 minutes has elapsed, a frequency meter with harp spikes just outside each end of the band, a receiver which automatically screams with pain when a C.S.A.R. member comes squirting down the aerial, a rubber-contact key connected to a buzzer and a pair of Plasticene headphones for use on the key click merchants.

There is also the kettle, a tin of tea (for keeping awake when listening to duplex phones), a bottle of throat pastilles for mid-phone throat and, of course, the usual raspberry bush, carefully grown in a large flower pot. When the raspberries are in season, my little ones, I'll give you some nice ones. Come to think of it, I'll spare one now for all the 'phone operators who talk mincingly about "QR Morocco" and "Q Esses Baltimore" and the like. What we ought to avoid is anything that makes Amateur Radio seem ridiculous to the ordinary listener with a short-wave set and certainly all that mush does.

If your 'phone isn't good enough to get "QSB" over and you have to say "Q Esses Baltimore," why not, for the love of Mike, say "fading" instead It's easier to say, anyway, and it means what it says. Likewise "interference" is easier to say and sounds more civilised than "QR Morocco." If you want to use all the Doodahs, why leave the Q and the R in the middle? Why not say "Quite Ridiculous Nonsense" when you mean atmospherics, or "Quite Right Too" when you are going to stop transmitting?

And now I do hope someone will bite! I have to "Quit Rotten Typewriting" now, but I'll be seeing you all again soon I don't suppose. Up the C.S.A.R.'s—I'll take a pot at you

The Story of VR6AY

By Dorothy Hall (W2IXY)

Pitcairn Island—a dot in the South Pacific—made famous by the exploits of The Bounty, *came into the public eye recently as a result of the splendid work achieved by Dorothy Hall (W2IXY) on the one hand, and Andrew Young (operator of VR6AY) on the other.*

In this brief account W2IXY explains some of the difficulties which have been encountered since VR6AY first came on the air.

THE story of Pitcairn, as far as we radio amateurs are concerned, can be traced back to a visit to the island made by Alan Eurich (W8IGQ) during a world cruise two years ago. On his return to the States Mr. Eurich contributed an article to *QST* dealing with radio conditions in Pitcairn, and drew specific attention to the fact that the sole means of radio communication with the outside world (meaning shipping) was a prehistoric piece of gear which operated under the call PITC.

The amateurs of America were quick to appreciate that a service of great value would be rendered to this lonely British Colony if suitable modern equipment could be supplied. An appeal met with instant success, but almost immediately certain U.S. radio manufacturers saw the possibility of commercialising the idea. As they stepped in the amateurs stepped out.

The Author—W2IXY.

The *Coto Coil Company* offered to build a 60-watt transmitter from parts donated by other manufacturers, and that company made it known through the press that if financial backing was forthcoming, one of their engineers would accompany the gear to Pitcairn. Mr. Granville Lindley, lately returned from the second Byrd Antarctic Expedition, heard of this project and communicated with the Coto engineer, Mr. Bellem (W1BES). The Pitcairn Island Expedition was thus born.

Before leaving the States Mr. Lindley interviewed the N.B.C. with a view to arranging re-broadcasts, but they refused to consider the idea because of the low power involved. However, the promise to take a 650-watt amplifier soon settled the matter, and contracts were promptly signed.

Messrs. Bellem and Lindley arrived in Pitcairn towards the end of February, 1938, and on March 5 VR6A went on the air *sans* licence! Panicky engineers sent frantic messages to close down, and for several days VR6A was silent—but Pitcairn had spoken!

In amateur shacks throughout America and Europe the thrill of a contact was awaited, and then, early in April, the official licence, granting the call VR6AY, arrived.

During all this time Andrew Young had neither called or worked an amateur station, fulfilling the role of " guest speaker " with W1BES as operator.

Three days before the Americans left for the States, Mr. Young started to receive his instructions, using the 60-watt gear, but alas, the *Delco* plant, which had been called upon to operate the 650-watt amplifier, was soon to " go west " as a result of the heavy strain which had been put upon it. Messrs. Lindley and Bellem departed with the big amplifier on May 5, and Andrew Young was left with his rather tired battery charger, a 4-valve TRF receiver—and a schedule with W2IXY. The reason for the latter was that the writer had, ever since the station first went on the air, maintained regular communication with W1BES. As a matter of personal record the wives of the two Americans spoke from W2IXY, and numerous messages from friends were relayed *via* the writer's station.

On the second schedule after the Americans left, Mr. Young said his receiver was not working properly on the 600-metre band, but he battled along under difficulties, and never missed a schedule, which were now carried out at 4 a.m. New York time every other day.

During one of these schedules Mr. Young commented on the fact that no ship had called for some time, and in June he told us he had discovered that a false rumour had been started to the effect that there was typhoid on the island. On July 19 Mr. R. E. Christian, Chief Magistrate at Pitcairn, through VR6AY, asked the writer to obtain help, as supplies, medicine and petrol were running low. This information was passed on to the British Consulate in New York, whilst Mr. D. Williams, American correspondent of the *Daily Telegraph*, questioned Mr. Christian from W2IXY. As a result of this personal discussion he was convinced that something was wrong. Cables passed across the Atlantic to the British Colonial Office, and the world at large was aroused by the situation. On July 28 the *Akaro* stopped at Pitcairn, leaving flour—and gladness in the hearts of the islanders.

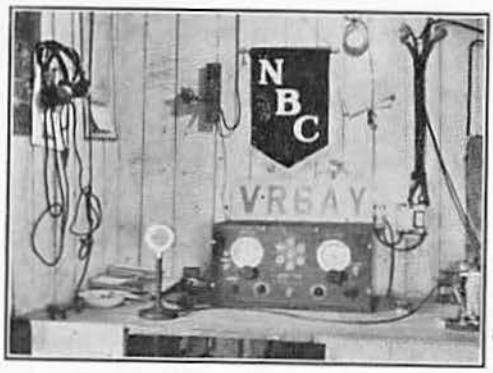
Andrew Young, VR6AY, standing at the base of the wind charger mast.

During this period a brief daily schedule with the island was maintained, but power had to be conserved. For this

reason it was not possible during May, June, July and August for Mr. Young to give contacts to the many amateurs who were anxious to work him.

A few words must be written concerning QSL cards. When the Americans went out they took with them 1,000 cards, but these had all gone in the first few weeks. Through the generosity of the *Kenyon Transformer Co.* a fresh supply of 5,000 cards has been sent to the Island, and all report cards will be acknowledged providing New Zealand stamps have been enclosed.

Andrew Young has, during his short amateur career, rendered yeoman service to his people, a service which will long be remembered in amateur circles. Unassuming and with little to talk about



Station VR6AY, showing the receiving position.

except ships, batteries and petrol, he has already endeared himself to all those who have been privileged to speak with him.

With the arrival of new *Delco* plant and petrol, VR6AY will soon be fully active again, and many an amateur will then be able to stick a pin in his shack map, on that spot of red which reads "Pitcairn Is. (Brit. Col.)."

Trade Reviews

50-Watt Universal Modulation Transformer

The transformer reviewed below is intended for use as a matching transformer between a single-ended or push-pull modulator and a choke modulated P.A. The manufacturers are *Central Radio and Television, Ltd.*

The transformer is of shrouded construction fitted with terminals and fixing feet and is about the size of the old *Marconi* "Ideal" L.F. transformer. The weight is about 2½ lbs. The rating is 25 watts maximum output with a maximum input of 50 watts to the modulator valve. Either winding is insulated to withstand 1,000 volts and rated for a maximum current of 100 mA. The windings are arranged so that symmetry is obtained when following a push-pull stage and an unused portion of the tapped secondary is not permitted to come between a used portion of the secondary and the primary or the inner core. The wire used is single silk-covered enamel throughout. The primary winding is centre tapped for push-pull operation and the sample tested had a primary resistance of 100 ohms. The whole winding is used for a single-valve modulator. The measured inductance of the primary without D.C. was 4.5 Henrys at 50 cycles with 3 volts drop.

The secondary winding has 4 taps arranged so that the ratios are in approximately geometric progression in order to minimise the matching errors. The ratios are 0.92, 1.04, 1.18, 1.30, 1.47 and 1.59 to 1. The measured total secondary resistance was 240 ohms.

The transformer was tested following a 4211D valve running at 900 volts 60 mA., matching into a P.A. of equivalent resistance 10,000 ohms. The whole primary was used and tests were made with D.C. in the primary and with choke output to the primary, *i.e.*, no D.C., with the following response figures where the drop in gain is compared with that at 1,000 cycles :—

Frequency Cycles.	No D.C. Loss in dB.	With D.C. Loss in dB.
25	—7.5	—9.0
50	—3	—5
100	—1.5	—1.5
200	—0.5	—1
1,000	0	0
5,000	—2	—2
10,000	—4.5	—4.5

These figures indicate that under the conditions of test the response is entirely satisfactory for speech, and only slightly down at the bass end for music, which is unimportant for an amateur transmitter. Using a lower impedance valve than a 4211D, the bass loss would be less and with a single-valve modulator it would be as well to connect the windings so that the D.C. in each winding is in the direction to cancel out. The bass losses would be rather higher if a high impedance push-pull modulator was used. The transformer can be recommended for use in transmitters and for its modest price of 17s. 6d. represents good value.

The same firm also manufacture to order a larger model rated at 100 watts at 27s. 6d.

D. N. C.

* * *

Messrs. Wilkins and Wright have recently introduced a short-wave three-gang variable condenser, incorporating ceramic insulation, which, with the bonding of the vanes, ensures negligible losses. The rated maximum capacity of each section is 87 $\mu\mu$F, which was confirmed by actual measurement, whilst, in addition, the matching of the sections was found to be extremely accurate. The measured minimum capacity was 2 $\mu\mu$F.

Mechanically, the condenser is built up around two thick aluminium bars, with the fixed vanes mounted on two small ceramic pillars, these being firmly secured in aluminium channel pieces. The spindle is of brass, and is mounted on ball bearings, giving a smooth yet firm movement without a trace of backlash. The whole forms a substantial, rigid component, eminently suitable for inclusion in circuits in which constancy of characteristics is essential.

Four feet are riveted on, thus allowing the condenser to be mounted on a chassis in a vertical position, the tags of the fixed vanes then being very accessible for short sub-chassis connections. Further tags are available on top of the condenser. To

(*Continued on page* 378.)

Snowdon Tests, 1938

By M. C. Crowley-Milling (2ACB).*

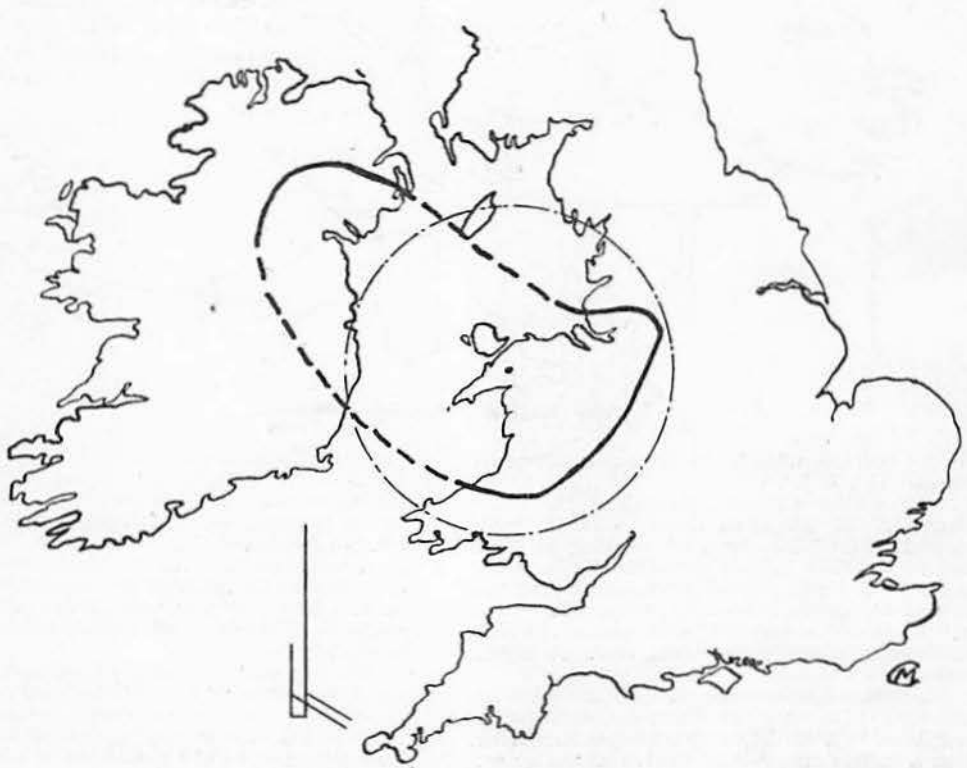
IN past tests from Mount Snowdon, the apparatus was, from necessity, of the simplest, but for the 1938 Autumn Tests it was decided to see what could be done with frequency stabilised transmitters and directional aerial arrays. Accordingly, several months were spent in building and experimenting to find the most suitable gear for the purpose. The tests were arranged to coincide with the G.W. 56 Mc. Trophy Contest, and a circular letter explaining the plans was sent to most amateurs who were known to be active on 56 Mc., in order that as many as possible might be participating.

With the usual last minute rush, the apparatus was loaded into the train at Llanberis on the morning of Friday, September 9, and arrived at the summit about noon, in fine and sunny weather. The beam array was erected without much difficulty, and the apparatus installed in the Summit Hotel before nightfall. The station came unto operation at 2015 G.M.T., when EI8L was heard working EI2J, and was contacted shortly afterwards (S9 phone both ways). This was the only contact that evening, although EI8L reported that EI2J, who was down in Dublin at the time, was receiving GW6AAP at S4. EI2J had been heard earlier, but contact could not be established.

Saturday morning was spent erecting the other three aerial systems, and the station was in operation again from 1400 G.M.T. almost continuously until 2200 G.M.T. on Sunday. A full log is given in the table at the end of this article.

It was unfortunate that the period chosen for these tests coincided with the "Harvest Moon" week-end, crowds coming from all over the country to see the moon, and the following morning's sunrise. On the Saturday evening a crowd of over two thousand collected on the summit, and a motor-car headlamp, worked from one of the accumulators, had to be used to illuminate the masts and stays, to avoid accidents. The writer was operating on the night shift, when some of the rowdier element in the crowd decided it would be a good idea to pull down the masts and aerials! After their kindly efforts, the only thing left standing was the vertical half-wave rod, and even that was minus its feeders! After much hard work all the aerials, including the beam array, were up and working at 0730 G.M.T., but a heavy mist which had sprung up during the night did not make this work too pleasant.

* Co-partner with GW6AA.



Polar Diagram. Half-wave Vertical.

Description of Apparatus

Two transmitters and three receivers were used, and a detailed description may be of interest.

The main transmitter consisted of a 6J5G crystal oscillator, operating on 28 Mc., followed by an RK-39, doubling to 56 Mc., and driving an *Eimac* 35T as power amplifier. The size of the power amplifier valve may seem surprising in view of the low input of 10 watts which was used, but this valve has been found to be one of the most efficient which is available for 56 Mc. work, apart from the " door-knob " types, which are rather fragile and difficult to mount for portable work, as well as being expensive. The only disadvantage of the 35T for portable work is the large filament power required (5v. 4a.).

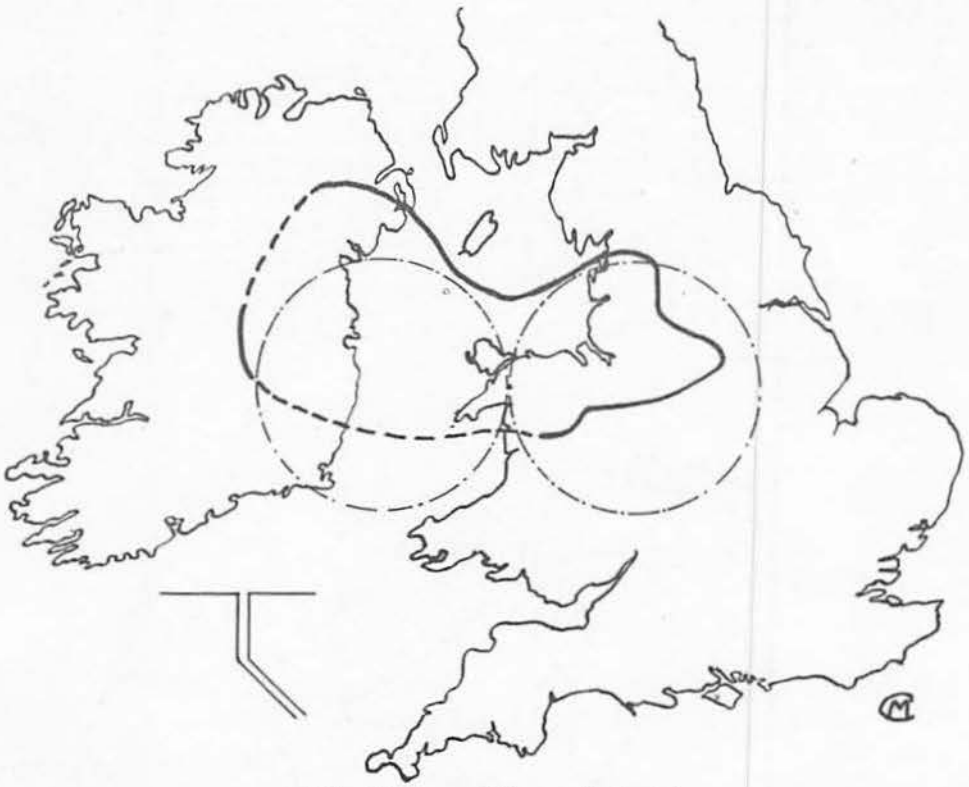
Link-coupling was used throughout the transmitter, as this has been found to be the most efficient and reliable form of coupling at these frequencies. The cathode circuit of the frequency doubler was keyed for CW work, and a 6N7 was used as a plate modulator for phone. This latter was driven by another 6N7 with plates and grids paralleled, preceded by a third 6N7. A crystal microphone was used.

A self-excited transmitter was used as a stand-by, consisting of a type '45 Ultra-audion oscillator, modulated by a '42, driven by a '76 speech amplifier, from a carbon microphone. This transmitter was also useful in determining the resonant frequencies of various aerial systems.

The main receiver used was a *National* " 1-10 " modified for CW work by the addition of a 3-Megohm grid-leak in parallel with the existing 25 Megohm leak, thereby turning it into a fairly efficient " straight " receiver. Many signals which were completely inaudible when the receiver was operated as a super-regenerative were heard when it was used straight. The second receiver was a self-quench super-regenerative of conventional type, whilst the third, a *Hallicrafter* " Ultra Sky-rider " super-heterodyne, was not used, due to difficulties with the vibrator for the power supply.

Power for the filaments and heaters of the transmitters and receivers was supplied by two 6-volt car type accumulators. Two similar 12-volt accumulators, in conjunction with two M.L. 400-volt converters, were used for the H.T. voltage supply to the transmitters. The accumulators were kept charged by means of a " Tiny Tim " petrol generator, which worked almost continuously, out of doors in the rain and mist, for over 30 hours without fault. The generator was located about 30 ft. from the receivers, and caused negligible interference.

The huts on the summit of Snowdon, used by previous amateur " expeditions," have now been removed, and the only shelter is the hotel, which is about 150 ft. down the western side. Past tests have shown this to be unsuitable as a location for the aerials, as it is badly screened in all directions except westwards, consequently the aerials had to



Polar Diagram. Half-wave horizontal.

be located on the summit, with long transmission lines to the apparatus in the hotel.

Aerials Used

The aerials used were as follows:

(1) A directional array consisting of eight half-waves in phase, with half-wave spacing, vertically polarised. This was suspended between two 24 ft. poles, fed with 150 ft. of 600 ohm transmission line, and directed along a line from Sligo, Eire, to South Foreland, Kent.

(2) A half-wave horizontal dipole, fed by a Johnson " Q " quarter-wave matching transformer, from 180 ft. of 200 ohm transmission line. Suspended 18 ft. above ground, in a north-south direction.

(3) A half-wave vertical rod, with quarter-wave shorted matching stub, fed by 130 ft. of 600 ohm transmission line, 12 ft. above ground.

(4) A half-wave vertical dipole, fed with 150 ft. of 75 ohm transmission line, 14 ft. above ground.

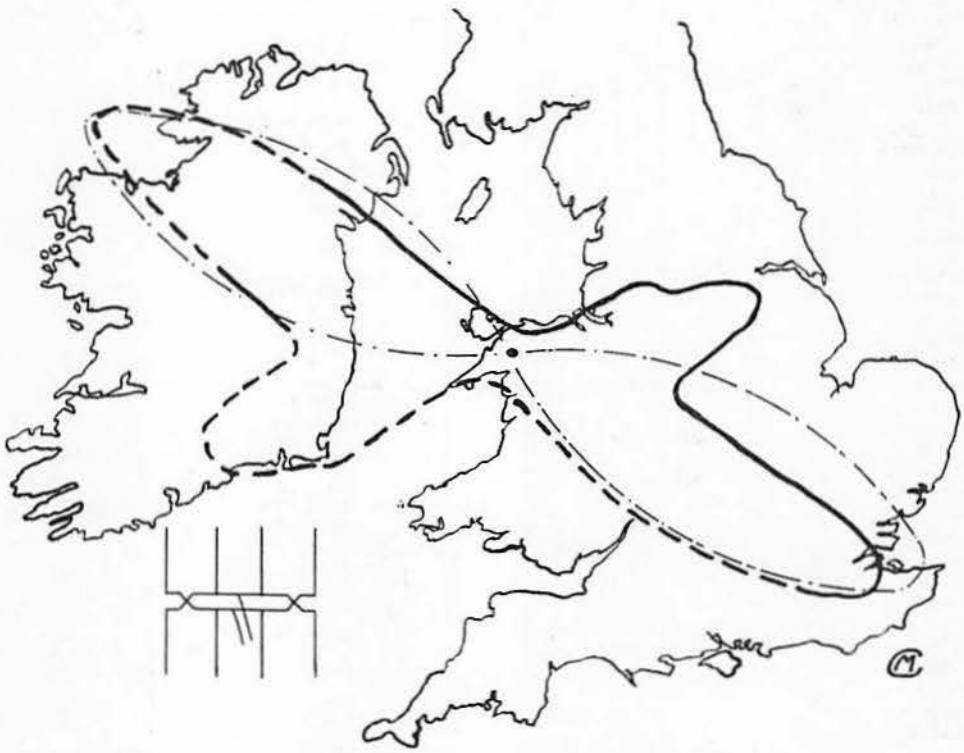
All the aerials, with the exception of the vertical rod, were supported by thick bamboo poles. These were found to be a great improvement on the 2 in. by 2 in. wooden masts used in the past, as they are lighter and stronger. Their value was demonstrated when they were pulled down by the crowd during the night; they were only slightly split, whereas the 2 in. by 2 in. masts would probably have been shattered.

As the summit of Snowdon is of solid rock, it is impossible to drive in stakes for the stays and guys, so these were secured to large sacks filled with stones, each weighing over a hundredweight. Fifteen sacks were used for the six masts. In addition, eight feeder supporting posts were employed, each eight feet high, the stays for these being fastened to out-jutting rocks.

Results and Conclusions

As stations were contacted in so many directions, it was decided to plot polar diagrams for the different aerials, based on the reports received. To further this work, reports were obtained from as many stations as possible on each of the aerial systems used. The points on the curves were plotted on the assumption that the field strength is inversely proportional to the square of the distance, which, though not strictly accurate, serves as an approximation for this purpose. The limit of accuracy of the curves is set by the accuracy of the reports, which are not usually in microvolts/metre, to three places of decimals! However, with all the errors, the plotted diagrams (heavy lines) agree surprisingly well with the theoretical diagrams (light dashed lines). The portions of the diagrams filled in with heavy dashed lines are assumed, as no reports were received from these directions. The diagrams are all drawn to approximately the same scale. As no attempt has been made to allow for varying attenuation, these diagrams give no more than an idea of the field strength which can be expected at any point.

The diagram for the beam array follows the theoretical fairly closely, except for the large lobe



Polar Diagram—Beam Array.

in the Sheffield direction. It is hoped to carry out experiments at a later date to determine its cause. The other two diagrams will be seen to have large lobes out in the North-West direction, showing the low attenuation over the sea path.

The vertical doublet, fed with the low impedance line, was not used, as a preliminary test on the Saturday had shown that although, this aerial "drew" well on the transmitter, reports were about two to three S points down on the other vertical, which was about the same height, and not far away.

In the writer's opinion, most of the solid dielectric low impedance lines are unsuitable for use at these frequencies, and best results have been obtained with two wire air-spaced lines, of between 600 and 200 ohms impedance. Large wire must not be used for 600 ohm lines, as the spacing becomes an appreciable fraction of a wavelength, 6 in. being the limit, and 4 in. is preferable. Matching "stubs," although inconvenient for portable work, have been found well worth while, as the efficiency is so high, when they are correctly adjusted.

The beam array fulfilled every expectation, and amply repaid the time and trouble spent in erecting and adjusting it. G6OT, G6XNP, and G5ML reported that signals vanished completely when the aerial was changed, whilst G5ML, G6GO, and G6LI could only be heard when using the beam.

Further evidence was found to support the theory that vertically polarised transmissions can be received on vertical aerials only, while horizontally polarised transmissions can be received on both horizontal and vertical aerials.

Summary

These tests have clearly demonstrated the great superiority, for long distance work, of crystal-controlled telegraphy transmissions, with straight or superheterodyne receivers, over "wobbulated" transmissions with super-regenerative receivers.

The receivers used in these tests, though good compared with the average, are by no means perfect, and it is hoped to carry out a further series of C.W. tests in 1939, using better receivers.

Appreciations

The operators of GW6AA wish to record their sincere appreciation for the valuable assistance and

(*Continued on page* 378)

Call	Maximum report		Aerial ured for max. report	Distance miles
	Given	Received		
		Stations worked		
EI2J	59 'phone	59+ phone	Vertical	118
G5ML	59 ,,	57 ,,	Beam array	117½
GI8TSP	59+ ,,	59 ,,	Horizontal	113½
G5TO	58 ,,	55 ,,	,,	112
G3FAP	58 ,,	55 ,,	,,	110
EI8L	59 ,,	59 ,,	,,	103
G2MF	58 ,,	44 ,,	,,	95
G8JVP	599 cw	599 cw	Beam array	90
G2HQP	59+ 'phone	59+ 'phone	Horizontal	88
G5ZTP	58 ,,	59 ,,	,,	86
G5KL	59 ,,	59 ,,	Vertical	82
G3BY	579 cw	559 cw	Horizontal	82
G2VG	59 'phone	58 'phone	,,	81
G6SQ	57 ,,	55 ,,	Vertical	76½
G5MQP	57 icw	58 ,,	,,	75½
G2WSP	58 'phone	59 ,,	Beam array	65
G6DP	569 cw	579 cw	,, ,,	59
G6MX	56 icw	59 'phone	Horizontal	53
G2XR	59 ,,	57 ,,	,,	52
G2DA	58 'phone	56 ,,	,,	51½
G8AAP	59 ,,	59 ,,	Vertical	49
G2OA	59 ,,	58 ,,	Horizontal	49
GW6OKP	57 icw	59 ,,	,,	44
GW5FUP	59 'phone	59+ ,,	,,	35
G6USP	59 ,,	59 ,,	Vertical	33
GW3GLP	58 ,,	59 ,,	Horizontal	21
GW5YB	57 icw	55 ,,	Beam array	16
		Stations heard but not worked		
G6GO	56 'phone		Beam array	130
G6LI	579 cw		,, ,,	122
		Reports received		
G6OT		349 cw	Beam array	208
G6XNP		559 ,,	,, ,,	178
G2GHP		57 'phone	,, ,,	169
G3MY		57 ,,	,, ,,	115
EI2M		59+ ,,	,, ,,	103
	And many others under 100 miles			

Stations Worked, Heard and Reports Received

Experimental Section

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

AT the November Council meeting, bye-laws affecting the Experimental Section were submitted by the E.S.M. in consultation with the G.M.'s and these were approved. The bye-laws are additional to the R.E.S. Rules.

The bye-laws, which are printed here, should be studied carefully, as they concern *every* member. The changes made have been decided upon after the most careful consideration, solely with a view to increasing the efficiency of the Section.

In bringing them into effect, the Council approved the following minor alterations to the general rules of R.E.S. :—

The Section will in future be divided into Advanced Members and Experimental Members, and all applications for membership will be required to satisfy the E.S. Committee *before* admission to the Section is granted.

Home members will be required to join as full Group members, and those outside Britain as Individual members. Under this arrangement, delay in the circulation of letter budgets, high postages, etc., will be overcome. This new arrangement will not prevent members living abroad from forming their own groups, especially if several reside in the same country, nor will it stop them from corresponding with any group in the Section.

The bye-law which restricts home members to join one group as their main study, will not prevent them from corresponding with any other group (or groups) if they desire to do so. Members may join more than one sub-group in the same group.

Experimental Section Bye-Laws

1.—The Experimental Section shall be controlled by a Manager appointed annually by Council.

2.—The Section shall consist of Experimental Members and Advanced Experimental Members who are fully-paid members of the R.S.G.B.

3.—The Section shall comprise four Groups, namely the Aerial, Propagation, Receiver and Transmitter Groups, each under the control of a Group Manager, appointed by the Section Manager.

4.—The Section Manager and the four Group Managers shall form the Experimental Section Committee.

5.—Those seeking membership in the Section shall apply in writing on the prescribed form. All applications shall be examined by the Committee before an applicant is elected to the Section and posted to any Group.

6.—Groups may, at the discretion of the Manager, be divided into Sub-Groups, each under the control of a Group Centre.

7.—As a general rule, only fully licensed members of the R.S.G.B. may become members of the Transmitter Group or the Transmitter Aerial Sub-Group.

8.—Home members will join the Section as Group members, and those resident outside Great Britain, as Individual members. The former will be required to report monthly, and the latter quarterly.

Group members who fail to report after a period of two months, and Individual members who fail to report after a period of six months, will warrant their membership of the Section being cancelled at the discretion of the Committee.

9.—The Experimental Section Committee may invite Home members to join as Individual members under certain circumstances.

10.—Group activity reports shall reach the Experimental Section Manager by the 20th of each month.

11.—Full length articles intended for publication should be submitted in the first instance to the Experimental Section Committee.

12.—Section members on election will be given a certificate, renewable annually, which will remain the property of the R.S.G.B. Renewal will be by adhesive disc or other method.

13.—Members whose contributions have been accepted for publication, or those who have carried out meritorious work, shall be entitled to be considered for recognition by the Council. Recognition shall take the form of a special certificate bearing the words " Research Holder."

Such members shall be entitled to describe themselves as " Research Award Holder " in correspondence.

The Experimental Section Manager may submit to Council recommendations for Research Awards bi-annually, in June and December.

Bulletin Notes

The policy adopted since the Experimental Section came into being will be continued. The E.S.M. will restrict his Notes to matters of general policy, regulations, etc., leaving each G.M. to give a brief outline of his Group's activity. This policy, in the opinion of the E.S. Committee, is considered best, because thereby all R.S.G.B. members will be informed as to the general trend of activity. It must, however, be kept in mind, that in devoting space in THE BULLETIN to Group notes, all unnecessary " padding " must be eliminated. When results are published, they will appear in the form of articles.

The Section has been criticised for not publishing sufficient data, but the Committee are of the opinion that little can be gained by premature publication of experimental work in hand. To give a case in point: one of the Receiver groups is at present experimenting with fixed as against variable grid condensers in super-regeneration receivers. When the experiments have been fully carried out and results proved, then (and not before) will be the proper time to give publicity.

Next month, as a reference, we propose giving a list of articles by E.S. members, which have appeared in THE BULLETIN to date.

Eclipse of the Moon

Full details are not yet available, but it would appear that, as expected, results were negative so far as wireless conditions were concerned.

Cosmic Data

Mr. E. J. Williams (G2XC), of Rochdale, London Road, Purbrook, Portsmouth, offers to supply a monthly Cosmic Data sheet to the G.C. of any Experimental Section Group free of charge on application, to E.S. members at ½d. per month, nd to non-members at 1d. per month.

G2XC states that Cosmic Data is broadcast daily in English from W1XAL, Mondays to Fridays, on 11.79 Mc. at 21.55 G.M.T.; from NAA on 9250 and 4390 kc. at 22.30 G.M.T. in International Morse (coded); and from FYL on 10,526 kc. at 20.15 G.M.T. (coded). He will send a copy of the code used on receipt of a stamped addressed envelope.

* * *

Propagation Group

The Magnetic Group is discussing the good conditions which are alleged to occur during magnetic storms, and evidence for and against is being collected. Various theories are put forward to account for the divergence of signals from the Great Circle Course. It has been noticed that good reception of K6 and K7 accompanied recent magnetic storms.

Extended Ground Waves are still being investigated by the 28 Mc. Groups. "Character Numbers" are found to be of great value in assessing the conditions on any particular day. In this connection it may be said that a similar scheme is planned for the other bands so as to give data readily comparable with meteorological and cosmic information.

Great enthusiasm is shown by the 1.7/3.5 Mc. Group members who have had schedules at all hours of the day and night. They are at present investigating changes in propagation conditions which occur at sunrise and sunset. A 1.7 Mc. subgroup meeting took place at Bristol on November 27.

GM6JJ.

eiver Group

Activity in the U.H.F. and T.R.F. Groups seems to be high, but it is still early to judge the work achieved, taking into consideration the setback caused by the crisis.

One or two useful ideas have come from the U.H.F. Section on the subject of hand-capacity, and these will be further investigated.

Although there is little to publish this month, the Receiver Groups in their small way are active and keen.

G5HF.

Transmitter Group

Activity throughout the Group is good, and letter budgets are circulating, with the majority of members contributing to them. A list of problems met with in transmitter design has been sent to each G.C., who will select one or more for consideration. The members in each group will be expected to conduct definite experiments connected with such problems. The resulting cooperation should benefit everyone as well as providing useful information for incorporation in articles.

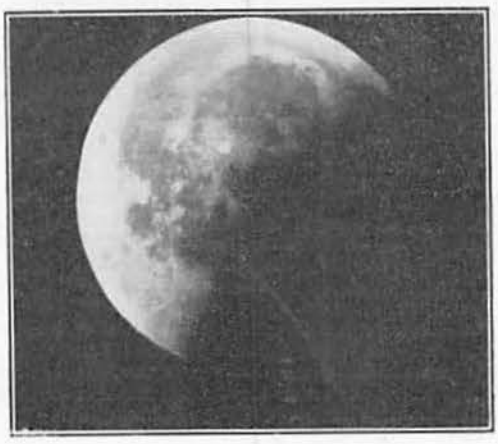
Mr. N. F. Byers (G8AF) has submitted an interesting report dealing with his experiments with 56 Mc. crystal-controlled transmitters, and a condensed version will appear in an early issue.

G5JU.

The Lunar Eclipse

Through the courtesy of Mr. Percy Murden, BRS3379, we are publishing two Lunar Eclipse photographs. Although of limited radio interest we are aware that the Propagation Group of the Experimental Section carried out observations during the eclipse, and we have no doubt the members of that Group will be interested in these "close up" views of the moon taken in North London.

Early Phase.—The earth's shadow is about to blot out the giant craters, Copernicus and Tycho. These "mountain-ringed plains" are shown in the photograph as centres of ray-like formations. Veterans of the Great War may muse on the fact that the diameter of Copernicus (upper half of picture) is 46 miles. Some crater!



Closing Phase.—A clear sky gave the camera a little more chance of getting sharper detail of the lunar seas and craters. Copernicus and Tycho have now been disgorged by the earth's shadow. The herring-bone line to the right of Copernicus is the Apennines, a mountain range with peaks rising to heights of over 15,000 ft.

Members who carried out observations during the Eclipse are requested to report results to Mr. Allcorn (2FIH), Group Centre of the Aurora Group.

By J. N. WALKER (G5JU)

Part XVI.—IMPROVING RECEIVER PERFORMANCE

AT this season of the year, with contests to prepare for, an overhaul of the receiver is desirable. It is therefore proposed this month, by way of a change, to give some hints on improving the performance of receivers. The suggestions which follow apply chiefly to battery-operated sets, but some are also applicable to mains receivers.

L.T. Battery Connections

Up to a year ago, there was no standard method of returning valve filaments to earth, some designers indicating the negative (chiefly in order to reduce the amount of grid bias necessary for the L.F. valves) and others the positive (so that the detector grid leak could be returned direct to earth). It is now standard practice to use the negative L.T. as the correct earth return and this method should be adhered to in all battery operated apparatus. By following this arrangement two or more receivers, monitors, etc., can be connected to common batteries without fear of shorting the filament cell.

To make this point perfectly clear, the chassis (or earthing terminal) should have connected to it the L.T. negative, H.T. negative and grid bias positive leads and, in addition, all the earth returns from coils, condensers and other components mounted on the chassis. The negative L.T. terminal of each valveholder can of course be connected straight to the chassis, thus saving some wiring, but it is essential to make very firm joints because looseness or dry contacts will result in a varying resistance. If poor contacts occur the valve will be deprived of a proportion of its filament voltage and trouble of a type difficult to locate will undoubtedly be experienced. The L.T. switch should be fitted in the positive lead and, to be absolutely safe, a fuse of the 60 mA. type and of reliable make should be included in the H.T. negative lead.

The performance of a battery valve falls off seriously, especially on the higher frequencies, if it is starved of its proper filament voltage and current. It is surprising to see the number of stations in which the L.T. battery is tucked away in a corner, and connections made to it by means of many feet of ordinary lighting flex. The voltage dropped in this type of flex is negligible when used in mains lighting but is certainly *not* negligible when only a single cell (often showing a voltage of less than two volts) is connected at one end. Thick power flex should be used, the ends being fitted with proper tags or connectors, and whilst a short length is desirable, a few extra feet will not then make much difference. The improvement that can be effected in the performance of a receiver by following this hint has to be realised to be appreciated. See to it also that the terminals of the accumulator are kept clean and covered with vaseline—a badly corroded terminal will introduce undesirable resistance. Finally, make sure that the accumulator itself is in good condition. Worn plates, a thick layer of sediment or weak acid will all help to reduce the efficiency of the cell.

Automatic Bias in Battery Receivers

Automatic bias for both the radio frequency and audio frequency stages can be incorporated in a battery receiver, although the method of obtaining it will of course differ from that used for a mains receiver. Auto bias possesses two definite advantages: (1) a separate grid bias battery is not required; (2) the bias is adjusted in proportion to the voltage of the H.T. supply. If the latter is a dry battery, the bias voltages are progressively reduced as the battery ages.

The circuit for such an arrangement is given in Fig. 1, with the essential components indicated. The value of R_1 is not critical and may be anything between 25,000 and 100,000 ohms; the same applies to R_2, which may vary between similar limits. The values of R_3 and R_4, which can be found by applying Ohm's Law, will depend upon the amount of bias required, and on the total

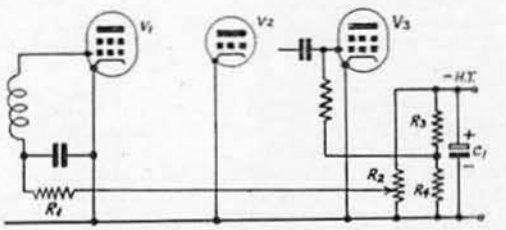


Fig. 1.—Automatic grid bias, as applied to a battery receiver.

current taken by the valves. For example, if the A.F. valve requires 4 volts bias at the full applied voltage and the total measured current is 8 mA. (assuming 2 mA. to V_1, 1 mA. to V_2 and 5 mA. to V_3—screens and anodes), the value of R_4 will be 4 divided by .008 (reading the current as a fraction of an ampere) equals 500 ohms. In most cases the four volts so obtained will be sufficient to effect all the control necessary of the bias to V_1, in which case R_3 can be dispensed with. Otherwise R_3 must be calculated to give the extra voltage drop required. If this is 5 volts, bringing the total up to 9 volts (a value suitable for most screen grid valves), R_3 in the previous instance will be 725 ohms. Any value close to this will be equally suitable. The effects of R_2 in parallel with R_3 and R_4, and of the reduced anode current taken by V_1 when a comparatively high bias is applied, will modify the calculations, but only to an extent which may, in practice, be neglected. C_1, which is a 12-volt 50 μF electrolytic condenser, is essential to prevent instability and interaction.

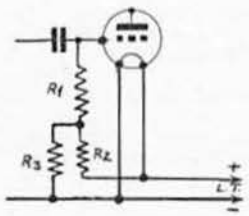


Fig. 2.—Connecting the grid leak to a potentiometer across the filament aids smooth reaction.

Smoothing Out Reaction Control

If the grid leak of the detector valve is connected to the positive side of the filament, the positive bias applied to the grid improves the rectifying action of the valve but, very often, it also gives rise to "ploppy" reaction control. If, on the other hand, the grid leak is taken to the negative side, the reaction control is usually very smooth, but signals are a good deal weaker. The most satisfactory overall performance will be obtained by striking the happy medium, and this may easily be accomplished by the method shown in Fig. 2. R_1 is the normal grid leak and R_3 and R_4 additional resistances forming a potentiometer across the filament. Their value is immaterial within wide limits—they may be 50 ohms or 250,000 ohms each, with negligible drain on the L.T. battery. A further variation is to make R_3 and R_4 unequal in value, say, 100,000 and 200,000 ohms, so that the effect of a greater or lesser bias may be noted by merely reversing the connections of R_3 and R_4 to the filament terminals.

Another refinement is to incorporate resistance reaction control, either in addition to or instead of condenser control. The circuit shown in Fig. 3 invariably results in smooth and noiseless control and, in addition, has a minimum effect on the frequency of the tuned grid circuit. C_1 is the normal reaction condenser and may, if desired, be replaced by a fixed condenser, a value of .0003 μF. being suitable for all amateur bands. R_1 is the normal coupling resistance, usually about 50,000 ohms, and C_2 the normal decoupling condenser of 2 μF. The variable resistance R_2 should preferably be of a wire-wound type capable of dissipating 3 watts—not that it is usually called upon to do so but to provide a factor of safety. The *Varley* type CP159 is to be recommended in this position. R_3, of 100,000 ohms, and C_3 are inserted to ensure noiseless operation. C_3 should have a value of 2 μF. or more, an electrolytic type of high capacity being especially suitable. R_4 reduces the voltage graduation across R_2 and also reduces the drain on the H.T. supply. Values of between 25,000 and 50,000 ohms are usually suitable, but experiment with individual valves is desirable.

The reaction coil, L_1 in Fig. 3, should be close wound and placed as near as possible to the "earthy" end of the grid winding. The number of turns should be few, consistent with smooth oscillation over the band of frequencies covered by the coil.

R.F. to Detector Stage Coupling

When inductive coupling is employed between the radio-frequency valve and the grid circuit of the detector, it pays to experiment with the number of turns in the coupling coil and with the distance between the latter and the grid coil, as the two are interdependent. If too many turns are employed, the grid circuit will be heavily damped and both amplification and selectivity will suffer. If the coupling is too loose, signal strength will not be as great as it might be, although, in the interests of selectivity, it is always wise to keep the coupling a little below optimum.

A little-known method, when capacity coupling is employed, is to use what in effect is one condenser instead of the two normally used, one as grid condenser and the other as coupling condenser proper. If an ordinary mica condenser of .0001 μF capacity is removed from its bakelite case it will be

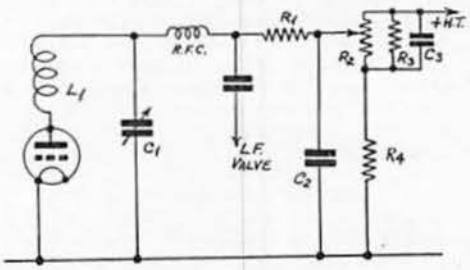


Fig. 3.—Circuit illustrating the potentiometer control of reaction.

found to consist of mica and copper foil plates, bound together with a strip of tinned brass. The latter should be carefully removed, the width reduced to ¼ in. and then replaced. Alternatively, the strip can be cut into two and the two pieces fitted at each end of the mica plates, thus making a stronger job. The copper plates are connected in the normal way, one to the grid and one to the coil, whilst the lead from the R.F. valve anode is connected to one of the outer strips. The capacity of the coupling condenser so formed (as an integral part of the grid condenser), although small, is quite sufficient. The writer has obtained very good results using this method.

The substitution of a disc type ceramic condenser (a capacity of 50 μμF is quite large enough) in place of a mica grid condenser will invariably result in an improvement in ease of oscillation and general performance. A similar condenser,

of 10 to 20 $\mu\mu$F, is suitable for coupling purposes.

Reducing Hand Capacity

Hand capacity, like its associated trouble threshold howl, is always due to R.F. reaching the L.F. stage and telephone leads. It often persists, especially on the higher frequencies, even when the usual precautions of stopper resistances and by-pass condensers have been added at points prior to the A.F. valve.

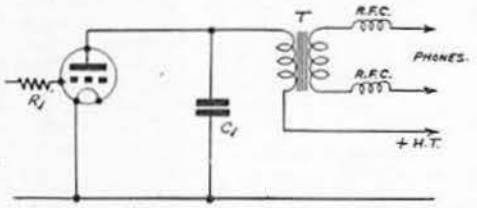


Fig. 4.—An output transformer, with R.F. chokes on the secondary side, may be relied on to reduce hand capacity.

A method which has been found to eliminate the trouble (in most cases entirely) is illustrated in Fig. 4. The by-pass condenser C_1, of .0003 μF capacity, should be connected as close as possible to the anode of the valve, whilst the lead to the chassis should be very short. The output transformer T will usually have a ratio of 1 to 1, but experiments may be conducted with other ratios, if a transformer of a different type is at hand. The radio frequency chokes are connected on the *secondary* side of the transformer, as close to its terminals as possible, and may be of the usual pie-wound 2.5 millihenry type for any band, including the ultra-high frequencies.

It has also been found beneficial to make the leads to the primary of the transformer of considerable length, conveniently disposing of them around or underneath the table. The advantage of this method is that the total distributed capacity to earth is increased and variations, caused by movements of the operator, reduced.

Something New in Exciter Units

By W. H. ALLEN (G2UJ).

THIS is a description of a simple one-valve exciter unit, the basic circuit of which has been in use at the author's station for nearly two years, and which was originally suggested to him by GW6YQ, of Prestatyn.

Sundry improvements have been made during that time, and it is felt that others might be interested in a unit which, among its many advantages, includes exceptionally low crystal current (positively preventing crystal fracture even under conditions of misuse), seven different frequencies from four crystals in four bands selected by switch, and no coil changing.

Valve Used

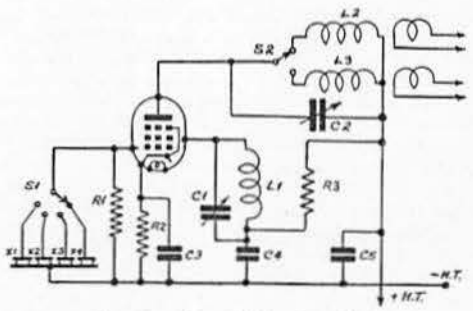
The type of valve used is a double-diode output pentode with a slope of about 9.5 now available from several manufacturers and which appears in the *Osram* and *Mazda* ranges under the designation DN41 and AC2/Pen DD respectively. The former is the one at present used by the writer, and several specimens tested have proved equally satisfactory in a service for which they were not, of course, intended.

Readers may wonder why a type of valve incorporating a pair of diodes is specified. This is partly due to the fact that in this class of valve the grid is brought out to a cap on the top of the bulb, so making for better efficiency on the high frequencies, and partly because a top grid fits in particularly well with the lay-out employed here. The diodes themselves are not used, and in practice it has proved best to leave their anodes entirely free.

The Circuit

Turning now to the circuit diagram, it will be seen that so far as the anode circuit is concerned, standard pentode oscillator practice is followed, but the other tuned circuit (used when doubling) is placed in series with the screen-grid, and not, as in the tritet, in the cathode lead.

The action of the circuit is as follows. When an output is required at crystal frequency, the condenser C_1 is swung to a point where L_1 is out of resonance with the crystal in use, or arranged to short-circuit itself at maximum capacity by means of bending one of the moving vanes. The anode circuit is then tuned to resonance in the usual way. The frequency on which output is taken under these circumstances can be one of four selected by means of the four-point switch S_1, mounted on top of the chassis near the crystal box. The switch S_2 selects one of the two anode coils L_2, L_3, each of which tunes to two amateur bands, one at the low and one at the high capacity end of the condenser C_2. Thus, with S_2 in one position, the 1.7 and 3.5 Mc. coil (L_3) is in circuit, and the bands mentioned will be found one at a low dial reading on C_2, and the other at a higher reading. Similarly, when S_2 is placed in its other position, L_2 is in the anode circuit, and 7 Mc. will be found towards the maximum capacity of the condenser.



Circuit of Special Exciter Unit.

R_1,	50,000 ohms,	S_1,	4-point switch, B.T.S.
R_2,	500 ,,	S_2,	S.P.D.T. switch, Wearite
R_3,	20,000 ,,	X_3,	1.7 Mc. Crystal.
C_1, C_2, C_3,	.0003 μF.	X_1,	3.5 Mc. ,,
C_4 C_5,	.01 μF.	X_2,	7 Mc. ,,

Doubling Arrangement

Now we come to a description of the circuit when doubling, and the use of L1, C1 (the tuned circuit in series with the screen grid).

If the circuit diagram is studied, it will be seen that, disregarding for a moment the presence of the anode of the valve, the cathode, grid, and screen grid form the necessary elements of a triode crystal oscillator, and when the valve is used as an oscillator doubler they serve as such. The next electrode in line after the screen grid is the suppressor grid, which in this class of valve is connected internally to the cathode, and is, therefore, at earth potential. The action of this grid by virtue of its function of an earthed screen, is to prevent interaction between the anode and the other electrodes, so preventing feed-back on the crystal *via* the tuned screen circuit L_1, C_1. So efficient is this screening that even if the anode is tuned to crystal frequency at the same time as the screen-grid circuit is also so tuned, no unpleasant effect will be produced on the crystal, as the normal, very low, crystal current rises very little, and all that occurs is a reduced output which quickly calls the operator's attention to the fact that something is amiss.

To get back to the process of doubling, it is only necessary to tune L_1, C_1 to crystal frequency and the anode circuit to twice that frequency in order to obtain a good output on the second harmonic with an anode current only a little in excess of that taken when running as a straight oscillator.

A moment's thought will show that if the second harmonic of the 3.5 Mc. and the two 7 Mc. crystals be utilised, there is available, in addition to the fundamental crystal frequencies, three others, falling, one in the 7 Mc. band and two in the 14 Mc. band. If the two latter crystals are so chosen that their harmonics fall into the high and low frequency ends of the 14 Mc. band respectively, those interested in 14 Mc. DX will have the chance of working stations at both ends of the band.

Experiments conducted by the writer show that it is possible to obtain enough output on the fourth harmonic of the 3.5 Mc. crystal to excite a sensitive PA, such as the RK23 pentode, on 14 Mc., thus producing a quadrupling of the crystal frequency in one valve.

Driving the Next Stage

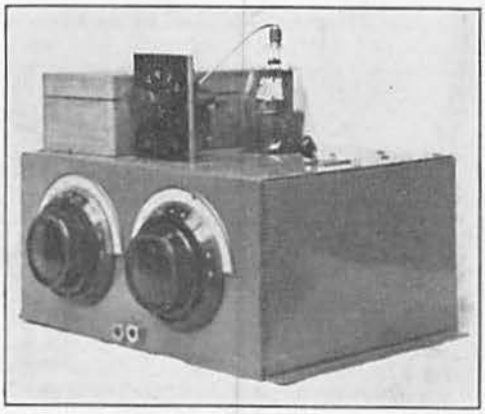
The drive for the stage following the exciter, which may be either the PA, a buffer amplifier, or a further doubler to 28 Mc., is taken off by two link lines connected at one end to a winding of one turn on L_2 and two turns on L_3 respectively, and at the other end to two-pin sockets into which the link line from the following stage can be plugged.

It may be mentioned here that voltages up to 400 may be safely used on this exciter, the SG voltage being dropped by the 20,000 ohm resistor R_3, but to protect the valve, as well as to facilitate crystal oscillation, a 500 ohm resistor R_4 is included in the cathode lead. This resistance, by-passed by the condenser C_3, provides a constant bias which is augmented when oscillations start by a further bias voltage produced across the grid-leak R1 by the flow of grid current. This high working bias not only increases the harmonic output of the exciter, but keeps the standing anode current low, a condition conducive to longer valve life.

Lay-out

The actual location of components is not important, provided care is taken to avoid long leads in either the grid or the anode circuits, and to make all earth return wires short and to one point only on the chassis. The exciter here described is built on an aluminium chassis measuring 10½ ins. by 8 ins., and has sides 5 ins. deep. The front panel supporting the two variable condensers C_1 and C_2 can be of the same material provided the condenser spindles are insulated from it. Otherwise ebonite or dry wood must be used, as the aforementioned spindles are " alive " in relation to the chassis.

It will be noted that no RF chokes are incorporated in the design. This is intentional, as it was found they were quite unnecessary—in fact, the unit worked better without them, and it has been the writer's experience that this applies to many other applications of RF chokes in radio gear generally.



General view of the exciter unit described.

The crystal holder consists of a piece of 4½ ins. by 1½ ins. by ¼ in. brass strip ground flat by means of carborundum powder on plate glass, and then bolted to the bottom of a wooden box of suitable size, with a tightly fitting lid to prevent the ingress of dust. The four top plates for the crystals are also made of small pieces of brass of a suitable size and weight, and are connected by means of fine gauge copper wires to four terminals on the sides of the box, and thence to stouter leads to the *B.T.S.* four-point low-capacity switch.

Naturally there is nothing to prevent the use here of four open or closed crystal-holders in place of the home-constructed unit mentioned, but this point can be left entirely to the choice of the constructor.

The tuning condensers should be of sufficient capacity to tune to two adjacent amateur bands on each coil, and 300 μμf. will be found a large enough capacity. This, of course, leads to a fairly low L/C ratio on, say, 7 Mc. and may reduce the output somewhat, but, in the writer's opinion, the desirability or otherwise of an oscillator is not measured by its ability to drive a high-power final " right off the map " without further amplification, but by its being able to produce a source of R.F.constant in frequency, and capable of being keyed for break-in working. These conditions this oscillator certainly fulfils. It must not be thought, however, that the

(*Continued on page* 378)

THE MONTH ON THE AIR

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

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

CONDITIONS during the month still point to the fact that we are on the downward trend of the solar cycle. The 14 Mc. band faded out very early compared with last year, and the 28 Mc. band has been disappearing earlier, with conditions of a generally poorer nature. This would appear to show that the ionisation of the F2 layer has been less, thereby allowing signals to pass right through, and as a further indication of this fact, it is interesting to record that 14 Mc. DX has been good at noon, whereas a similar condition did not obtain last November, due no doubt to the ionisation being greater which would cause short skip at this time of the day.

Lincolnshire seems to be a good spot for Oceanic DX. You will remember that G6GH made the first contact with VR4AD, he now tells us that he worked VK9VG (14425 T9 1400) and VK9BW (similar time and frequency) whereas G5BD worked VK9VG on November 7 on 14450 between 13.00-14.15 G.M.T. The address he obtained was: V. Gilchrist, Bulolo, New Guinea. We do not know whether one of these contacts was the first between VK9 and G, but we suspect that it was. G5BD also added CP1AA (14400, 2300) VQ3HJP, ZB2A, XZ2LZ bringing him up to 113 countries in 38 Zones. New ones heard include ZC4EB, VP2LC, VP6RB, EL2A, U8IB, HI6Q, VP7NU, K6PMP (Guam), and HR2ON CW on the H.F. side of 14 Mc. G6GH and G6NF are known to have worked CR6AI, I. Chaves, Box 62, Mossamedes, Angola, on about 14150 T7 at 18.30 G.M.T. This latter station is believed to be ex-CR9AB the operator of which was also named Chaves.

Another rare contact was made by G8GQ during the VK/ZL contest. He worked VR4BA and has received his card stating that the contact made him WAC and was his first with G. The inputs used are interesting, as the Solomon Island transmitter consisted of a 6L6g CO, 6V6g PA with an input of 12.5 watts, whereas that at 8GGQ used 10 watts to an RK 34 fed into a rhombic aerial, two wavelengths on each leg at 14 Mc. G8GQ tells us he has worked ZL, VK, KA, XU8, and VU on 'phone with this array. Apparently VR4BA works C.W. both on the high and low frequency side of 14 Mc.

2DQS of Thurnby, Leics., reports reception of the following 14 Mc. stations: CX2AJ (HF 14), VP4TK (14070), PK4KO, PK2DT (HF C.W.), KA1TZ ('phone), and U2AF 14400 CW. G6ZO reports a contact with OY4C and was told that cards would reach him c/o Nissen, Firn I., Faroes. The signal was T4 on 14400. OY4C stated he had no knowledge of OY1B. G6ZO heard the following: EL2A (14350), CE3BF (14360), CE3AJ (14405), HK2BL (14430), CX1FB (14390), CX3AH (14240), XU7CW (14290), VP5ZA (14390), SKHN (14380, Swedish ship near Dakar), VP5RS (14320), K6HOO (14360), XU4XA (14350). ZO reports that LX's 1RB, 1TW and 1AY are active on 'phone and 1AW on CW to which we can add 1BB (14400 genuine) on CW, so at last Luxembourg is treating us to some genuine CW operation. CT3AB (14240) and CT3AP (14320) represented a relatively rare country during the month.

G6BW is well known to all users of 14 and 28 Mc. 'phone, and he writes a very interesting letter giving some of his recent results using 50 watts and an assortment of beams. All U.S.A. have been worked on both 14 and 28 Mc. '*phone* and he has just received his WAS certificate being the first issued in Europe for exclusive '*phone* contacts. Besides this award, W.B.E. and W.A.C. have been achieved on 'phone on both 14 *and* 28 Mc. Among most of the unusual DX worked, TG9BA has been raised and his QRA is: Walter C. Bay, Chalet Krouk, Guatemal City. In mentioning that G6QS was the first to submit cards for WAS last month, we should have made it clear that although this was the first for Great Britain, the first WAS award in Europe was OE3AH; there appears to be a spot of argument at the moment as to whether G5BJ or G6QS was granted the first WAS in Great Britain.

2DKQ of Reading can always be counted upon to report some rare DX, and this month is no exception. SV6SP on 7120 is again active in Canea, Crete, and was worked by many G's during the month, while on HF 14 Mc. 2DKQ heard J's 3FZ, 6DM, 8CA and 8CG and all districts of U.S.A. on 7 Mc. in one day. He asks if anyone has information on OX1AA heard on HF 14? In reply to his query, G6WY has now worked 151 countries with 141 confirmed, according to ARRL list. 2DKQ has heard 149. G6XL finished with 2,520 points in the Junior VK/ZL fray—35 QSO's in 8 districts and heard K6PMP 14300 (Guam), K7FST in Zone 1, ZB2B 14410 (we hope he is real!), J8CG 14390, CP1BF 14430, XU0C working XU7CW (14355) passing traffic in 4 figure code. 6XL worked U8IB in Tashkent, VS6AO (also active on 28200), ZD4AB and KA1FG, while 7 Mc. produced a QSO with KA1AX. G2DH has reached 96 confirmations and had contacts with YS2LR,

VP2LB/LC, VP4TO and VP7NT. Other DX heard included CR6AI, CN1AA, and HR7WC.

Eric Trebilcock, BERS195 reports as usual by air mail, and asks if we can explain why he heard ZE2JB? We know that several G's including G3IG have worked this station and are wondering if they have started ZE2's now that ZE1's are exhausted. He scored 59,000 points in VK/ZL contest, but complained of bad conditions. ZD4AB's signals have at last reached VK as Eric heard him for a new one as well as K6HCO, PJ1BV (QSL via W5FNX or ARRL), ZC4EB (is he genuine anybody?), these bring his country total to 168! SKHN was also received and K6NWK (mobile) when 100 miles east of Brisbane on 28 Mc. "195" has at last heard *all* the 40 zones by receiving VE5LD in Zone 2, and among his best catches for the month we record, CN1AA, CP1AA, CR6AI, EA7AV (OK in Cadiz), FM8AD, HH3MC, I7AA, K6ODC (also in Canton I.), ST2CM, TF3C, U5KY, VP2LC, 4TO, VQ3ALT, 8AT, YI2BA, YS2LR and ZD2H. In just over three months, 42 countries have been heard on 28 Mc., Europeans are heard between 08.00-12.30 G.M.T. almost every day, but always on Sundays. PK6XX has been heard on 14009 between 03.30-10.30 G.M.T., but always working North Americans.

Continuing with the British Empire ZD4AB reports that he had worked 60 countries and WAC several times, but cannot get W.B.E., whereas ZD2H has raised a couple of VK's to "make" this award. ZB1P reports hearing T4TWO again on HF 14. Those who have not yet worked Palestine will be interested to know that ZC6XX is genuine, and QSL's should be sent *via* RSGB. We are informed that all new licenses are suspended for the time being in ZC6, but confirmations for contacts with 6XX will be forthcoming. VO3X reports for the first time. He has heard VU2FO and 2FV, and is very anxious for a VU contact for WBE. Will all VU's please look for him on 14400? VO3X also worked ZB2B, and hopes he will prove genuine, but if this was for a contact in January, he was bogus.

Martin Bourke, 2AOU of Jersey, asks if we know anything of AR4FT frequently active on 28 Mc. MISS was also heard and is a ship, but details are unknown (G2YL was unable to obtain any information during a QSO). Other DX heard with frequencies, VQ8AF 14280, XSV1SM 14420 (QSL *via* SP1LP), VS6AB 14150, J8CA 14300, K6PHD 14310, VQ2HE (a new one) 14180, TG3AC 14000, TG9BA 14000, OY7AN (sounds genuine enough) 14200, VP8AD 14370, VP1ZA 14310, XU2JH 14120, and OQ5LU 14080, while on 7 Mc. 2AOU reports CM2PF, XE1NN, YV3AH, PY, LU and W6. His country total now stands at 158 with 61 on 28 Mc., but BERS195 (his "enemy") thinks he is claiming some before he is certain they are genuine! 2AOU has heard 45 H.B.E. zones and has cards from 40 of them.

OQ5HR is the call used by a survey boat S/S Kindu, and was worked by G6WY when in mid-jungle at Kindu on the River Congo. This boat sails between Ponthierville and Kindu and it would appear that OQ5LU must be another of these survey ships. We are wondering if they are attached to the Gatti Expedition (OQ5ZZ). The frequency was 14100, whereas OQ5LU is reported as using 14080. BRS3213 of S.E. London reports TI2FG on 7 Mc. and VE1GR on 3.9 'phone. 14 Mc. produced 'phone from VQ2HC, KA1BH, ZL4GM, XZ2DY and 9 ZS's. G6YR is pleased, as he has worked 3 new ones in PJ1BV, VP4TO and YS2LR, but he was not the first to work the latter! Others worked included VP2AD 14415, KA1DL 14030, VQ3ALT 14055, and XE1AM 14405. G2QY had an unusual contact with W3EHO-O (zero) on an oil tanker in the Gulf of Mexico, on 28 Mc.; another boat operating on this frequency is W2CQB 28000, also mobile near Georgia.

VQ5ELD is a brand new one in Uganda on LF 14, and can be addressed at Post Office, Entebbe. LZ1AB was worked by G3BS on HF 14, but we have no details. G3UP used to be a regular reporter to this page under the call 2ATI and has now started in real earnest to work the DX he used to hear. He is on 7 Mc. and reports contacts with TF3C 7015, UK6WA 7250, SV6SP and XOH1WW 7198. DX heard included KA1AX at 10.10 G.M.T., VO4Y, ZS6EQ at 18.10 on 7190. ZS4M has also been coming through on 7100. G3BI contacted XU8CM, CR6AI, VP5ZA, VQ8AI, CR7AG and ZS4L. CR7AG requests cards *via* CR7AW. G8CV is active again and tried Windom, doublet, zepp, W8JK, end-fed aerials, but had no DX until he used a W3EDP type, this brought contacts with KA1FG 14300, OQ5AV 14080, VE5AID (Resolution I, and cards should be sent to Resolution Island Dvn. Supt., Radio Dept., Transport, Halifax, N.S.), VP2AB 14395, also VK's, ZL's, VE4 and 5, etc.

An interesting letter arrived from the Lithuanian organisation, the L.R.M. which was formed on October 2. There are 45 officially licensed LY's and LY1J was elected President with LY1S as Secretary. This Society send their greetings to all other amateurs throughout the world and we know that they all play the game in the true amateur spirit.

We have some interesting news (*via* radio) from W2IXY. She informs us that TG9FN is the call of the station operated by TG9BA at The Faire Nationale, Guatemala City, which opened its doors on November 7, and the station will be operated until the end of the Exhibition. A special card will be sent for all contacts made on 14040 kc. An unusual 'phone was worked on 14118—OH2OI whose QRA is Viarkkala, and is not correct in C.B. The latest decrees for U.S.A. stations include crystal control on 56 Mc., and also that a record must be kept of all people who speak over the air from a station.

G3JR writes a constructive letter in which he asks us to *insist* that information of an unusual station worked/heard shall not be considered complete enough for publication unless it is accompanied by time of reception, frequency and tone, where the tone is not T9. You will note that we have done so in certain cases this month, and we do ask for fuller information on unusual stations and please keep your lists down to the really interesting signals heard. G3JR gives his information thus: Contacts—ZD4AB (21.30 14350), KA1DL (17.15 14040), J5CC (22.20 T6X 14300), HH3L (20.50 14315), VE5ACR (N.W.T., 20.10 14050), VQ8AI (18.45 T8 14325), CR6AI (19.35 T5 14060 and 14320), and heard:—CT3AB (20.50 T2 14300), VP2LC (22.30 14340), VP7NU (01.50 14305), XU6KT (16.50 14140), W7UQ (Idaho 10.10 14285), W6NEL

(Ariz. 01.00 14040). We think this method of presenting DX news is to be desired and contributors are asked to furnish details on similar lines.

G8SD is hopeful of W.A.C. this season using 2.5 watts from batteries. He has already worked 31 countries with 2 watts to a 2 v. battery valve including 26 on 7 Mc. with one watt. U8MI was raised using 1½ watts and this Russian has at last sent some cards *via* the Society in company with some from U8BK, U9ML and others. 8SD also heard XU3XA on 7 Mc. VU2FO reports, and you will remember that this is our old friend G2DC. He is active with ECO between 14.00-18.00 G.M.T. on the HF side of 14 and has beem coming through at midday in England. He reports that the following are active between 12.00 and 18.00 G.M.T.—VQ2MI, VQ2ML, VQ2PL, VQ8AS (Chagos), XU7CK, XU6TL, 8NR, 6AW, FNIC, VS6AO, J2JJ, VE5ZM and VE5AAD, all on the HF side of 14. Please note that cards for China should be sent to Box 685, Shanghai, or Box 132, Canton, for XU6's.

VK6JE tells us he worked XZ1GN in December, 1936, and later received a letter from G. K. Nicholls, c/o Eastern Telegraph Co., Ras Boradi, Aden. SU1WM also had a similar experience, but we know of no G who has worked Aden. VE5ZM reports (*sia* G6MK) that VE5LD has changed his QRA to Burnside River, Cambridge Bay, N.W.T., but is still in Zone 2. VE5UM (QSL *via* VE4ZM) is in Zone 1 on 14080, G6MK is anxious to know if ZA1AC is genuine as he requests cards to be sent *via* GUF, Trento, Italy. We shall be interested to know if any cards arrive and reserve our opinion until then! I1IR worked HZ1A, but was unable to obtain his QRA and is wondering if this station is *bona fide* in Hedjaz. W6QIX5 is puzzling him, but we should imagine that this is W6QIX operating portable in fifth district. ZC4EB was also heard working I1LD, but we have no details of this so-called Cyprus station. G2YL sends some more information from VE5AAD to the effect that VS5CA is operating 'phone on the HF end of 14, while 2YL heard VE2AX calling OY7AN (already reported in this column), and she worked CR6AI on November 2 for his first G QSO. G2NJ is very active on 7 Mc. and worked XOH2WK, the S/S Diana nearing Swedish waters.

G8UJ sends us a letter received from W7GGG in Wyoming, who writes as follows:—"We have about 2,000 QSO's a year, and since there are only 6 or 7 active hams in this State we are constantly being asked for cards. We have decided that we will not QSL until we have *first* received a card requesting ours." Of course, W7BJS is the other well-known Wyoming 10 metre 'phone and also QSL's. W6DTB and W6KKG in Utah have been worked by G6BW and others also on 28 Mc. 'phone. G8JJ raised XOH1WW (05.00 7 Mc.), who is the Finnish S/S Gertrud as she was passing Gibraltar. The operator states he is on 7195 every night looking for G contacts.

G8NY had an interesting contact with ZL4GM on 'phone at 18.20 on 14220. VU2AN tells us he worked AC4YN on October 12, and although we have all thought this station was QRT, we are glad to learn that he expects to be regularly active again on 14106. There has been a pirate using his call, so if you do not get a card, you will understand that you have been the victim of a cruel joke. G8UZ worked AA1AA who gave his QRA as Elkherim, Arabia, and said he was ex-VU2CN. Time of QSO was 19.25 and details are requested! GM3OM, who represents Stirling, used Ostar Ganz DC valves with 230 v. D.C. mains. Forty countries have been worked with this power, including K7ETS, W6, ZL, VU, LU, ZC6AQ, VQ4 and CX1AR on 14280. He required further details of VS1AR. G6LB is active again after many years absence and is really getting down to this DX business. At 09.30 he worked VP4TA on 14270. G3DO contacted I1AB on 'phone who said he was in Italian North Africa. Perhaps I1IR can tell us if he is genuine? G3DO has now worked 53 countries in 23 Zones on 'phone, including XU8ET.

G5HH recounts an interesting story of ex-G5TB, who went to Bahrein and after a terrific struggle obtained permission to transmit. The authorities, not understanding amateur licenses, granted him the call BNI-1, and he worked for a week or so on 7 Mc. with this call, working G5BQ for his first G. 5BQ quickly terminated the contact believing he was working a pirate (who wouldn't!). The permission was then withdrawn as the local authority found that licenses were granted through the India Office, so we shall soon be hearing a genuine VS8 call on 7170 or 7174 or their multiples.

7 Mc. is Hotting Up

W2IXY reported hearing numerous British telephony signals on 7 Mc. during the beginning of December, between 08.00-08.30 G.M.T. In spite of this item of interesting news we would urge telephony enthusiasts to listen for DX *telegraphy* stations, particularly around the times mentioned above. Unless we are greatly mistaken 7 Mc. will provide the DX enthusiast with many good contacts this winter.

3.5 Mc. Also Wakes Up

During the first weekend in December, ZL stations were worked on this band from G. In addition VU2AN was worked by G6WY, whilst several transatlantic contacts have also taken place recently.

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

Call	*Dominion Districts*	*Colonies*	*Total*
G6XL ...	25	13	38
G5HH ...	24	14	38
ZS6BT ... (ex-ZT6AQ)	18	16	34
G6ZO ...	21	13	34
GM8HA ...	22	11	33
G3BI ...	23	10	33
G5ND ...	22	10	32
G2GK ...	23	7	30

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

THE 28 Mc. BAND

By Nelly Corry (G2YL).

ON November 8, 9, 17 and 18 conditions were rather poor, but during the remainder of the month they were well up to expectations for the time of year, and all continents were heard on November 3, 5, 6, 13, 19, 20 and 27. Activity in Great Britain has increased considerably in the last few months, especially among the 'phones, and reports of "QRM from another G" are frequently given by DX stations. Though not strictly "28 Mc.," it is of interest to note that the B.B.C. television sound transmissions have been getting out well on occasions this winter, as in previous years, and among those reporting reception are VU2AN, W9ZHB and ZS6CF.

Oceanic signals came through on at least 20 days, but the majority were heard at week-ends, at an average strength of S4/5 between 09.00 and 12.00 G.M.T. ZL3KZ was S7 on C.W. and 'phone on the morning of November 12, but activity in New Zealand still appears to be low. Twenty-five different VK's were reported, from VK2, 3, 4, 5 and 6, and G6XL worked VK4HR, 5KO, 5RT and 5JS in an hour on November 20. G6DH had another contact with K6MVX on November 2, and this station and K6LQM and K6MVV were logged by BRS3179 on November 3, 12 and 13. K6MVV was erroneously reported in this column last month as having worked G2PL; actually the station worked was G2PU. PK1VY and PK2WL were worked on 'phone by G6DH, 8DM, 8UJ and others, and KA1ER was worked by G2CR on November 5. This latter station was W.B.E. on 28 Mc. during the first month after receiving his licence, making contacts with VK2, 3, 4, 5, VU, EI, ZS and VE3. BERS195, of N. Australia, logged 24 British stations during October, including 18 on October 16. He reports that PAOFB, G2HK and G6DH are the best European 'phones he has heard up to date.

VU2AN and G6DH have proved conclusively how consistent conditions have been for Europe/Asia contacts, by running a daily sked at 09.00 G.M.T. From October 28 to November 27 inclusive the only day when a QSO was not effected was one when VU2AN was unable to be active. Other stations in India and Burma reported during the month were VU2DR, 2ED, 2EU, 2FV/FZ, 2KD, 2LK, XZ2DX, 2DY and 2EX. G6DH had a contact with J3FJ on November 12, and he, G6YL and BRS3179 heard J2MI, 3FK and 3FZ on several other days. UK8IA and YI2BA were heard by BRS3003, and FI8AC by BRS3179.

A total of 48 African stations logged during the month included 7 ZE's and 16 ZS's. The remainder were all in North Africa, CN, FA, FT and SU, except for FB8AA, VQ3TOM and VQ4CRE. The latter was worked by G2XC at 14.00 G.M.T. on November 13, and this QSO is believed, by the writer, to be the first G/VQ4 contact.

South American signals were heard on about 12 days, and included 24 stations in CX, HC, HK, LU, PY, VP3 and YV. Another QSO which is believed to be a first contact was made by G2DH and YS2LR at 17.50 G.M.T. on November 6. At least 25 other Central American and West Indian stations were logged during November, in CM, FM, HI, HR, K4, K5, TG, TI, VP1, 2, 6, 9, and XE. Of these stations about 75 per cent. used telephony only, and most of them obviously have great difficulty in hearing DX through the W QRM. Unusual calls reported by BRS3003 and 3179 include FM8AA, HR4AF, VP1BA, VP9L, TG9AA, TG9BA, XE2FC and XE3AR.

North American signals were audible daily throughout the month, and included stations in VO, W1-9, and VE1-5. BRS3179 logged 22 VE4's and 6 VE5's, mostly on 'phone, and G6YL worked W3EHO/O, a ship off the coast of Florida. It has been pointed out that "W2CQB Mobile," reported in last month's Notes, should have been identified as the S.S. "Pan-Kraft," and that W signals were, in fact, heard for a short period on October 27.

A large number of European signals from 27 countries were heard during November, and "pre-skip" signals, with and without echoes, were frequently audible when DX conditions were good. A contact between G6DH, of Clacton, and GM6XW, of Stirlingshire, at 09.50 G.M.T. on October 30 produced rather interesting results. When using a Beam radiating N.E., G6DH's signals were reported S5 with a bad echo, but when he changed to a Beam radiating N.W. (i.e., more in GM6XW's direction), the report was S6 with no trace of echo. Bearing in mind the possibility of a round-the-world path to the N.E. at that time of day (VK's were also audible), and the improbability of one to the N.W., it seems likely that these signals were being propagated over the direct route, and that the echo was due to a round-the-world signal.

Judging entirely by 28 Mc. conditions, there have been no very violent magnetic disturbances during the month of November. The "hiss" was heard by VU2AN at 10.00 G.M.T. on November 6, and by G6DH at 09.39 on the 11th, and 10.05 on the 12th. W9GWM, in a QSO with G6TG on November 10, stated that the poor conditions of the previous two days had coincided with a brilliant display of the Northern Lights which he had himself witnessed.

Many thanks for the interesting reports and logs received from G2CR, 2DH, 2XC, 6DH, 6TG, 6XL, 6YL, 8CV, 8DM, 8UJ, 2DQS, BRS25, 3003, 3179, BERS195.

THE 56 Mc. BAND

By J. M. R. Sutton (GW2NG)

NEWS of activity on the band this month is scarce, and it is to be hoped that stations usually active with the pen have been devoting their time to listening for trans-oceanic signals. At the time of writing (November 27), no news of G-W contacts has been received. The International Contest is drawing to a close, and it seems extremely probable that it will conclude without a two-way contact between Europe and the U.S.A. The observations of 6DH in last month's notes seem well founded and it appears that the peak has been passed and that many years must elapse before the frequency limit again becomes consistently high. Yet, such is the fascination and uncertainty of this band and the still higher

frequencies, that everyone hopes that such remarks as the above will be confounded !

British Observations

G6QZ reports that October was a very barren month and he had no contacts at all, although running a schedule with 6DH. The highest frequency signal heard was 35 Mc. as compared with 40 Mc. at the same time last year. November was better and signals were heard to 41 Mc., 6DH hearing U.S.A. signals to 48 Mc. His schedule with 6DH has gone very well, and they have discovered, by very frequent contacts, that this 60-mile contact between their stations is always possible. Strengths vary considerably from day to day and contacts have mainly taken place at 21.40 G.M.T.

The best day was November 9, when QZ was 579x at 6DH. On completing the QSO he was called by 5BY (Croydon, 105 miles), who thought he was a local signal until he signed ! 5BY was 559x and gave QZ 569x, although the latter was

Portable station, GI8TS, operated from the Mourne Mountains during the G.W. Cup Contest on September 10. Contact was made with GW6AAP on Snowdon.

579x when in contact with 6DH. This was at 22.00, and further calls until 23.15 on a N-S beam only produced a report of 559x from BRS2538, of Laindon, Essex. Conditions were still good on November 10, but had dropped below those on the 9th. A schedule with 2OD, of Ascot, has produced no results so far.

G2XC also reports that October was the very worst month this year for G signals, but November was much better. 2LC reported him as 559x on November 7, at Leigh-on-Sea, Essex (95 miles). Several contacts were also made with 5BY at 55 miles. There was much QSB and the peaks were S6. 2OD has been putting in a good signal and a report was received from 6FO on November 6. 2MV (55 miles) was heard for the first time on November 13. Good conditions seem to have coincided with mild weather, and the colder weather which has now appeared, with poor conditions.

G8LY sends her usual monthly report for October and states that conditions were very poor at her QRA, or else everyone was on 28 Mc. ! G5NF, 8MG, 5BY(?) and 2OD were heard on various days, but no QSO resulted until October 18, when 2OD was contacted at 569x. Many aerials have been tried this month, including a rotatable half-wave with reflector (72 ohm line), and a W3EDP with 42 ft. horizontal and 42 ft. semi-vertical and also two transmitters, but conditions seem to have been dead against any concrete results.

BRS2601 sends in an illuminating report for November. Conditions were good for contacts up to 100 miles early in the month and improved tremendously from November 6 onwards. November 5 was a very warm day, while November 6 was cool. The eclipse of the moon occurred on the best day—November 7. November 6 gave G6DH (72 miles) at 559x and many signals up to 30 miles. November 7, being the best day, gave 6DH 559x ; 2XC (53 miles), 568 ; 5XY (48 miles), 539 ; 8LY (45 miles), 569, with QSB to 539 ; 2UJ (30 miles), 577. These stations are inaudible on ground-wave, because the station is only 140 ft. A.S.L., and there is high ground of 900 ft. to the south. 6DH, 2UJ, and 2XC were again heard on November 9, but on November 10 6DH was only 329, the weather becoming very erratic. Conditions went off from then to the end of the month.

G8CV has started up again and, using his 35T as a frequency doubler, he contacted G2DN and 5MA on November 15. On the following night he was in QSO with 6DH (95 miles). He is building the 35T as a PA and will shortly have a rotatable beam. 8CV has written to F8AA and 8CT for schedules, as they are not much further away than 6DH. He will be on every night at 22.00 G.M.T.

G8BI and 6TL, of Manchester, would be pleased to get in touch with 56 Mc. stations in the locality. They are on 1.7 Mc. every Sunday from 11.00 to 12.30 arranging 56 Mc. schedules from 13.30 to 16.30. They are also on 56 Mc. every Friday from 20.30 to 21.15. They have other operating times, too, and will be pleased to give details. G8BI is on 56280 kc. and G6TL on 56316 kc.

G6YL kept a close watch on 28 Mc. during October and QSY'd to 56 Mc. when S8/9 signals were received from CT1, YR, YT, I, FA, CN, YL, ES, W2, 3, 5, 9, etc., but with no results, not even harmonics.

American Notes

W9NY is still holding on to his 39 points and has made no addition to them. Although active every day in October except October 17 to 23, no DX has been heard or worked. He wonders if that elusive G contact will happen just after the close of the contest—as it did on 28 Mc. ! His log is a record of patient calls and no results, with the entry " Band Dead " appearing with disheartening monotony. He cannot be accused of not trying !

W5EHM was to be on 56210 kc. daily, at 15.00 G.M.T., after October 25. G6YL has listened, but with no results to date. Some very interesting 56 Mc. news and theoretical discussion has been received from W9FM. It is too long and detailed to be given here, but we hope to incorporate the technical data of general interest in a separate article at a later date.

(*Continued on page* 378)

The 1.7 Mc. C.W. Contest

THE above contest will be held during the second week-end in January, 1939. The arrangements are similar to those which have proved so satisfactory in the previous two contests, and remain substantially the same.

The only alteration of any importance is concerned with the timing of the event. There has been a certain amount of criticism from our Scottish and Northern Ireland members, who say that they are unable to make contacts on the Sunday morning, consequently they are handicapped in comparison with those who live further south.

In order to meet this quite justifiable point of view, the contest will start at 2300 G.M.T. on Saturday, January 7, and will terminate at 1100 on Sunday, January 8. This will not affect those competitors who want to take some rest before the contest starts, nor will it trouble those who have to work late on Saturday nights. It is felt however, that any further alteration in the times might be unfair to these sections of the membership.

It will be noted that telephony contacts will not be allowed to count for points, and in this connection may we once again appeal to the telephony operators who have so sportingly co-operated in past years, to keep the band as free as possible for the duration of the contest.

A suggestion has been made that a telephony *only* contest might be popular on the " top band." Members who would support a contest of this kind held, probably, some time in November, are asked to send a postcard to Mr. A. O. Milne, G2MI, 29, Kechill Gardens, Hayes, Bromley, Kent.

May we ask all competitors to maintain a careful watch on their input power and to operate their station strictly in accordance with both the letter and the spirit of the rules, and also to send in a legible entry form. So many members seem to take no care whatever in this connection, and thereby cause the adjudicators much unnecessary extra work. We wish everyone an enjoyable time, with good conditions and minimum of QRM.

A.O.M.

* * *

The rules of the Contest are as follows:

1. The contest will commence at 2300 G.M.T., Saturday, January 7, 1939, and will conclude at 1100 G.M.T., on Sunday, January 8, 1939.

2. Entrants must be fully paid-up members of the Society, and be resident within the British Isles.

3. The British Isles, for the purposes of this contest, includes England, Scotland, Wales, Northern Ireland, Eire, and the Channel Islands.

4. Entries will be accepted only on official log sheets which can be obtained free of charge from Headquarters prior to the commencement of the Contest.

5. No entry form will be accepted after Tuesday, January 17, 1939.

6. Entry forms, unless completely filled in, will be disqualified.

7. The declaration at the foot of the entry form must be signed by the operator.

8. Proof of contact may be required.

9. Contacts with, or calls from, ship or unlicensed stations will not be permitted to count for points.

10. No telephony contacts will be allowed to count for points.

11. Only one person will be permitted to operate a specific station during the contest.

12. An exchange of RST reports will be required before points for a contact can be claimed.

13. Only one contact with a specific station will be permitted to count for points during the contest.

14. One point will be scored for inter-British Isles and European contacts, and five points for contacts outside Europe.

15. The input to the final amplifier must not exceed ten watts, nor may this figure be exceeded on any previous stage.

16. Leading stations will be granted certificates of merit, whilst a trophy may be awarded at the discretion of Council.

17. Council have the right to amend or alter the rules at any time prior to the commencement of the contest, and their decision will be final in all cases of dispute.

Cosmic Notes

Sunspots

Cloudy weather restricted the number of solar observations that could be made during November but several average-sized centres of activity were noticed. An average group crossed the central meridian on November 10 and further groups on November 13, 16 and 18. A large group crossed the meridian on November 28.

The Magnetic Elements

The following data is for the period October 25 to November 27. No data is available for November 19. The moderate storm which started on October 24 continued until 21.00 G.M.T. on October 28. Conditions were then calm until November 8, when a moderate disturbance began in the evening and lasted until 08.00 G.M.T. the following day. Except for occasional slight disturbances the elements were quiet from that time until November 17, when they became moderately disturbed during the latter part of the day and continued so during November 18. The period from November 20 to 27 was generally slightly disturbed with the chief activity on the 22nd and 26th (morning).

Critical Frequency Elements

The following details of the ionised layers may be of interest. Measurements were made at Washington, D.C., U.S.A., on Wednesdays at 17.00 G.M.T. (noon local time). For the F2 layer extraordinary ray the critical frequency for vertical reflection on the four Wednesdays in October were: 12,800, 11,600, 14,100, 11,000 kc. respectively. On November 2 and 16 the frequencies were 13,600 and 13,700 kc. It may be pointed out that the highest frequency on which communication over DX distances is possible is about three times the critical frequency given above.

G2XC.

Photographing Amateur Radio Apparatus

By PERCY MURDEN, F.C.S., F.R.A.S., F.R.G.S.

ANY subject to be photographed, such as a piece of radio apparatus, is really furniture, and is known to the professional photographer as "a subject which reflects." Herein lies difficulty No. 1. The next is almost as bad, for unless one uses untold care and the right type of plate the photograph will reveal a hundred and one defects in the woodwork, as well as dust and greasemarks on the metal parts. To avoid this, panchromatic plates with appropriate filters should be employed. It is essential, therefore, that before photographing the apparatus it must be cleaned of all dust.

The Camera

The most suitable type of camera is undoubtedly a quarter-plate or $3\frac{1}{2}" \times 2\frac{1}{2}"$. A fast lens is not necessary, but most cameras to-day have an aperture F/6-F/3.5. A ground glass screen is, in the writer's opinion, essential, for fine focussing can only be obtained by using this, in combination with a dark headcloth, and by running the focussing rachet in front of and beyond the point of focus until pin-point definition is determined. We say "determined," because to focus correctly requires much critical discrimination. To those readers who are myopic—or shortsighted—critical focussing can best be accomplished *without* spectacles.

The camera-object distance depends upon the size of the object and photographic plate, but assuming the apparatus is of the usual type a distance of 7 or 8 ft. might be tried out. A rigid tripod and cable-shutter release are essential to eliminate camera shake at the moment of exposure. If the lateral spread of the set runs out of the picture, then the camera must be shifted back, or, if cramped for space, a wide-angle lens must be used. Distortion must be guarded against by squaring-on the camera to the subject, more particularly if a wide-angle lens is being used.

A suitable background must be prepared. For a radio set of dark colour a plain white sheet of card will be found most useful. If an ordinary white linen sheet is used it must be damped and stretched to avoid creases, as these will show up in the photograph as dark slashes. A dark velvet background is suggested for a chromium-plated set.

Plate

The writer has always found that panchromatic (backed) plates, not films, give better results than "ordinary" plates used in daylight. The panchromatic plate enables the lighting factor to be kept fairly constant, since artificial lighting can be used, and is particularly suited to it. On the other hand, when an ordinary plate is used the daylight factor is constantly changing. Another advantage of the panchromatic plate is that when used with the correct filter it enhances the grain and lustre of the woodwork and at the same time tends to subdue scratches and defects. Care must be taken over the arrangement of lighting, for sometimes a scratch or defect, which is not apparent to the eye, stands out in a most glaring manner in the photograph. However, if it is remembered that scratches, etc., show up according to their degree of luminosity, then a little additional trouble taken over an extra exposure, with slightly different lighting, will be considered worth while.

In this type of photography speed is not essential, and a panchromatic plate of about H. & D. 1200 or H. & D. 700, such as panchromatic Special Rapid or Soft Gradation plate supplied by *Messrs. Ilford, Ltd.*, is excellent for the purpose. For information as to the different types of filters employed to bring out the grain in various light and dark woods, the reader is recommended to study the fascinating booklet "Panchromatism" issued for a few pence by the same firm.

Lighting

Serious difficulties will be experienced if this point is not well considered, for a badly placed light, especially where only one is used, will often produce grotesque shadows, the resultant photograph being utterly inartistic.

In a room where the walls are papered light or tiled this helps to reflect the light evenly; but a suitable background, as mentioned above, must be set up with ample margin each side of the set. Side lighting may consist of a white sheet hung on laths. A lookout must be kept for any reflection from the bright metal parts of the apparatus, and this must be done by taking up a viewpoint near the camera lens, and not through the ground-glass screen, for here these points will be missed. Careful scrutiny is essential.

The main lighting should consist of one, two or three Photoflood high-efficiency lamps; also an ordinary 100-watt pearl type to soften harsh shadows. The Photofloods are usually used in aluminium reflectors, but they can be used in an ordinary bracket-type stand. If this is done, careful avoidance of inflammable shades is urged, as these high-efficiency lamps throw out a great heat. It should be remembered that Photoflood lamps have a life of only two hours and are not designed to burn continuously.

The position of the lamps must also be a matter for experiment; but to commence with one or two Photofloods can be directed from the front sides on to the white background to cut out shadows cast by the set. The third Photoflood could light the set from the front. The 100-watt pearl lamp will be found useful in toning down the general harshness of the lighting, but "flatness" must be guarded against.

One may sum up the subject of lighting in a phrase: the movement of one lamp by even an inch or two may revolutionise a photograph, making success of failure, or *vice versa*.

Exposure

Allowance must be made for the filter factor. This is given by the makers. As exposure depends on so many other factors a trial exposure or two is the best method of arriving at the correct time. Make a note of the number of lamps, distance, aperture, filter, plate, developer, temperature, time, etc., and then correct where necessary.

Negatives and Prints

Negatives should be developed in a M.Q. developer for contrast. They must be sharp for detail, and if intended for reproduction it is recommended

that prints should measure 6"×8", or, better still, 12"×10". Blockmakers prefer to reduce from this size. A little of the picture's sharpness may be lost in reproduction, but if the print is "contrasty," sharp and glossy, a good result is certain.

Summary

Camera : Quarter-plate or 3¼"×2¼" on tripod.
Focussing : Ground-glass screen.
Plate : Panchromatic (backed). Speed H. & D. 700-1,200.
Filters : Delta, Minus blue, Micro, Gamma.
Lighting : Two or three Photoflood lamps, and 100-watt pearl. Reflector sheets.
Background : Contrast.
Exposure : According to filter factor, or, say, 1-25th to 2 secs. at F/11.
Developer : M.Q. acid fixing.
Print : Contrasty, glossy, 6"×8" or 12"×10".

THE N.F.D. FILM DISPLAY AT SCARBOROUGH ON NOVEMBER 7

Front Row : Extreme left, 2DDA with G2CP next. Seated : Second from left, G6SO, fourth G8KU. Third Row : Second from left, G6TG, third 2BGO, fourth G3KS, extreme right, G5GI. Third from right, G5MV.

The R.A.F. Civilian Wireless Reserve

We are advised by the Chief Instructor of the C.W.R. that the following Regional Controllers have been appointed :—

GROUP "A"

Frequency 2583 *kc.*

Berkshire (Mr. A. E. Lambourne, G5AO).
Blackheath (Mr. J. Hunter, G2ZQ).
Cheshire (Mr. J. Croysdale, G5US).
Devonshire (Mr. H. A. Bartlett, G5QA).
Fifeshire (Mr. W. N. Craig, GM6JJ).
Glasgow (Mr. D. M. Tyre, GM5TY).
Hertfordshire (Mr. J. W. Mathews, G6LL).
Kent (Mr. H. C. Page, G6PA).
Leicester and Warwick (Mr. C. S. Goode, G2OH).
South Wales (Mr. G. R. Scott-Farnie, GW5FI).
Surrey (Mr. H. A. M. Whyte, G6WY).
Yorkshire (Mr. H. Biltcliffe, G5HB).

GROUP "B"

Frequency 2727 *kc.*

Berwick (Mr. S. B. Young, G2YY).
Birmingham (Mr. W. G. Money, G2UP).
Brighton (Mr. C. F. Barnard, G8AC).
Bristol (Mr. J. N. Walker, G5JU).
Dornoch (Mr. J. C. Foster, GM2JF).
Ipswich (Mr. J. C. Egerton, G8MU).
Kirkcudbright (Mr. W. J. Ross, GM3VJ).
Lincolnshire (Mr. G. Hutson, G6GH).
London (North) (Mr. K. E. Aris, G8GC).
North Wales (Mr. D. S. Mitchell, GW6AA).
Sunderland (Mr. T. F. Rendall, G6TR).
Westmorland (Mr. A. L. Sherriff, G5CJ).

It is interesting to note that with two exceptions the Controllers are members of the R.S.G.B.

We understand that at the end of October enrolments had reached the highly satisfactory total of 840. Of this number over 300 are fully licensed amateurs.

Air Ministry Station

The Air Ministry Station is now established with the transmitter at present located at Greenford, and remotely controlled from Kingsway. The equipment has been tested for keying on 2727 kc., and a successful test was recently carried out on this frequency with a station in South Wales.

Regional Activities

During November four members in each area of Group "A" were selected to carry out preliminary tests with their respective Controllers.

It has been arranged that each of the twelve areas shall operate on a separate frequency. The necessary frequencies having been assigned tests are now proceeding.

Experimental Section

As a result of suggestions made by the R.S.G.B., Mr. J. W. Mathews, G6LL, has been appointed to take charge of the C.W.R. Experimental Section to deal with technical problems concerning C.W.R. activities.

HEADQUARTERS CALLING

A Personal Message from our President to Every Member

I should like to take this opportunity of wishing you a very happy Christmas and a prosperous New Year, and to express the hope that with your co-operation and support the Society may in the future, as in the past, work successfully for the welfare and progress of Amateur Radio.

ARTHUR E. WATTS, G6UN
President

The Amateur Radio Handbook

This long-awaited publication is now available, and as will be seen from an announcement on another page, the post free price in Great Britain has been advanced to 3s.

When the project was first put in hand, it was anticipated that the weight would allow us to post it for 3d., but due to the additional number of pages, the postage amounts to 5½d. per copy, excluding cost of packing.

The overseas selling price remains unaltered at 3s. 6d. per copy post free.

Christmas Holidays

Headquarters will be closed from 5.30 p.m. on Friday, December 23, to 9.30 a.m. Wednesday, December 28.

We shall appreciate it if members will apply early in Christmas week for Handbooks and other Sales Department items. Frequently, due to delays in the post, orders do not reach us until just before the holidays, which leaves us little or no time to effect delivery before the 25th.

The Braaten Trophy

Hearty congratulations are extended to our Executive Vice-President, Mr. A. D. Gay, G6NF, who, for the second year in succession, has been awarded the Braaten Trophy. This trophy is held by the British Isles amateur scoring the highest number of points in the A.R.R.L. C.W. International Contest. The trophy will be presented at the annual general meeting.

B.E.R.U. Junior Contest

Members possessing 10 watt permits who wish to be recommended for the use of 25 watts during the B.E.R.U. Contests in February are requested to make an application to the Secretary not later than January 7, 1939.

No application can be considered after the above date.

District 18 Representative

Council have been pleased to appoint Mr. E. Mitchell (G5MV), 40, North Marine Road, Scarborough, Representative for District 18. It is hoped that under his guidance, the East Yorkshire District will continue to make good progress.

London Social Event

Since the days of the Pinoli Hamfests the wish has frequently been expressed that a social function could be held in London to which members could bring their ladies.

In order to test out the feeling of the London and Home Counties members, the Secretary will be pleased to receive a postcard or verbal information from those who would support such a venture. It is essential that it should be self-supporting as are similar functions organised in the Provinces with great success.

It would prove helpful if interested members could indicate a suitable inclusive price, together with the type of event they would prefer, such as Dinner, Dinner-Dance, Dinner-Theatre.

If the response justifies proceeding with the idea, a small Committee will be invited to act as organisers.

It is suggested that a suitable time would be towards the end of March.

Cairo Convention

H.M.S.O. announce that the Cairo (1938) Revision of the International Telecommunication Regulations has been published. Three volumes are available, namely Telegraph Regulations (post free 6s. 5d.), Telephone Regulations (post

free 2s. 8d.), and Radiocommunication Regulations (post free 7s. 6d.). The books contain the definitive French text recently issued at Berne, together with the English translation prepared by the British Post Office.

The Radio Regulations should be studied by all members.

B.E.R.T.A. Certificates

The following B.E.R.T.A. certificates have been awarded to members since our last list was published :—

No.	*Name.*	*Call sign.*	*Date.* 1938
16	J. Mahieu	ON4AU	June 2
17	T. P. Allen	GI6YW	,, 17
18	R. W. Rogers	G6YR	,, 23
19	W. E. Marsh	SU1WM	July 5
20	A. M. Braaten	W2BSR	,, 28
21	J. Lips	HB9J	,, 28
22	A. Smith	G6VP	,, 28
23	R. L. Varney	G5RV	,, 28
24	S. W. P. Henton	G5VU	Aug. 1
25	J. S. Owner	G6XQ	,, 20
26	F. J. Finn	G6UF	,, 20
27	F. R. Neill	GI5NJ	Sept. 15
28	T. Martin	G2LB	,, 26
29	H. J. Gratton	G6GN	Oct. 13
30	H. A. Bartlett	G5QA	,, 13
31	S. Riesen	G5SR	,, 13
32	F. H. Cooper	G2QT	,, 24
33	R. T. Dealey	G6DT	Nov. 21

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

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

W.B.E.

Name.	*Call sign.*	*Date.*		
N. P. Haskins	G8JR	September	8,	1938
A. Machan	OK2MA	,,	10	,,
A. Eburne	G2DK	,,	10	,,
C. A. Heathcote	G3JR	,,	16	,,
S. R. McDowell	VU2FV	,,	19	,,
N. F. Joly	SV1RX	,,	19	,,
P. C. Mortimore	G8KI	,,	22	,,
S. Howard	G8TY	October	1	,,
L. G. Watts	G6WO	,,	1	,,
T. Arnold	VU2AN	,,	13	,,
J. Millie	GM8MQ	,,	13	,,
O. A. Spalding	W1FTR	,,	13	,,
J. Fairley	G2IX	,,	13	,,
P. H. Hellier	G8NX	,,	13	,,
W. F. Knott	G3BM	,,	24	,,
J. A. Drinkall	G8MD	,,	25	,,
E. G. Thomas	G8IT	,,	25	,,
A. H. Broomfield	G6OQ	,,	25	,,
P. Stein	G8NV	November	3	,,
M. Ryle	G3CY	,,	5	,,
L. F. Woodhams	G8RL	,,	5	,,
J. B. Duncan	GM6JD	,,	8	,,
J. E. Ironmonger	G8PO	,,	14	,,
A. Tomlinson	ZD2H	,,	15	,,
E. F. Wadsworth	VE5AAD	,,	15	,,
D. W. Flavell	G3PG	,,	17	,,
W. Price	G8OQ	,,	21	,,
A. Garnock-Jones	G8TJ	,,	22	,,
H. W. Scott	G5DR	,,	22	,,
R. H. Atkinson	VK6WZ	,,	23	,,

28 Mc.

G. McL. Wilford	G2WD	September	16,	1938
J. H. Adama*	PA0FB	,,	23	,,
N. F. Joly	SV1RX	,,	19	,,
J. Clarricoats *	G6CL	October	8	,,
Capt. B. Wallich *	G6BW	,,	9	,,
H. Caunce	G6KS	,,	16	,,

*Telephony awards.

Telephony.

G. McL. Wilford	G2WD	September	16,	1938
E. Dell	GW2UL	,,	20	,,
D. Edwards	G3DO	,,	27	,,
W. J. Butler	G5LJ	,,	30	,,
G. H. Grossin	F8RJ	October	20	,,
H. W. Scott	G5DR	November	22	,,

H.B.E.

F. H. Cooper	G2QT	September	23,	1938
H. J. Hunt	G5HH	October	13	,,
H. J. Gratton	G6GN	,,	13	,,
H. Scholz	VK4HR	,,	13	,,
J. L. Bates	VK4UR	,,	13	,,
L. Coupland	BRS3154	,,	20	,,
B. F. Larsen	LA2B	November	21	,,
G. P. Anderson	BRS536 / G2QY	,,	23	,,

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), Little Hallingbury, Essex. (Telephone : Bishops Stortford 785.) In addition to G3GH, of Braunton, North Devon, Mr. W. A. D. Howes (G2CF), Curlew Point, Charleton, near Kingsbridge, will represent South Devon as from the following schedule. Gloucestershire is also represented by Mr. N. F. O'Brien (G3LP), 31, Brunswick Street, Cheltenham, Glos.

	G.M.T.	kc.	Station.	Location.
Sundays ...	0900	1755	G8NF	Manchester.
	0900	1865	G3LP	Cheltenham.
	0930	1792	G8AB	Loughton.
	1000	1080	G8PR	Staffordshire.
	1300	1920	G6VC	Northfleet.
	1230	1758	G6VD	Leicester.
	1500	1887	G3GH	N. Devon.
Mondays ...	2230	1925	G2CF	S. Devon.
	2315	1741	GI6XS	Bangor.
Wednesdays	2215	1865	G3LP	Cheltenham.
	2315	1741	GI6XS	Bangor.
Fridays ...	2230	1925	G2CF	S. Devon.

NEW MEMBERS

HOME CORPORATES

L. W. AIRTON (G2HT), 9, Merton Road, Bradford, Yorks.
R. K. CLEGG (G2PB), Foxhill Hall, Oswaldtwistle, Accrington, Lancs.

V. F. B. Dunk (G2SG), 60, Weston Drive, Belmont, Stanmore, Middlesex.
A. T. Kennedy (GI3KN), 49, Kansas Avenue, Belfast, N. Ireland.
J. Mears (G3LW), 30, Elm Road, Grays, Essex.
J. Gotch (G3OG), The Bungalow, Bondgate, Selby, Yorks.
P. M. Bartlett (G3OK), 47, Sharrard Grove, Intake, Sheffield, Yorks.
T. Gatis (G3TF), 38m, Wrottesley Road, Tettenhall, Staffs.
J. C. Graham (GM3TR), Air Ministry Control Station, Wideford Aerodrome, Kirkwall, Orkney.
R. Sykes (G3UR), "Stonelea," Oldfield Road, Honley, Nr. Huddersfield, Yorks.
G. Farnworth (G3WA), 18, Ramsgreave Avenue, Blackburn, Lancs.
S. Thaw (G8CD), 6, High Croft Crescent, Almondbury, Huddersfield, Yorks.
W. H. Windle (G8VG), 96, St. Alban's Road, Dartford, Kent.
A. Dowdeswell (2ADC), 111, St. Marks Road, London, W.10.
R. F. Hansford (2BGH), 22, Sudley Road, Bognor Regis, Sussex.
R. Tole (2BQT), 7, Testerton Street, N. Kensington, London, W.11.
W. G. Billinghurst (2BRO), 33, Cranbrook Road, Thornton Heath, Surrey.
P. J. E. Maycock (2CWC), 52, Donald Road, Uplands, Bristol, 3, Glos.
T. J. S. Cole (2CYU), "Bearsden," Linkside, Hindhead, Surrey.
H. Smith (2DAN), 13, Oslo Road, Burnley, Lancs.
J. Irwin (2DFO), 85, Stanfeld Street, Blackburn, Lancs.
A. C. Hall (2DOZ), 11, Welwyn Road, Whitchurch, Cardiff, Glam.
T. Sagar (2DVC), 35, 2nd Block, Fallin, By Stirling, Scotland.
D. J. Allen-Williams (2FJJ), "Beach Lodge," Littlehampton, Sussex.
J. B. Roscoe (2FJM), 59, Croham Road, South Croydon, Surrey.
A. Dickinson (2FJO), 111, Sprotborough Road, Doncaster, Yorks.
T. G. Ward (2FKO), Tormeen, Mary Tavy, Tavistock, Devon.
C. D. Adamson (2FMS), 46, Marywood Square, Glasgow, S.1, Scotland.
R. C. Frisby (2FQV), "West View," Leicester Road, Uppingham, Rutland.
K. D. Ayers (2FRG), 8, Hamwell Leaze, Cashes Green, Stroud, Glos.
P. E. Chaundy (3458), 112, Osmaston Road, Derby.
J. S. Gibbs (BRS3459), 100, Bridgnorth Road, Wallaston, Worcs.
E. S. G. Fish (BRS3460), 52, Muir Drive, Irvine, Ayrshire.
J. Greig (BRS3461), Dept. of Elec. Eng., The University, Edgbaston, Birmingham.
E. Shields (BRS3462), 78, The Mount, Renishaw, Sheffield.
H. M. Smith (BRS3463), 28, Talbot Road, Knowle, Bristol, 4, Glos.
H. G. Kendall (BRS3464), 14, Gasking Street, Plymouth, Devon.
A. Baird (BRS3465), Whinbrae, Polmont, Stirlingshire, Scotland.
H. G. Collard (BRS3466), 81, Hampton Gardens, Prittlewell, Essex.
A. E. Cameron (BRS3467), 10, Moor Park Road, Northwood, Middlesex.
P. J. C. Harrison (BRS3468), 63, Southtown Road, Gt. Yarmouth, Norfolk.
C. R. Beaven (BRS3469), 3, Bedford Place, Horfield Road, Bristol,2.
I. I. Bosell (BRS3470), Crawley Grange, Newport Pagnell, Bucks.
J. Leggat (BRS3471), 42, The Avenue, Ealing, London, W.13.
A. E. R. Bucke (BRS3472), 56, Mereworth Drive, Shooters Hill, S.E.18.
J. L. B. Pitcher (BRS3473), Pathways, Loom Lane, Radlett, Herts.
H. A. S. McGregor (BRS3474), 13, Back Lebanon, Cupar, Fife.
R. Allison (BRS3475), 57, Birchfield Drive, Scotstoun, Glasgow, W.4.
D. H. Barlow (BRS3476), 7, Warwick Park, Tunbridge Wells, Kent.
V. H. Thorne (BRS3477), 4, Homerton Street Cambridge.
W. S. H. Morley (BRS3478), 650, Lytham Road, South, Squires Gate, Blackpool.
B. Middleton (BRS3479), Tingley Common, Morley, Yorks.

Dominion and Foreign

O. V. Lacy (TG9OL), 3a, Calle Poniente 18, Guatemala City, Guatemala, Central America.
R. H. Richards (BERS455), Wireless Experimental Section, P.O. Box 48, Quetta, India.
J. R. Farr (BERS456), 1st Bn. Devonshire Regt., Connaught Barracks, Rawalpindi, Punjab, India.

SILENT KEYS

It is with profound regret that we record the death on November 27, at the age of 44, of Baron Louis Bonaert de la Roche, of Marchiennes, Harvengt, Belgium, known to many of us as ON4HM. Baron de la Roche had for several years been QSL Manager of the Reseau Belge, and was a Council Member of our sister Society.

During the never-to-be-forgotten R.S.G.B. visit to Belgium, three years ago, the Baron and his wife entertained the whole company at their magnificent Chateau de Marchiennes at Harvengt. Members will remember in particular the films taken during that visit showing ON4HM feeding a tamed boar.

In recording his passing, we British amateurs send to our Belgian colleagues our sympathies and condolences.

Europe is the poorer for the passing of this Belgian nobleman who was, in every way, a perfect amateur. J. C.

* * *

It is also with deep regret that we record the death of Mr. H. R. Haigh (G2TY), who passed away after a brief illness. Mr. Haigh will be sadly missed by his many radio friends by whom he will long be remembered as a keen amateur, always willing to give his help and sympathy. We mourn the loss of a fine gentleman, and offer our sincere condolences to his relatives in their bereavement.

Correspondence

A NEWCOMER'S VIEWPOINT

To the Editor, T. & R. Bulletin

Dear Sir,—The letter from G5XH, published in the November Bulletin, contains many justifiable, if caustic, remarks, but surely the position is not so bad as it appears.

It is a fact that Amateur Radio is being placed before the public to a far greater extent than ever before, and this places even more obligations on each member of the Amateur movement. It is the duty of everyone to play the game with regard to the observance in strict detail of the licence conditions; the intelligent and considerate choice of C.W. or 'phone and power, according to the particular band activity; the dignified and proper use of such "accessories" as the QSL card; and, above all, the resisting of any attempts to lower the status and high ideals of the real Amateur fraternity. These points, coupled with keen attention to practical operating procedure, would do much more towards clearing away the fog of apparent rapid deterioration than all the enumerating of the things that are wrong. In short, Amateur Radio, like most good things, has got to fight for its soul against modern "blaséness."

Yours sincerely, S. G. Abbott (G3JU).

To the Editor, T. & R. Bulletin

Dear Sir,—I have read with great interest the article by Mr. W. F. Holford in the November Bulletin but I feel that I must point out that special modulation transformers are obtainable at a price equal to or less than the list price of the stock transformers he uses.

Yours faithfully,
For Central Radio & Television, Ltd.,
R. Lidbury (2FKN).

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).

BLACKBURN.—Congratulations to 2CGK and 2AFA on receiving the calls G3VV and G3WA respectively. The following are now active: 2HW, 2PB, 6BH, 6WH, 8FI, 8JA, 8LZ, 3LR, 3TU, 3WA and 3VV.

There was a happy gathering at the anniversary dinner of the Blackburn Group, and a warm welcome was extended to G8UF, 8WY, 2GA, 8NL, 8QS and 8NF, who came from Bolton and Bury. Visits were paid to stations 2HW and 8JA. To wind up an enjoyable day a raffle of apparatus generously given by 8FI and 6BH was conducted. At the conclusion of the evening it was decided that Bury should have a similar celebration in the near future, Blackburn members to pay a return visit (but Blackburn members don't intend walking back!).

Burnley.—Congratulations to 2DKR, who is now G3VO. We also welcome a new member with a new call, 3WU. 8DC and 8UA (father and son) put in a claim to be the first to have separate calls at the same address; 2RB and 5XC are chasing DX with W3EDP aerials; 8TD is our star 28 Mc. station, working the world on phone with 20 watts input; 5ZN is on 3.5 Mc. during week-ends; 3SJ is trying out a pair of doublets at right-angles on 7 Mc.; 3KT has installed a Super Skyrider. 2BFB, 2FIA and 2FBI are also active.

Bury.—The Bury Group held their first open meeting at the Elsinore Café, Town Centre, Bury, on November 15. These meetings will be held on the third Tuesday in each month. The following attended: G2GA, 3CJ, 8QS, 8NF, 8NL, 2BGF and 2BDA, the last being a newcomer to the Group.

The T.R. wishes to thank the Blackburn members for the true ham spirit shown in entertaining the Bury contingent at their dinner.

G8QS (who thanks Scottish members for their hospitality during a recent holiday in GM) now has 25-watt permit. 8NL, who has new mast and

will welcome reports, visited Bristol to meet fellow group members of R.E.S. Active stations include 2GA, 3CJ, 8NF, 2BDA, 2BGF and BRS3008.

Rochdale.—An interesting meeting was held in Rochdale on October 30, when 22 members of the Ashton Short Wave Society made a tour of places of interest. The Fire Station was inspected, following which a demonstration was given on the projectors at the Empire Cinema, a short film being run through, for which thanks are due to *Jackson's Amusements, Ltd.* The tea arrangements were ably carried out by G3BN, after which the party visited 3BN and 6QA, where a CW test call brought a first contact with SV6SF (Crete).

Liverpool.—It is regretted that due to pressure of private business Mr. J. Davies (G2OA) has been compelled to resign his position as T.R. for Liverpool, and in his place the members have elected Mr. H. Caunce (G6KS). In accepting this office G6KS would, on behalf of the members, like to than 2OA for his services to the Group, and at the same time express the hope that he will be able to attend future meetings.

At the last meeting 19 members were present, when plans for a club in the Liverpool area were again discussed. No individual reports have been received, but many stations are active.

DISTRICT 2 (North-Eastern)

Barnsley.—The Association club dinner will be held on December 15 at the Royal Hotel.

Ilkley.—We are sorry to lose G8UQ, who has moved to Harrogate. G6SN has recently completed a very efficient exciter unit, using switched crystals and operating with C.O. or E.C.O. at will. G6BR, 8BT, and 8ID also report active.

Leeds.—G6HI has moved to Blackburn. All his friends in Leeds wish him the best of luck. The following stations are active: G2XY, 5MW, 6GA, 6XT, 8IR, 8OG, 2DRO, and 2FCB. 2CTQ is congratulated on his new call sign, G3QI. Reports of his 7 and 14 Mc. transmissions will be welcomed. Mr. Green, Jnr., son of SU1KG, is staying in the town for a year or two.

Sheffield.—Successful meetings are now being held at Victoria Schoolroom. New members are invited to communicate with the T.R. at 51, Masefield Road, Sheffield, 2. Several stations are concentrating on 1.7 Mc. The following report active: G2AS, 2JI, 3FN, 5HK, 5TO, 6LF, 8JP, 2BXA, and 2DTJ. All members extend their deepest sympathy to G3FN in his bereavement.

Wakefield.—G6WJ and G8NM are keeping weekly schedules on 56 Mc. at 12.00 Sundays, and invite co-operation. G2BM, 6VT, 6WJ, and 8KP are active.

DISTRICT 3 (West Midlands).

Coventry.—On Wednesday, November 23, the sixth annual dinner of the Coventry Amateur Radio Society was held at the King's Head Hotel, Coventry. Among the principal guests were Mr. V. M. Desmond (the D.R.), Dr. Strong (G2RQ) Chairman of M.A.R.S.), and Mr. G. Brown (G5BJ) (Birmingham T.R.).

The result of the M.A.R.S.-CA.R.S. contest was announced and the cups were presented to the winners—the "Desmond" Cup going to G2LB as winner of the Transmitting section of the contest and the "C.A.R.S." Cup to 2FTK in the Receiving section. During the evening G5YS offered to present a cup to the club to be won in a 5-watt contest.

As reported last month, G5PP is operating on 56 Mc. He transmits on this band every Sunday at mid-day and would welcome reports.

Cannock.—Activity has been rather lower, as most members are rebuilding. The C.D.A.R.C. is applying for its transmitting licence and hopes to be on the air soon. The club has proved extremely successful and now has 15 members. A hearty welcome is extended to any new amateurs in the area.

Shrewsbury.—There are now five fully-licensed transmitters in Shrewsbury and the immediate neighbourhood. All local amateurs are asked to get in touch with the T.R., Mr. E. R. Westlake (G6KR), "Ardlui," Wenlock Road, Shrewsbury.

Rugby.—Local meetings have been well attended. G2JN, who won the low power contest (limited to 2 watts input from a 120-volt dry battery) had 60 contacts with 10 countries. G8RL has received his W.B.E. BERS182 has left for India. Active stations are: G2JN, 3DI, 3IS, 3FQ, 8RL, and 8VN.

DISTRICT 4 (East Midlands).

The November District meeting held at Leicester was well attended in spite of bad weather, and by tea-time the assembly consisted of 26 members. It was gratifying to see that most of the smaller towns in Leicestershire were represented, though few attended from the other three counties.

After tea and a very brief business session, the T.R. for Leicester, G6VD, called upon BRS2692 (Mr. E. Frost, of Derby), to give his paper entitled "Meters." Without being mathematical, Mr. Frost gave us an interesting chat on the construction and uses of the various kinds of meter used by amateurs. A brief discussion followed, and then G2RI was asked to take charge during the junk sale. A number of members had brought gear and the proceedings were both profitable and amusing.

The December meeting, at the other end of the District, will take place at the Swan Hotel, Market Place, Mansfield on Sunday, December 18, at 3.30 p.m. Mr. Slack, G5KG, has kindly promised to give a talk and we can confidently look forward to a treat. A request has been received for another junk sale, so remember to pack a suit-case with "spares." The D.R. hopes to have copies of the new Handbook for sale at the meeting.

Mansfield.—Most local stations report active, and monthly meetings continue to be popular. Ten members were present at the last meeting at the Swan Hotel.

Worksop.—We are glad to hear from the Worksop and Retford members via G8ON. A successful meeting was held at G8ON's station on November 6 and a "short-wave circulating library" has been inaugurated among the members in this area. Consideration is being given to a 7 Mc. transmitting contest and G8ON would welcome the views of all transmitters in North Notts. Morse classes are held at G8ON every Monday and regular meetings at this station on the first Sunday of each month. G8PO, G8SD 2CAJ and BRS3436 are actively supporting the T.R.

DISTRICT 5 (Western)

The outstanding item of interest to report upon is the first Conventionette ever held at Cheltenham, which took place during the evening of November 27. The event, which proved highly successful, is described elsewhere. The D.R. regrets that he was unable to attend this function.

G8JQ, of *Bath*, has nearly completed his 28 Mc. rotary beam aerial, points about which may interest others. Instead of using wires and ropes, the aerial is made of conduit piping, and is self-supporting. By using oval section tubing he hopes to obtain a streamline effect which will enable the aerial to withstand gales better than its predecessors! The aerial system is supported on a strong ball-bearing mounting, fashioned from old car parts, and G8JQ has ingeniously solved the problem of keeping rain out of the bearing by cutting in half a rubber ball and making holes in the top and bottom so that the two parts are a tight fit around the bearing. (Descriptive article, please.—ED.)

G2IW now licensed for 28 Mc. is experiencing difficulty in modulating a carrier on this frequency, although everything is normal on 14 Mc. Others active include G8DX, G8HW and 2DLW.

The monthly meeting held in *Bristol* on November 3 resulted in another excellent attendance. Fifty members had been circularised to the effect that T.R. nominations would be discussed, and the fact that over forty members turned up emphasises the interest taken locally in Society affairs. The present T.R., G5UH, announced his intention of not standing for that office next year. He, and his scribe G2IK, desire, through the medium of these notes, to express their thanks for the support accorded them during the past year. It is also appropriate here to express the thanks of the D.R., speaking as an ordinary member, and of the local members to G5UH and G2IK for the energetic way in which they have carried out their duties. All are agreed that the past year in Bristol has been one of the best, if not the best, in the memory of present members.

At the same meeting Mr. Proctor-Gregg gave a very interesting talk concerning the progress being made by the C.W.R., and much interest was shown.

The schedule of visits to places of interest was maintained during November with a visit to Broadcasting House, Bristol. The engineer who showed the party round explained everything so clearly that few could think of any questions to ask when invited to do so! The Effects Studio provided some amusement, as also did the audition of 2BYU!

FORTHCOMING EVENTS

Dec. 16 District 14 (Brentwood section), 8.15 p.m., at 2DRI, 2, Sebastian Avenue, Shenfield.

,, 18 District 11, 6.30 p.m., at GW6KY, "Cavendish House," Prestatyn, Flintshire.

,, 18 Scotland "H" District, 7 p.m. prompt, in District Shack, 3a, Bank Street, Kirkcaldy. Special meeting for display of R.S.G.B. and N.F.D. films.

,, 21 District 1 (Liverpool section), 8 p.m., at 56, Whitechapel, Liverpool.

,, 21 Scotland "E" District, 7.30 p.m., in Fleury Meng's, 48, Newmarket Street, Ayr. Lecture by Mr. J. H. Preston, BRS1295: "Reception on 1.7 and 3.5 Mc."

,, 21 District 14 (East Essex Section), 8 p.m., at G5UK, "Newhaven," 19, Meadway, Westcliff-on-Sea.

,, 22 District 13 (Central Areas), 8 p.m., at Brotherhood Hall, West Norwood.

,, 22 District 6 (Exeter section), 8 p.m., at Y.W.C.A., Exeter.

,, 28 Scotland "A" District, 7.30 p.m., in room "A," Institution of Engineers and Shipbuilders, 39, Elmbank Crescent, Glasgow.

,, 28 Scotland "H" District, 7.30 p.m., in District Shack, 3a, Bank Street, Kirkcaldy.

,, 30 Annual General Meeting, 6 p.m., at I.E.E. Tea at 5.30 p.m. Lecture by Mr. R. H. Hammans, G2IG. Subject: Recent Improvements in Receiver Design.

Jan. 1 District 7, 2.30 p.m., at Tumble Down Dick Hotel, Farnborough, Hants.

,, 2 District 14 (Chelmsford section), 7.30 p.m., at G5RV, "Arvika," Galleywood Road, Chelmsford.

,, 4 District 14 (Colchester section), 7.30 p.m., at G8PZ, 19-21, Artillery Road, Colchester.

,, 4 S.L.D.R.T.S., 8 p.m., at Brotherhood Hall, West Norwood.

,, 5 District 15 (W.L.S.), 7.30 p.m., at G8ZD, 259, Ladbroke Grove, North Kensington, W.10.

,, 5 District 6 (Exeter section), 8 p.m., at Y.W.C.A., Exeter.

,, 7 District 15 Dinner at Park Royal Hotel, 7.15 pm.

,, 11 Scotland "H" District, as above.

,, 11 District 15 (W.L.S), 7.30 p.m., at G8KZ, 348, Portobello Road, North Kensington, W.10.

,, 13 Northern Ireland District, 6.30 p.m. at Thompson's Restaurant, Belfast.

,, 19 District 15 (W.L.S), 7.30 p.m., at G3UQ, 70, Wormholt Road, Shepherds Bush, W.12.

,, 19 District 6 (Torquay section), for Exeter and Torquay, 8 p.m., at "Sherrington," Cleveland Road, Torquay.

,, 21 Scotland "H" District. Annual Dinner to be held in the Station Hotel, Kirkcaldy, at 7.30 p.m. Tickets, 7s. 6d. each.

,, 25 District 15 meeting, venue to be announced later.

The fact that many of the Bristol amateurs have commented on the poor conditions prevailing on all bands indicates that activity is well maintained.

There *is* activity in *Cheltenham* and plenty of it. The T.R. (G5BK) reports that notes have not been submitted recently because of the decision to cut these down to include only items of " real " interest. He notes also that certain other Districts still give detailed accounts of individual members' activities. G8DT, 6ZQ, 8ML, 5BK, 8LB, 3LP, 8DA and 3LZ are active on the 56, 28 and 1.7 Mc. bands chiefly. G6IH, Malvern, suffered a breakdown, but is now back on 56 Mc. after a rebuild. He is joined by 3QL, who has moved to Malvern.

The D.R. learns with interest that the legal owner of the call, G3WD, resides in Redditch, and the misguided amateur in Bristol who has been using this call and giving his QRA as Gloucester is warned to cease his undesirable activities.

A full list of the names and addresses of T.R.'s for 1939 will be given in the next issue. In this connection the D.R. would like to see the Weston amateurs appoint an official T.R. to act on their behalf, and advise him, at the earliest moment, the call of the member selected.

The D.R. extends Christmas and New Year greetings to all old friends.

DISTRICT 6 (South Western)

Torquay.—The usual monthly meeting was held at G5SY, when there was an attendance of nine. This was not quite as good as usual, but it may have been due to the fact that members are relying too much on receiving notice cards, and not noting for themselves the dates of the meetings as given in " Forthcoming Events." Quite sufficient notice is given in THE BULLETIN, and it should not be necessary now to send out cards.

Most members in the area are active, and G2CI, 3HW, 5SY, 5IF, 6JL, and 6WT are using one or more bands. Certain trees, extremely local to G5SY, are expected to be brought down soon, and, as those who know them will agree, this should be a golden opportunity to find out if there is any difference in results on the H.F. bands.

North Devon.—There is nothing of special interest to report, although all stations report active. Several members, who had looked forward to B.E.R.U. next year, will be debarred from entry due to the change of operating periods. It has been suggested that, next year, a consensus of opinion be taken by vote.

Taunton.—The following members visited the QRA of G3SB: G6LQ, 5TN, 5GT, 5AK, 3SB, 3KX, 3VA, 2DBB, 2CMM, BRS3446, and Mr. Upstone, a prospective member. All very much enjoyed the visit. Schedules were made with 5LM and 6FO on 1.7 Mc. and also with 6FO on 56 Mc. In the later QSO the signals were received at S5.

Cornwall.—The D.R. has received letters from two members in this county. The first is from G2CJ, who says that after lots of wandering about the country he has at last landed in a place where he is likely to stay, at least for some years. He has not been active for some time, but now hopes to take the gear out of cold storage and get on the air. His QRA is Camelford, North Cornwall. Welcome to No. 6, O.M.! The other letter comes from ex-BRS2792, who is now G3WJ. (Congratulations). He wants to know what has become of the Cornish membership, as nothing is nowadays reported of them. He thinks it is high time that something was done about it. The D.R. has many times, by letter, in THE BULLETIN, and by personal contact, tried to get someone to take this area in hand, but nobody seems prepared to do the job. A volunteer, or volunteers, wanted, please! No reports have been received this month from Exeter or Plymouth, but it has been reported indirectly that these areas have held their meetings as usual.

Will all members please note that on Thursday, January 19 there will be a combined meeting of Exeter and Torquay members at G5SY. At this meeting the Society films will be shown.

A Merry Christmas and a very Happy and Prosperous New Year to all members, and particularly those in No. 6.

DISTRICT 7 (Southern)

At the October meeting, G6NA gave a most interesting talk on the design of amateur band superheterodyne receivers using his own home-built receiver as an example.

The next meeting will be held at The Tumble Down Dick Hotel, Farnborough, Hants, on Sunday, January 1, at 2.30 p.m., when the D.R. will give a talk on " The Design of a Modern Exciter."

Portsmouth.—At the November meeting, held in conjunction with the South Hants. R.T.S., G2XC was asked to continue as T.R. for the coming year. G3LV gave a very interesting lecture on Microwave Communication, and demonstrated his apparatus. Several new members were present at this meeting, but there are one or two local R.S.G.B. members who did not answer the T.R.'s letter, and whom he has not met. It is assumed that these members do not wish to participate in local activities. Congratulations to G3WZ (ex-2CBL), and welcome to BRS3427 and 3437. 3WZ is using very low power from dry batteries on 1.7 and 7 Mc., and would appreciate reports. 6NZ came back to Portsmouth for a week-end, and visited the T.R. He hopes to be in " Pompey " again at Christmas for a short period.

Guildford.—G6GS contacted K6 and VK on 28 Mc. 'phone. 5YA, 6YZ, 8GS, 8IX, 8UG, are active on 14 Mc., and 6GS, 6LK, 5WP on 28 Mc.

Reigate.—The East Surrey Short Wave Club is still holding well-attended and successful meetings. The club have recently enjoyed talks of an educational nature from some of their own members (including G5LA and G6JF), with the transmitter at G6JF used for demonstration. Aerials for transmitting and receiving was the subject of a splendid talk by G2MV. G2YL, 5LA, 5LK, 6JF, 8HH, 8MP, and 2BGN are active, and G8KI is rebuilding.

Kingston.—The New Malden Radio Society was successfully launched on November 14 with an enthusiastic meeting. Ex G6NK hopes to be on the air again soon. G8HA is now in Edinburgh. The following are active: G2GK, G2NH, 3AV, 3BF, 3DZ, 3NF, 3OR, 3VK, 5LC, 5MA, 6KP, 6MB, 6PK, 6VR, 8HY, 8SM, 8TX, 2BLX, 3CXI, 2DGB, 2DOK, and BRS3297.

Reading.—We welcome to the District G8LG and BRS3480, also congratulate 2FPD on his

A.A. call. Several A.A. members have passed the Morse test, and are awaiting full licences. At the local meeting, which was held in November with some 20 members present, a lecture was given on 112 Mc., followed by general discussion. Most members report active, some on C.W.R. work. 2DKQ reports he has now heard 148 countries, and that he is studying the effect of electrical, magnetic, solar, and cosmic phenomena on radio conditions.

Croydon.—G2KU is on 28 Mc., and needs Asia for W.A.C. and W.B.E. phone awards; 2DN has built a super-het employing Acorns; 8TB has joined C.W.R.; 5XH, 5AA, 3IG, and others are experimenting with a "mystery" aerial developed at the latter station; 2VZ is on 28 and 56 Mc.; 5GQ and 5HI work QRP on 1.7 Mc., and join in the local QRM on 14 Mc.; 6VA is on 56 Mc. using c.c.; 6SM, after a long absence, has been heard on 14 Mc.; 5BT is in the same category, but finds DX hard to raise from his new QRA; 3VN is a new call, and the owner receives our best wishes; 8LU has been heard with a self-excited note; 6NF is often heard working DX; 2TI although inactive, supports Surrey Contact Club meetings.

BRS3003 and 3179 continue to log good DX on 28 Mc.; 2AAO is now 3VT.

VS1AN is extended a warm welcome to the Area. He hopes to be active shortly.

The Surrey Radio Contact Club continues to prosper. Meetings are held at the Alhambra, Wellesley Road, Croydon, at 8 p.m. on the first Tuesday in each month.

The D.R. takes this opportunity of wishing everyone in No. 7 District the very best of luck for Christmas and the New Year.

DISTRICT 8 (Home Counties)

A District Meeting was held at the Waffle Cafe, Petty Cury, Cambridge, on Friday, November 4. Sixteen members were present. A District Committee was elected, consisting of G5JO, 2XV, 5DR, and 8SY. Ways and means of building up a substantial Field Day Fund for 1939 were discussed, whilst a Junk Sale of goods provided by BRS2739 realised £1 8s.—a good start. Other offers of junk would be welcome. G5NP gave a brief talk on "Smoothing of Power Supply," followed by a demonstration with an oscilloscope.

It has been decided not to hold a monthly meeting in addition to the R.S.G.B. Film Show, during December.

The Committee has formulated the rules for the District DX Contests for the Granfield Trophy, to be held during January and February.

Most of the *Cambridge* stations report activity. G2XV awaits better conditions to decide whether his three-element vertical beam is really more successful than the vertical Windom he used previously. 5DR has qualified for BERTA, WAC, and WBE. He is checking contacts for the DX.C.C. 5JO is active on 3.5, 7, 14 and 28 Mc. 5DQ has now WAC on CW. 2PL is seeking DX on 1.7 Mc. in the early mornings. 8SY is active, and 5BQ is trying out a pair of PX 25a's as modulators.

From *Peterborough* we learn that 3DY has a motor-driven 65 ft. revolving beam, almost completed, for use on 14 Mc. 2UQ, using a Zepp. aerial, has a fine signal on 7 Mc. 2NJ operates from alternative QRA's. During the week he works on 7 and 14 Mc. from Peterborough, whilst at week-ends he uses a CO on 1.7 Mc. from his bungalow on Heacham beach. Congratulations to Mr. Thurlow who is now on 7 Mc. as G3WW. 2DSL, of Hunts, is busy with the code. 6WA and 6FL are often heard on 1.7 Mc. and 5OV on 14 Mc.

At *Luton* 3KG and 5CS are active.

News from *Bedford* at last! G5FO has worked VK7. BRS2811 is now 2CAP. 6HB hopes to be home from Australia in time to be on the air at Christmas. 5PA is on 7 Mc. 2BFN is experimenting with some novel aerials for reception.

The D.R. would like to take this opportunity of wishing all members the Compliments of the Season.

DISTRICT 9 (East Anglia).

The meeting held in *Norwich* on November 27 was well attended and voted a great success by all present. With the D.R. in the chair the following subjects were discussed:—N.F.D. for 1939; and the possibilities of an inter-station network in the district, working on 1.7 Mc. and 56 Mc. It is thought that if experimental communication between our own members could be made more frequently, this would in some measure make up for the fact that we are so scattered. After a meat tea had been disposed of, a general rag-chew took place. The meeting closed at 7 p.m., after which two of the Norwich stations were inspected. Thanks are due to Mr. Nicholson, G2MN, for arranging a very excellent place of meeting.

Mr. Firmin, G5QO, having asked to be relieved of his duties as scribe, Mr. H. A. Spashett, G3RK, of Beccles, has been appointed by the D.R. to take over this work.

Ipswich.—Local activity during the past month has not been very great with the exception of G8MU, who has worked consistent DX on 28 Mc. with his new beam aerial. G3OJ has been getting good reports on his 1.7 Mc. transmissions. Others active include G6TI, 2JD, 8KB and 2AN. G8AN is building a 1.7 Mc. rig. The local branch has lost another member in the person of 3NQ, who has been moved to London, where we wish him every success.

Great Yarmouth.—Activity and interest is still high. G3RW is working DX with QRP on 14 Mc. BRS3255 is rebuilding his receiver, and 2FAO expects to resume activities very shortly. Welcome to a new member, Mr. P. Harrison, BRS3468. The local club is still progressing.

Other Towns.—G2XS and 5UD, of Lynn, are both active. 8FL, of North Walsham, is on 14 Mc., and 3RK, of Beccles, is on 7 Mc. 3UT, of Bungay, works on 14 Mc. At Norwich, G6QZ is concentrating on 56 Mc., having had 12 contacts with 6DH, Clacton, and one with 5BY, Croydon (105 miles). G2MN, 2UT and 8VW are also active.

Scribe's Note.—G5QO wishes to take this opportunity of thanking all those who have assisted him to compile the notes during his term of office, and extends a hearty welcome to his successor. All reports for next month must be sent, not later than Dec. 24, to Mr. H. A. Spashett, Smallgate, Beccles, Suffolk. (The D.R. takes this opportunity of thanking Mr. Firmin for his good efforts during the past two years.—G2XS.)

DISTRICT 10 (South Wales and Monmouthshire)

Main items of news this month concern the eastern end of the District, where there has been a marked increase in 56 Mc. activity; what is even more gratifying is that all of it is crystal control and CW receiver operation, with the result that the alleged "blind spots" are rapidly being eliminated. GW2NG and G6FO hear GW8CT (from 28 Mc.), GW5BI receives G6FO and GW8WU can work the latter with ease, which establishes a reliable Cardiff-Newport-Bristol 56 Mc. link. This could also include Weston, as G6LQ and G6FO likewise QSO without difficulty, and it is anticipated that when the newer stations settle down to regular schedules, they will all be able to contact one another. G2JL, GW2NG and possibly GW8CT will be ready for transmission shortly, and we now look to co-operation from the Swansea area to expand the links. The G5BY-G6FO London-Newport working has been maintained through the month, though there are times when they can only just hear one another and solid QSOs are not then possible. G6FO has been received in Minehead, and reports continue to come in from the South Coast.

Blackwood.—Regular meetings are being held fortnightly, and the famous Hamfest has been arranged for Thursday, January 19, 1939, at the Butchers Arms, Blackwood, 7.0 for 7.30 p.m. As in previous years, it is hoped that this event will be well supported from the Newport and Cardiff areas.

Cardiff.—The R.S.G.B. meeting on November 24 drew GW2BG, 2JL, 2UH, 2XZ, 3AJ, 3VL, 5AB, 5BI, 5FI, 5XN, 6FO, 8AM, 8GN, 8NP, 8UH, 8WU, 2BQB, 2BUF, 2DBO, 2DHM, 2DOZ, 2DSD, and 2DXS. The D.R. propounded some controversial topics for discussion, such as "Is QRP preferable to QRO?", these being drawn from a hat and introduced by the victims, after which they were discussed by the meeting at large. As one subject was exhausted, another was brought up, the result being that some extremely interesting and instructive points were raised from unexpected quarters.

There is nothing to report from Newport, Swansea, Chepstow, Monmouth, Merthyr or Pembroke, and it is from these areas we should like to hear some news.

The D.R. takes the opportunity of wishing all members of District 10 a very happy Christmas and a prosperous and plentiful New Year.

DISTRICT 12 (London North and Hertford)

At the November District meeting, Messrs. Adams and Pickard, of *Webbs Radio*, kindly displayed a full range of modern American apparatus, including *Hallicrafter* transmitters and receivers. Also on view were several types of morse key and recorders, each piece of gear being connected up and in working order.

Welcomed to the meeting was Mr. J. Shirley (ZL2JQ), who was invited to give a brief account on his impressions of American and British radio conditions.

In response to G6CL's gentle reminder at this meeting *two* members have been nominated as Area or Town Representatives. Such is the apathy of No. 12!

There will be no District meeting in December, but at the January meeting it is hoped to make preliminary arrangements for N.F.D. All interested in this popular summer event are urged to attend.

Activity in North London is well maintained. G2YD (ex-2DPV) is doing well on 7 Mc. with a modified version of "The DX Two"; 3DT, back from Wales, is on 7 Mc.; 8TY is having some difficulty with his transmitter on 28 Mc., but hopes the rebuild will overcome the snags; 5FA is planning to work on that band; 5CD, 6LL and 6OT are active on 56 Mc.; 6CL found DX on 7 Mc. during the beginning of December, W7EC (Montana) being worked at 07.45 G.M.T.; 6WU continues aerial experiments on 28 Mc. The D.R. is, as usual, busy on bench work.

Welwyn.—At the meeting of the Central Herts group at G2YN on November 4 details were completed of a local contest which is being organised. This event will take place during the last fortnight in January and entrants will be restricted to a 120-volt supply derived from a standard 5s. dry battery feeding all stages. If the contest is a success it may be possible to organise a general low-power test for the whole District in the spring. It had been intended to restrict the present contest to amateurs in the Central Herts or Welwyn group but owing to the difficulty in deciding just where the boundary of that group begins and ends, it has been decided to throw it open to all members resident in Herts. Many will already have received entry forms, but those who have not can obtain them from the T.R., Mr. J. Hum (G5UM), "Byways," The Drive, Welwyn.

The D.R. and T.R.s wish all members a very Happy Christmas and Prosperous New Year.

DISTRICT 13 (London South)

A meeting of the Central Areas held at West Norwood on November 24 was well attended. We were pleased to welcome Mr. Bassiouni Ahmed from Cairo, who is visiting London. Mr. Ahmed, who is a keen amateur, is very anxious to become a paying guest with some amateur within the District. An amateur who is in the wireless trade would be preferred; the D.R. would be pleased to hear from anyone able to assist in this matter.

G5PY has now maintained his regular morning schedule for over three weeks with our old friend LA3G. 2JK is active and has spent some considerable time dissecting 2UX's superhet and finding out "what makes it tick!" He seems particularly dextrous with the soldering iron. 2UX, 3DF and 3CU are active. OK2GO has paid visits to several stations. 2DKZ has passed his morse test and awaits his call; congratulations, and good luck O.M. 2GZ is still getting good results from his new aerial. 2CX is exceedingly busy with a major rebuild and we look forward to hearing him back on the air once more. 2WV is active.

Before closing these, the last notes of 1938, the D.R. would like to take this opportunity of thanking everyone for his support and assistance during the last year. We think that District 13 has fully maintained its progress and we look forward to a successful 1939. In conclusion, the best of good wishes for Xmas and the New Year to all.

DISTRICT 14 (Eastern)

East Essex.—The meeting for November was held at G2KH when the attendance was 16 including G3BS and G5RV from Chelmsford. The chief topic of discussion was the QRP transmitting contest, which commenced on December 11. G5UK has kindly offered to present a prize to the winning entrant. At the junk sale which followed a few members managed to dispose of unwanted gear but prices obtained were poor. G2KH has just finished building a new superhet which is working well on 7 and 14 Mc. G5UK has been building an all-bands exciter unit as described in a recent issue of *QST*, and he hopes to be active again very shortly after a long absence. 2DDL has passed his Morse test and is awaiting a call sign.

Chelmsford.—At the November meeting held at G5RV it was announced that Mr. Fuller, G6LB, was relinquishing his position as T.R. A cordial vote of thanks was accorded to Mr. Fuller for his past services and congratulations extended to him on his forthcoming marriage.

Mr. Varney, G5RV, was unanimously elected the new T.R.

G3BS continues to comb the 14 Mc. band very thoroughly and appears to have worked all the available XU's! 5RW has been getting grey hairs over his various and frequent modulation problems but is showing commendable tenacity! 2KG continues to bombard the W's with his W8JK beam on 14 Mc. and is watching 28 Mc. closely. He is our pioneer 56 Mc. station and wants local co-operation. 8AD is active on 7 and 14 Mc. and mourns the passing of his Rotary Beam for the latter band! 3OX is putting finishing touches to a new 56 Mc. rig. 2DZL is constructing sub-standard frequency measuring equipment which includes a 100 kc. quartz bar. He has applied for his full call. 2GN has built a new 1.7 Mc. rig and will soon be active again. 6ZC seems to be too busy playing with 100 kilowatts at work to get on the air with his QRP transmitter! 5RV intends to give 6WY a run for his countries from now on. The rotary beam should be in operation when these notes appear.

Town meetings will in future take place regularly on the first Monday in each month. The next will be at G5RV on January 2, 1939.

Brentwood.—The following report active:—G2WG, G3MV, 3VD, 3JW, G8RC and 2CYW. 2ATU has applied for full licence, as has also 2AWK. A round up by G3LA has produced a number of prospective members.

Colchester.—Congratulations to BRS2063, now G3WP, and to 2DDZ now G3VM.

East London.—The November meeting was held at G3XS, Chingford. 2CID has passed his morse test and awaits call sign. G5DY has joined the R.A.F.C.W.R. G3KZ is contemplating a superhet for "ten," also a 56 Mc. receiver. Congratulations to 2DJI, of Chingford, now G3XS.

DISTRICT 15 (London West, Middlesex and Buckinghamshire).

If you have not yet bought your ticket for the District Dinner and Social to be held on January 7, 1939, you are asked to apply to your T.R. or to a member of the Social Committee at once. A good time is assured so send 5s. 6d. to make certain of being there. The venue is the Park Royal Hotel, situated just outside the stations on both G.W.R. and Piccadilly railway. We expect to have Mr. and Mrs. G6CL with us.

The largest attendance ever recorded was attained at the November meeting, with 44 members and visitors present. A fine lecture was given by G5NG.

Letters for the budget have increased and those who made promises to contribute have kept them. More would be welcome as we wish to revive the budget to its original size. Last month some letters arrived too late for inclusion, so please send them early.

Congratulations to the following members who have graduated—BRS1449 to G3UO, BRS2475 to G3TT, 2CMG to 3UQ, 2DFJ to 8ZD and BRS2178 to G6ZY. Welcome to 2ACD and 2BQT, who join the District.

West London.—The T.R. has arranged meetings for each week. These will be found under "Forthcoming Events" and marked W.L.S. (West London Section). The following are known to be active and some report—G3UQ, 5FG, 6CO, 8KZ, 8VM, 6RW, 6ZY, 8WR, 2ACD, 2BQT, 2DRF and BRS3074.

Middlesex.—The following are active, some reporting—G3TT, 5JL, 6WN, 6VP, 2IM, 8FA, 8ZD and 2DZK.

Both G6VP and G3UQ are at home for ham visits on Saturday evenings.

No reports from South and North Middlesex and Buckinghamshire this month. *Why?*

The DR would like to wish everyone a Very Happy Christmas and Prosperous New Year.

DISTRICT 16 (South Eastern)

So far T.R. nominations have only been received from Brighton and Eastbourne. This is rather a disappointing result, and it is hoped that further names on the "better late than never" principle will be received in the near future.

Ashford.—Meetings have been well attended. G2JV, 2QT, 3SL and 8RK report active on 14 Mc. The first mentioned is obtaining fairly good results from a vertical aerial on this frequency, and has worked ZL.

Brighton and Hove.—Congratulations to Mr. Lunson, the T.R., who is now G3WR. He is putting out a nice 'phone signal on 7 Mc. The November meeting took the form of a debate on commercial *versus* home-built receivers, and resulted in a large majority of the 18 members present voting for home-made apparatus. Active:—G2RU, 3HP, 3JF, 3WR, 6CY, 8AC, 8OQ (latter mainly on 28 Mc.; is awaiting cards for WAC/WBE), 2BYD and 2DGR (taking Morse test).

Eastbourne.—Please note that G3CX has moved: his new address is 48, Willingdon Road, Eastbourne. Active:—G2AO, 3AT, 3CX, 5BW, 5IH, 8CP and 2AVG.

Gravesend.—The group's reputation for interesting meetings was maintained on November 7, when G3GF demonstrated the new "Avo" test instrument, complete with its various adapters. He also exhibited a tape-operated automatic sender of his own design, which reflected great credit on his constructional ability. 6BQ gave an impromptu description of his new ECO 1.7 Mc. transmitter on November 21, when 2MI and 6WY, who were to have addressed the meeting, were prevented by fog from attending. Coming lectures are:—

January 2 : " Amateur Television " by Marconi's. *January* 30 : " Cathode Ray Oscilloscopes " by Mullards. *February* 13 : " Metal Rectifiers " by Westinghouse. *February* 27 : G6CL. *April* 10.. " Interference Suppression " by Belling Lee. Active :—G2IZ, 2TN, 5IL, 5SI, 5SU, 6BQ, 6VC and 2BDL.

Heathfield.—Activity :—G5AQ, 5JZ, 5PN (experimenting with W8JK beam), 2CJZ, BRS1173 (listening on 56 Mc., but complains of lack of activity).

Tunbridge Wells.—G2UJ continues to get out well on 56 Mc. CW, and is also active on 1.7 and 3.5 Mc. 8NO has a new shack at Tonbridge School with greatly improved aerial facilities. Also active :—G5KV (1.7 Mc. and rebuilding for other bands), 6OB (7 and 14 Mc.), 2AKQ, 2CUS and 2DIC.

Whitstable.—G5CI has worked good DX on 7 Mc., despite QRM. 2BJN and 2CMI have passed the Morse test and await their calls.

DISTRICT 17 (Mid-East).

Grimsby.—Although very few reports are to hand all stations are known to be active. G5GS continues on the 28 Mc. band and his evening schedules on 7 Mc. are well supported. 2BXG awaits his full licence.

Brigg.—G8AP reports the loss of his 50-ft. lattice mast in the recent gales, but still works W stations on 28 Mc. 'phone.

Lincoln.—G5XL is putting the finishing touches to his new transmitter and hopes to be active soon. 2CFT awaits news from the G.P.O. regarding full licence. BRS 2527 and 2270 both report. 5XU reports the completion of a new shack : he hopes to get the transmitter on the air soon.

Gainsborough.—Congratulations to 2CFA, who becomes G3WB, thus putting his town on the " ham " map with two stations, the other being G3OS.

Cranwell.—G8PI has now left us ; we are sorry to lose so enthusiastic a member and wish him luck at his new location. New arrivals are 6NZ and 5JB, who hope to be active shortly. 8FC is erecting a new aerial array.

Mablethorpe and Sutton.—Still no report from this area, but we presume 28 Mc. has kept 5CY and 5BD busy during the past few weeks. We shall also be pleased to hear from 2FT and 5LL.

Boston.—Nothing has been heard from this town, but we believe the usual activity continues.

DISTRICT 18 (East Yorkshire)

In taking office as D.R. the writer records his thanks to Council, and at the same time wishes to inform all members in the District that he is looking forward to meeting them at local gatherings. In order that these notes shall be of real value an appeal is made for activity reports, which should be sent to a member's T.R. not later than the 25th of each month. Those who are not attached to a Town Group are invited to report direct to the D.R., G5MV.

Scarborough.—Mr. H. P. Wiggins, G2CP, has resigned from his position as T.R. and Mr. L. Tranmer, G6TG, has consented to take on this work. We are pleased to report that Mr. J. Cooper, G6CP, is back at home after his accident. He has been heard on the air but is still unfit for work. G5GI, 5MV and 6TG are on 28 Mc. phone ; 8BB hopes to be on that band soon. 2DDA is rebuilding his receiver and 2BGO is re-assembling his gear at his new QRA. G2TK expects to be active on 14 and 28 Mc. shortly from a new QRA. 6SO has worked XE on low-power 14 Mc. phone. The T.R. will be pleased to hear from all other members not mentioned above.

A very enjoyable evening was spent at the St. Alma Hotel on November 7, when the N.F.D. films were greatly appreciated by a large gathering of members and their ladies. It was decided to prepare a local N.F.D. film next year.

Meetings are held at 8 p.m. every Monday at the Scarborough Short Wave Club (2BXX) in Gladstone Lane.

Driffield.—G6UJ reports that 2KO is now on A.C. mains and has a Raymart transmitter. 3DW is experimenting on 56 Mc., whilst 6UJ has 3.5 Mc. phone in operation.

Hull.—G5HA brought his 56 Mc. receiver to the last meeting, and answered queries regarding its construction and operation. It is hoped that this talk will foster interest in 56 Mc. work.

G6OS is making good contacts with new countries on 28 Mc., and has now reached 98.

Others active include G2XA, 3IU, 3PL, 5HA, 5JD, 5MN, 8UL, and BRS3271, whilst BRS3445 is welcomed as a new member.

DISTRICT 19 (North-Eastern)

The D.R.'s appeal last month for the appointment of T.R.s brought one nomination from South Shields. What about it, Sunderland, Middlesbrough, Darlington, Newcastle ? G2CR is willing to stand for Newcastle if somebody will propose him.

South Shields.—All stations report active. G5SB finds DX rare, but 8JO works plenty of Ws, 6XO is trying out a new transmitter. 8KK hopes to get an outside aerial soon, but continues to work Ws with an indoor one. 8VV is still unable to get his push-pull PA to work satisfactorily. Both 8IF and 8AO have burnt out their power packs ; 5WZ is occasionally active on 3.5 and 28 Mc., but has little time for radio at present.

Newcastle.—G5QY now wants one card for DX Century Club, and one card (Nevada) for W.A.S. 2CR is active on 28 Mc. only, and finds conditions very good.

Stockton-on-Tees.—G2FO is active on 1.7 Mc., but finds contacts hard to obtain, although plenty of signals are heard. 5XT is trying out a new aerial—three half waves in phase—on 14 Mc. 8CL has also erected new aerial, but is having trouble with BCL interference. 5QU is still working DX on 28 Mc. 6DR, 8OH, and 8PS are also active.

Scotland

" A " District.—At the monthly meeting three short lectures were delivered by GM8RJ on " Automatic Modulation Control," GM8TT on " Problems of Operation from D.C. Mains," and GM5ZX on " Operating Procedure." Last month it was stated that GM6MS and GM6ZV were active on 56 Mc., and interested members were asked to get in touch with either station. Apparently, however, the notes are not read, or there is no one now interested in work on this band, for at the time of writing no

member had got in touch. Work on 56 Mc. continues at both stations, and the operators will be pleased to hear from anyone interested. It is impossible to give operating times just now, as by the time this appears in print there is the possibility of present times being altered.

" B " District.—General activity in the district is increasing, local stations having been heard on all bands from 1.7 to 28 Mc. Certain individual members are engaged in experimental work on aerials and portable apparatus. During November meetings were held as usual, and a visit was paid to the local Telephone Exchange. This visit proved most interesting. The working of the Exchange and the Repeater station was fully explained in a most attractive manner. A Band Occupancy Group has been formed in the district, and the D.O. wishes to thank those members who offered their services. All members are requested to note that a social evening will be held on Friday, December 23. Members from outside the district will be welcomed. (Dundee and district members, please note.) The members in the district wish to thank Council for the reconsideration which they have given the rules for the B.E.R.U. Contest.

" C " District.—Activity was well maintained during the past month. GM6RT and GM3KU have installed new shacks. Congratulations to GM6RI on the arrival of a junior op. Mr. Anderson (BRS3350) is now 2FQO. GM8CF has been re-elected D.O. for 1939. WIDF's 6-valve super (*QST* for October) is considered a good job and at least two are under construction in the district. GM8HM is now WBE. There is no news from Kirkbuddo, Forfar or Crieff.

" D " District.—All stations are active in the district. GM5YX and GM6SR are now on A.C. The proposed clubroom is still in abeyance.

" E " District.—The November meeting was well attended despite bad weather and the lecture by Mr. Lamb (GM2UU) on aerials was much enjoyed. Activity is maintained at a high level and the Morse class continues its weekly meetings. BRS1295 occupied first place on both 1.7 Mc. and 3.5 Mc. during the May Band Occupancy check. By the time these notes appear in print the Ardrossan and Largs members will have received a circular letter asking them to nominate a Town Representative in order to facilitate meetings and general activity in that area. Reports are to hand from GM2UU and BRS1295, the latter states that during the recent lunar eclipse the 1.7 Mc. band was normal, but 3.5 Mc. appeared to be affected adversely, signals being weak, with rapid fading and a tendency to distortion. The next meeting will be held on December 21, when Mr. J. H. Preston will speak on 1.7 and 3.5 Mc. reception.

" F " District.—An attendance of 15 was present at the last meeting. Nearly all the members who are active give 28 Mc. as the most popular frequency. We welcome a new member, Mr. Sagar (2DVC).

" G " District.—Meetings continue to be well attended. A Question Bee is held at each meeting, two teams being formed. Questioner must know the correct answer to his question, which must relate to amateur radio. A referee is appointed to settle any doubt. GM6RG has erected a new rotary beam for 28 Mc., and has succeeded in working Nevada for his W.A.S. award. GM8CN is now back on the air after a long spell. 2FBM awaits Morse test, and GM3NI is QRT for a spell due to change of QRA. The following are active:—GM3TD, 5FT, 8NW and 8RV.

" H " District.—All stations in the district are active, while there has been a very good turn-out at all meetings. Another new call is GM3UU (ex 2AXG). This station has been experimenting with the extremely low power of .4 of a watt on 1.7 Mc. with GM2UW, and so far has attained a fair measure of success. GM8MQ plans installation of a rotary beam aerial. The District's annual dinner will take place on Saturday, January 21, 1939, in the Station Hotel, Kirkcaldy, at 7.30 p.m. Members from other Districts are cordially invited and may be assured of a hearty welcome. Tickets 7s. 6d. each. Those intending to join in the fun please notify the D.O. (Mr. A. W. Lawson, " Makora," Kinghorn) not later than January 16, 1939. The R.S.G.B. and N.F.D. films will be shown at the District Shack, at 3a, Bank Street, Kirkcaldy, on Sunday, December 18, 1938, at 7 p.m. *prompt.* District members are invited to bring their YL's or X-YL's. N.F.D. preparations are in hand, and it is hoped to fix on the sites in the early part of 1939.

SCOTLAND, DISTRICT H

ANNUAL DINNER

to be held on

JANUARY 21, 1939

at 7.30 p.m. in the

STATION HOTEL, KIRKCALDY

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

Northern Ireland

The next District meeting will be held on Friday January 13, 1939, at Thompson's Restaurant, Donegall Place, Belfast. Tea at 6.30 p.m., as previously. Afterwards : question time ; provisional stations and personnel for N.F.D., 1939 ; conversazione.

Replies to last month's questionnaire re crystals, bands, power and wave-meters were fewer than hoped, and further replies will be welcomed. It should be noted that frequencies are badly bunched together in groups all through the bands, leaving large gaps unallocated. When contemplating new crystals, if you *want* to keep clear of existing GI frequencies the D.R. will be glad to help on receipt of a card stating proposed position in the band.

The R.T.U.N.I. has made a good start with the winter programme. Forthcoming meetings : December 17, three 15-minute talks by GI's 5HV, 8TS and 5SJ. January 27, 1939 : " 'Phone and Its Problems," by GI8PA. Both meetings at 7.30 p.m., in Presbyterian Hostel, Belfast. Members of the

R.S.N.I. have accepted an invitation to the February meeting at Queen's University, Belfast, when we hope to hear an interesting lecture by Dr. Sloane. Fuller particulars later.

GI8DB is progressing well, even with 8dB up he should still be inside his 10 watts, as he is working direct off 110-volt D.C. mains. 6TK reports conditions on all bands very poor. His 70-ft. masts are now erected and aerial being tested out. 6YM, the Y.M.C.A. Radio Club, reports usual activity. Monthly meetings with lectures are held, while Morse classes are held twice weekly. They claim 15 operators, and mention that visitors interested in Amateur Radio are always welcome. 5DX (we hope the call-sign is prophetic) assisted by 8MI has been testing field strength from 7 Mc. Windom, and on 14 Mc. finds the orthodox polar diagram. During the recent eclipse of the moon 5DX found 14 Mc. dead except for strong signals from ZB1R who was calling " Test G " for dope on eclipse conditions, and was worked. 8TS has again the prefix " GI," on vacation. Other stations report active, but with nothing of note.

Town Representatives, 1939

Up to the time of going to press T.R. nominations had been received on behalf of the following members :—

District 1 :
- Blackburn ... Mr. J. Bolton (2CRM).
- Blackpool ... Mr. H. Fenton (G8GG).
- Burnley ... Mr. P. Nicoll (G5ZN).
- Bury ... ... Mr. T. C. Platt (G2GA).
- Liverpool ... Mr. H. Caunce (G6KS).
- Manchester ... Mr. W. Lucas (G2OI).
- Oldham ... Mr. F. Sutton (2DJV).
- Warrington ... Mr. F. Vost (G2DF).

District 2 :
- Barnsley ... Mr. T. Malkin (G5IV).
- Doncaster ... Mr. A. Dickinson (2FJO).
- Halifax ... Mr. R. P. Pohlman (2DOR)
- Huddersfield ... Mr. J. Dale (G5VD).
- Sheffield ... Mr. A. H. B. Cross (G3FN).

District 3 :
- Cannock ... Mr. T. Ball (G6SW).
- Coventry ... Mr. L. W. Gardner (G5GR).
- Rugby ... ... Mr. J. G. Stonestreet (G2JN).

District 4 :
- Ilkeston ... Mr. H. Mee (G5MY).
- Leicester ... Mr. W. M. Vendy (G6VD).
- Mansfield ... Dr. E. S. K. Vance (G8SA).
- Nottingham ... Mr. A. Clipstone (G8DZ).
- Retford and Worksop ... Mr. H. S. Chadwick (G8ON).

District 5 :
- Bath ... ... Mr. G. R. Marsh (G2IW).
- Bristol ... ... Mr. H. Gratton (G6GN).
- Cheltenham ... Mr. P. Malvern (G8DA).
- Gloucester ... Mr. J. Hamilton (G5JH).

District 6 :
- North Devon Area ... ... Mrs. C. Myler (G3GH).
- Plymouth ... Mr. J. Eddy (G3TX).
- Torquay ... Mr. L. Mays (2CWR).
- Taunton ... Dr. A. J. Iles (G5LM).

District 7 :
- Croydon ... Mr. L. W. Hooke (G5XH).
- Guildford ... Mr. W. E. Russell (G5WP).
- Oxford ... ... Mr. H. J. Long (G5LO).
- Portsmouth ... Mr. E. J. Williams (G2XC).
- Reading... ... Mr. A. E. Lambourne (G5AO).
- Reigate ... ... Mr. L. Knight (G5LK).

District 8 :
- Bedford ... Mr. H. R. Jeakings (G5FO).
- Cambridge ... Mr. L. W. Jones (G5JO).
- Luton ... ... Mr. A. G. Tearle (G3KG)
- Peterborough ... Mr. W. Carter (G2NJ).
- St. Ives ... Mr. C. Whaley (G6WA).

District 9 :
- Gt. Yarmouth ... Mr. D. Davy (G3RW).
- Norwich ... Mr. C. White (G8VW).

District 10 :
- Cardiff ... ... Mr. H. H. Phillips (2BQB).
- Newport ... Mr. R. V. Allbright (G2JL).
- Swansea ... Mr. S. Thomas (GW3AX).

District 11 (*County Representatives*) :
- Anglesey ... Mr. Ivor Jones (GW3KY).
- Caernarvonshire Mr. J. W. B. Evans (GW3GL).
- Denbighshire ... Mr. W. Jones (GW6OK).
- Flintshire ... Mr. E. G. Foulkes (GW5FU).

District 12 (*Area Representatives*) :
- N. 8 ... ... Mr. A. J. Mathews (G6QM).
- N. 11 ... ... Mr. P. R. Solder (G5FA).
- Welwyn... ... Mr. J. Hum (G5UM).

District 13 :
- Woolwich Area... Mr. G. R. Chiffey (2DKZ).

District 14 :
- Brentwood ... Mr. G. Turner (G3LA).
- Chelmsford ... Mr. R. L. Varney (G5RV).
- East Essex ... Mr. B. C. Leefe (G5XI).

District 15 :
- Hayes Area ... Mr. E. J. Napier (G8FA).
- West London ... Mr. H. B. Crowe (G6CO).

District 16 :
- Brighton and Hove ... ... Mr. H. T. Lunson (G3WR).
- Eastbourne ... Mr. F. Wingfield (G3CX).
- Gravesend ... Mr. R. S. Martin (G2IZ).
- Maidstone ... Mr. L. J. Cleggett (BRS2834).
- Medway Area ... Mr. J. E. Bryden (2BOL).

District 17 :
- Boston ... ... Mr. G. Hutson (G6GH).
- Cranwell ... Mr. R. Wilson (G3OI).
- Grimsby ... Mr. S. Brister (G6AK).
- Lincoln ... ... Mr. H. P. Townhill (G5XL).

District 18 :
- Hull ... ... Mr. J. W. Gill (G6OS).
- Scarborough ... Mr. L. Tranmer (G6TG).

District 19 :
- South Shields ... Mr. W. Smith (G5WZ).

Northern Ireland :
- Belfast ... ... Mr. S. N. Johnson (GI5SJ).

W6OTU

We are informed by GM6RG that W6OTU, located in Boulder City, Nevada, is looking for British Isles contacts. His frequency is 29164 kc. Best times are between 17.00 and 19.00 G.M.T.

BRITISH EMPIRE NEWS AND NOTES

Australia (Western)

By VK6WZ

OCTOBER - NOVEMBER conditions here showed no startling changes, American signals continuing to be scarce on 14 Mc. 28 Mc. has spasms, but when alive contains no lack of American and Hawaiian signals. Electrical storms here and in Eastern Australia have increased QRN, on several occasions making 14 Mc. sound rather like 7 Mc.

The November meeting of the W.I.A. saw the presentation of the trophy for the D.F. Field Day (November 6) to 6GM (first home and highest points), with 6BW second. Six parties entered, but mishaps with gear spoiled the day for some. At the end of general business the meeting adjourned to the Technical College where a most enlightening lecturette was given on bakelite, synthetic resins and allied thermo-plastics. Among the exhibits were lenses pressed from a new material (related to trolitul) and, in all but weight, apparently equal to glass.

QSL Officer 6CP has matters well under control and incoming and outgoing cards are being handled expeditiously. 6DF is now working on 28 Mc. but nothing is known of his results. 6MW has received several Air Mail reports from G on his work on this band but says contacts are hard to get. He asks British and European stations to look outside the American 'phone band—not an uncommon plea these days on 14 and 28 Mc.

Summer is coming in as these notes are written, and if DX conditions improve many VK6 operators will find the opposing influences of DX versus Beaches very unsettling! Results of the VK6 DX Contest should be available for next month's BULLETIN.

(Several VK6 stations were heard in London (on 14 Mc.) at good strength on December 3 between 14.00-15.00 G.M.T. Strongest was VK6GM with a chirpy note.—ED.)

British West Africa

By ZD2H.

Conditions continue erratic and show no immediate improvement. Static is also troublesome.

Nigeria.—ZD2H is still active but reports nothing of special interest. A hearty welcome is extended to Mr. Farrer, ex-G5FA-VQ3FAR, who has taken up an appointment in the Engineering Department of the Posts and Telegraphs.

Gold Coast.—ZD4AA may soon be heard on 7 Mc. ZD4AB contemplates installing electron coupling in order to explore new territory on the L.F. end of 14 Mc. The Sunday 7 Mc. sked at 2100 G.M.T. with ZD2H is proving successful. ZD4AB, whose QRG is 7,170 kc., would appreciate and will acknowledge reports on these transmissions. A new aerial designed to put an improved signal into G. is not working according to expectations.

British West Indies (Eastern Group)

By VP2AT.

Conditions on 14 Mc. have shown some improvement in recent months, and QRM from the U.S.A. is less, which makes DX working easier. In spite of the improved conditions, activity in Antigua has been below the average, especially for 2AT. This has been due to a change of QRA, and also to the recently imposed high rate for power. However, the company has now agreed to allow a power rate of 12 c. per unit, plus 24c. meter rent per month, instead of the exorbitant figure of 30c., which is the light rate. We envy the G's with their ¼d. per unit! Don't blame us if our QSL's are hard to get—each QSO costs enough in the first instance!

VP2AD also changed his QRA recently, but he is now back again working DX. 2AB has also been active.

The first YL operator in this Group is in St. Lucia. Known as "The Duchess," her call is VP2LC. She has been active for some months now.

News from the other islands is nil, but VP3AA, 6TR, and 6MO have been heard during the period under review.

In conclusion, the writer, along with the other amateurs in this Group, wishes all members a very Merry Christmas.

Eire

By EI9D

EI8M, of Cork, obtained first place in EI in the A.R.R.L. Tests and accordingly wins the I.R.T.S. Perpetual Challenge Cup for 1938. Sincere congratulations, OM. EI5F and EI5G, the runners-up, also produced very creditable scores.

The B.E.R.U. Tests commence on February 4. Log sheets are in possession of I.R.T.S. and further supplies may be obtained from EI9D. Here is a chance to collect that WBE certificate and at the same time take part in an enjoyable contest. What do you say, fellows?

Malta

By ZB1E.

Apart from some heavy QRN at odd times, conditions on the 14 Mc. band have been quite good recently around 06.00 to 08.00 and 15.00 to 20.00 G.M.T. VK, ZL, CM, LU, PK, W6, 7, have been worked. Periods of similarly good conditions are not very common in ZB1 and all members made good use of them. The 28 Mc. band continues to be open at patchy intervals mainly for W phones, but the 7 Mc. band is impossible due to QRN and QRM.

Some members have requested that a note be inserted in THE BULLETIN asking "G" stations not to reply to "Test DX" calls from ZB1.

The ZB1 group offer their best wishes to all fellow amateurs for a Happy Christmas and the very best of luck in the New Year.

Northern India

By VU2AN *via* G6DH.

Winter conditions were welcomed by VU amateurs and much VU/W activity has been taking place. Most stations were unable to enter the VK/ZL contest in earnest, but some good work was put in on 14 Mc. and we hope that all stations ave sent in their logs.

VU2EO has been finding his E.C.O. rig very satisfactory, especially during the contest when rapid changes of frequency were necessary. He reports VR1AA heard on 'phone. VU2FO, ex G2DC, apparently finds W contacts as easy as in G. VU2AN is active mainly on 28 Mc. VU2LK, who is managing the QSL bureau, asks members to send him large size stamped addressed envelopes and not stamps or postal orders. With the return of VU2LJ from leave in G, VU2AN hopes that members will send him monthly reports in the same manner as has made these notes possible through the summer.

VU amateurs wish the Empire a Merry Christmas and contacts with those elusive DX stations in the New Year!

Northern Rhodesia

By VQ2HC *via* G3BI.

Conditions have not been too good recently for DX work on 14 Mc., although VQ2PL has made numerous U.S.A. contacts on telephony. He is using a 6L6 and T20, but in the new year hopes to run a pair of T20's in the final with Class B modulation. An 80X receiver and rotating beam are also projected. From January 1, 1939, this station will work on 28 Mc. His present frequencies are 14,340 and 14,398 kc., but new crystals are expected for operation on 14,050 and 14,256 kc. VQ2PL recently worked all continents in 40 minutes, probably a VQ2 record W.A.C.

VQ2JC using 6L6's recently obtained an S8 report from VK4 during a telephony QSO. VQ2HC worked a good deal of DX on his rotating beam before it came to grief. Having strengthened the guys, he is now looking for G's at 1730 G.M.T. on 14 Mc. His QRA, Box 27, Nkana, is the Official VQ2 QSL Bureau.

No news has been received from VQ2FJ or other active members in the country.

The Cheltenham Hamfest

The amateurs resident in and around Cheltenham organised this year, for the first time, a Dinner and Conventionette, which took place at the Belle Vue Hotel on Sunday, November 27. Forty members and their friends attended from places as far afield as Birmingham, Droitwich, Malvern, and Abertillery, many of them spending the afternoon in Cheltenham visiting the stations of local amateurs. During these visits, contact was maintained on 1.7 Mc. between the local stations, thus enabling everyone to keep in touch.

The T.R. for Cheltenham, Mr. W. G. H. Brown (G5BK) took the chair at the dinner and meeting which followed. Mr. P. Malvern (G8DA) proposed the toast of the "R.S.G.B.," seconded by Mr. F. Watts (G5BM). This was followed by other toasts, including "The Visitors" and "The Ladies."

A general discussion on the future of amateur radio took place, and it was suggested that more use should be made of the 1.7 Mc. band, to enable members of the Society to keep in closer touch with one another.

The meeting represented the largest gathering of active amateur transmitters ever held in the Area.

BOOK REVIEWS

WIRELESS DIRECTION FINDING. (Third Edition.) By R. Keen, B.Eng. 803 pages and 549 illustrations. Published by Iliffe & Sons, Ltd., London. Price 25s. net.

This book, which is, in the main, descriptive, is intended for the student, the operator, the pilot and the installation engineer. The author has omitted in this edition the sections dealing with directional aerials for commercial traffic. This has allowed a fuller treatment of aircraft and marine apparatus, and wireless methods of navigation.

The first four chapters deal with the basic subjects of propagation, directive properties of aerials, and frame aerial reception in an interesting and useful manner.

The Bellini-Tosi system is then described with much practical detail, and a consideration of the errors due to polarisation, etc., leads on to the Adcock system for long and medium waves. At this point the author includes a very welcome chapter on maps, describing the various projections and their merits for the work in hand. Also included is an explanation of certain necessary elements of navigation.

Fixed station work, both "shore" and "ground," is next considered, from the choice of a site and the erection of aerials right up to the tests and method of taking bearings. Examples of modern apparatus are shown, as indeed they are at suitable times throughout the book.

Next comes the increasingly important subject of short-wave direction finding, which has now passed from the research laboratory stage to be a valuable practical instrument.

Ship's D.F. equipment is fully treated, and much information is given about calibration, errors and their correction, and examples of equipment.

A most interesting chapter describes beacon systems for the use of ships or aircraft. Non-directive, rotating and fixed-course beacons are fully covered, and the method of use explained in considerable detail.

Aircraft installations present special and difficult problems, mechanical as well as electrical, and the chapter on this section of the subject is a record of successful ingenuity. Homing devices and direction-finding equipment are well treated, and the practical procedure for various circumstances described.

One must know, having obtained bearings, how to find direction and position accurately. This is covered in a comprehensive chapter which includes operating procedure, an account of the duties of a ground station, and a quantitative treatment of errors. Examples of calculations and fixes are a very helpful part of this section.

The section on aircraft approach and landing systems is perhaps the most interesting in the book, and he is blasé indeed who does not marvel at the ingenuity of these systems. The procedure and the apparatus gets generous attention.

A special chapter deals with the many D.F. systems not already described, including the use of the C.R. tube as a direct reading finder. The final chapter is a short course in field and nautical astronomy applied to D.F., and a long bibliography concludes a most excellent, fascinating and enjoyable book.

Mr. T. L. Eckersley, in a foreword, says : " Everything that the technician requires to know about the well-established art of Radio Direction and Position Finding will be found most lucidly explained in the following chapters. . . ." With that opinion the writer is in complete agreement, and rarely has he read a book so attractively presented and written. The illustrations are, without exaggeration, delightful. A large number of the sketches display an artistic merit seldom found in textbooks.

Here is a book which should be in the hands of every student of radio engineering.

T. P. A.

ELECTRIC CIRCUITS AND WAVE FILTERS. (Second Edition.) By A. T. Starr, M.A., Ph.D., B.Sc., A.M.I.E.E., A.M.I.R.E. 476 pages and 402 illustrations. Published by Sir Isaac Pitman and Sons, Ltd., London. Price 21s. net.

It is not surprising that a second edition of this book appears so soon, and the author takes this opportunity to include details of recent developments in the theory and design of filters, in which rapid advances have been made in recent years.

The additions appear as appendices, and about 100 extra pages have been added.

Appendix 5 has been rewritten and greatly expanded to give a detailed treatment of Dr. Cauer's theory on the development of the lattice-type filter. Included in the appendix are details of Tschebyscheff Parameters for low, high, band-pass and band-elimination filters.

Appendix 6 deals with Norton's work on constant-resistance networks with applications to filter groups, and shows how groups can be designed so as to present a constant resistance.

Appendix 7 describes a filter of the bridged-T form which has constant resistance.

Appendix 8 describes the theory and design of impedance correcting networks to eliminate cross-talk due to impedance mismatch.

Appendix 9 deals with the use of quartz crystals in obtaining a filter of sharp discrimination.

Appendix 10 gives a simple proof of Foster's Theorem.

This enlarged edition of an important book should be very welcome to all communication engineers.

T. P. A.

QUESTIONS AND ANSWERS IN TELEGRAPHY AND TELEPHONY. By W. S. Procter, A.M.I.E.E. (Regional Engineer, G.P.O.). 205 pages and 125 illustrations. Published by Sir Isaac Pitman & Sons, Ltd., London. Price 5s. net.

Specimen solutions of the questions set by the City and Guilds of London Institute have appeared for a number of years in the *Post Office Electrical Engineers Journal*, and the present book is a collection of these solutions covering the years 1931 to 1935 in a handy pocket size.

The solutions are grouped into Telegraphy and Telephony, and further grouped according to the examination grade. The illustrations are numerous and excellent.

On page 184, and as an answer to a question regarding propagation constant, the author states that the " ratio of the currents at the beginning and end of each unit length of uniform line is :

$$\frac{I_1}{I_2} = \varepsilon^{\gamma} = \varepsilon^{\beta + j\alpha}$$

This is true for an infinitely long line, or one properly terminated, but such is not stated. It would seem advisable to emphasise this, as students have a tendency, especially when dealing with decibels, to neglect the terminations.

Students will benefit greatly, as will the poor examiners, if they observe not only the information in the answers, but the style—precise but adequate.

The writer does not advise this book as a text-book, nor is it so intended, he feels sure. But as a very valuable adjunct to text-books and class work, especially for candidates, it is most confidently recommended.

T. P. A.

Photographing Amateur Radio Apparatus

We are indebted to Mr. Percy Murden for his informative article on the above subject, at the same time we wish to record our thanks to the following members who also offered to prepare an article on this subject : Messrs. S. Rogers (2FGT), of Bristol ; Alan Mears (G8SM), of East Molesey ; T. J. Evans (2DFX), of Monmouth ; T. B. Beharrel (BRS2818), of Hull ; V. G. Mellor (G5MR), of Dover ; and L. Parfitt (G6PF), of Teddington.

CHATS

(No. 3 of a series).

Some two years' regular use of an adjustable air gap crystal holder has convinced me that it is the ideal method of frequency shift. With a low temperature co-efficient 3.5 Mc. crystal, 6 kc. change can be obtained, and when multiplied to the 14 Mc. band this give-24 kc., which in the " ham " bands is equivas lent to about 12 c.w. or 6 telephony channels. Usually this will enable you to clear the very worst interference, with the advantage over E.C.O. that you know exactly how far you have moved and can return to within cycles of any predetermined frequency without any trouble at all. Finally, there is no danger of over-shooting the mark and landing outside the band.

The main drawback, as usual, has been cost, and frankly I realise that the type AG holder at **27/6** is not within everyone's reach. The AG holder was developed from the a.g. holders that we use for mounting broadcast station crystals, and in a number of ways is unnecessarily complicated for amateur work. Well, we have designed a new one around the type U holder. It is very much smaller and neater and by careful design and, I hope, increased production the price has been very considerably reduced. At the moment we can only supply the holder complete with a 3.5 Mc. QS crystal for a total cost of **37/6,** but shortly the holder will be available at **17/6** for those who already have a suitable crystal. The new holder is known as the type VG.

In conclusion, G5MA, G2MR, G3CU, G3VK and the other members of the Q.C.C. staff join with me in wishing you the compliments of the season and plenty of DX in 1939 !

E. A. DEDMAN (G2NH).

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

G2GN.—E. D. GRIESS, 32, Shrublands Road, Chelmsford, Essex.
G2PB.—R. K. CLEGG, Foxhill Hall, Oswaldtwistle, Accrington, Lancs.
G2SG.—V. F. B. DUNK, 60, Weston Drive, Belmont, Stanmore, Middlesex.
G2VK.—C. E. WILLINGHAM, 6, Hale Road, Tottenham, London, N.17.
G3BB.—H. W. WARNER, 29, Grove Street, Retford, Notts.
G3CX.—F. E. WINGFIELD, 48, Willingdon Road, Eastbourne, Sussex.
G3HI.—R. SYKES, 10, Railton Avenue, Greenlane Estate, Blackburn, Lancs.
G3HR.—H. RIDGE, 10, Madison Avenue, Cheadle Hulme, Stockport, Ches.
G3LA.—G. L. TURNER, "Avalon," Crow Green Road, Pilgrims Hatch, Brentwood, Essex.
G3LS.—R. W. STEWART, "Eastleigh," 8, East View Terrace, Seaton Carew, West Hartlepool, Co. Durham.
G3NQ.—W. J. BAKER, 18, Cherry Close, Carshalton, Surrey.
G3NT.—R. Oliver, Hilton Grange, Northallerton, Yorks.
G3OG.—J. GOTCH, The Bungalow, Bondgate, Selby, Yorks.
G3OK.—P. M. BARTLETT, 47, Sharrard Grove, Intake, Sheffield, 2.
G3QD.—J. GORDON TREECE, 95, High Road, Beeston, Notts.
G3QK.—L. G. KING, 36, Lyndhurst Gardens, Pinner Hall, Middlesex.
G3RK.—H. A. SPASHETT, Smallgate, Beccles, Suffolk.
G3RW.—P. J. C. HARRISON, 13, Dene Side, Gt. Yarmouth, Norfolk.
G3SQ.—P. BUTLER, 67, Wood Grange Avenue, Kenton, Harrow, Middlesex.
G3TF.—THOS. GATIS, 38, Wrottesley Road, Tettenhall, Staffs.
G3TN.—T. NOBLET, 21, Woodlands Avenue, Preston, Lancs.
GM3TR.—J. C. GRAHAM, Air Ministry Control Station, Wideford Aerodrome, Kirkwall, Orkneys.
G3UD.—V. BLOOR, 26, Leveson Road, Hanford, Stoke-on-Trent.
G3UG.—W. C. FLINTOFF, 27, Eden Street, Saltburn-by-Sea, Yorks.
G3UJ.—I. H. AULTON, "Jesmond-dene," Shawhurst Lane, Hollywood, Nr. Birmingham.
G3UL.—K. SAUNDERS, Swan Street, Sileby, Nr. Leicester.
GW3UO.—R. H. SMALE, "Seacombe," Mayhill Road, Mayhill, Swansea, S. Wales.
G3UR.—R. SYKES, "Stonelea," Oldfield Road, Honley, Nr. Huddersfield, Yorks.
G3UZ.—F. G. SADLER, 154, The Guinness Trust, Stamford Hill, London, N.16.
G3VA.—J. P. HAWKER, "Redfields," Whitecross Lane, Minehead, Somerset.
G3VB.—P. W. GAMMON, "Sunnyside," Fernhurst, Haslemere, Surrey.
G3VK.—J. D. KINGSTON, 51, High Drive, New Malden, Surrey.
GW3VL.—P. R. JENKINS, 14, Keynsham Road, Whitchurch, Cardiff, S. Wales.
G3VM.—F. W. FISHER, 228, Ipswich Road, Colchester, Essex.
G3VN.—L. F. HOSKINS, 6, Dagnall Park, South Norwood, London, S.E.25.
G3VO.—J. P. BRIERLEY, 39, Glen View Road, Burnley, Lancs.
GI3VQ.—K. THOMPSON, 8, Holland Park, Knock, Belfast, N.I.
G3VV.—R. NELSON, Jr., 16, Accrington Road, Blackburn, Lancs.
G3VW.—R. H. NEWLAND, 4, Scudamore Lane, Roe Green, Kingsbury, London, N.W.9.
G3WA.—G. FARNWORTH, 18, Ransgreave Avenue, Blackburn, Lancs.
G3WB.—GEO. R. SLAUGHTER, 69, Bridge Street, Gainsboro, Lincs.
G3WF.—D. R. COCKING, Avondale, Easemore Lane, Redditch, Worcs.
G3WP.—J. H. BRAZZILL, 45, John Street, Brightlinsea, Colchester, Essex.
G3WR.—H. T. LUNSON, 80A, Beaconsfield Road, Brighton, 6, Sussex.
G3WT.—W. D. HAMER, 71, Portelet Road, Liverpool, 13.
G3WW.—R. F. G. THURLOW, 42, Regent Avenue, March, Cambs.
G3WX.—R. COWELL, 45, Belgrave Street, Stepney, London, E.1.
G3WZ.—R. J. BALDWIN, 64, Hollam Road, Milton, Portsmouth, Hants.
G3XA.—J. W. COOKE, 52, High Street, Mansfield Woodhouse, Notts.
G3XF.—F. G. SAMUELS, 41, Houblon Road, Richmond, Surrey.
G3XT.—W. OLIVER, Stratford Rectory, Saxmundham, Suffolk.
G5JD.—J. DALTON, 5, Lloyd Street, First Lane, Anlaby, E. Yorks.
GI5JN.—JAS. MILLIKEN, Fortfield, Upper Dunmurray, Co. Antrim, N.I.
G5PR.—G. C. PROCTER, Sunny Ridge, Horam, Sussex.
G5YA.—A. W. LEITCH, Broadmead House, Send, Nr. Woking, Surrey.
G5ZD (ex G6BB).—H. BRABROOK, 59A, Emmanuel Road, London, S.W.12.
G6AM.—E. A. MACKAY, 6, Melbourne Close, Orpington, Kent.
G6BP.—H. G. G. CHANDLER, "Headley House," Weybourne Road, Farnham, Surrey.
G6DK.—F. BOYCE, "Lotamore," Rookery Road, Staines, Middlesex.
G6FP.—WM. C. THOMSON, 49, Manor Road, Rugby, Warks.
G6IO.—E. RAYNER, 90, Englebeart Road, Catford, London, S.E.6.
G6JN.—R. S. JACKSON, 31, New Barn Lane, Whyteleafe, Surrey.
G6ML.—L. J. PLUNKET CHECKEMAIN, Manhattan, Long Meads, Rusthall, Tunbridge Wells, Kent.
G6UP.—A. H. S. SCOTT, 15, Station Road, Loughton, Essex.
G6WL.—JOHN W. KYLE, c/o Zimmermann, 44, Pembury Road, Tottenham, London, N.17.
G8AZ.—R. A. SPEARS, 72, Rocky Lane, Broadgreen, Liverpool, 16.
G8CO.—F. BARRETT, 2, Whitehall Road, Grays, Essex.
G8GS.—C. W. FARRELL, H.Q. Coastal Command Signals, R.A.F., Lee-on-Solent, Hants.
GM8HA.—J. H. EMMERSON, 26, Royal Terrace, Edinburgh, 7, Scotland.
G8HX.—F. N. F. BEWLEY, 67, Sadler Street, Mansfield, Notts.
G8IL.—J. R. LETTS, 107, Ormonde Court, Upper Richmond Road, Putney, London, S.W.15.
G8UQ.—J. C. ALFRED, Thrush Cottage, Burn Bridge, Pannal, Harrogate, Yorks.
2ACL.—F. C. ELLERTON-TATE, 49, Halton Road, Sutton Coldfield, Warks.
2AKS.—JOHN SPURGIN, "The Cedars," Woburn Sands, Bucks.
2AWG.—A. W. GODDEN, 8, Hamilton Road, Ealing, London, W.5.
2BGO.—G. D. WRAY, 4, Newlands Park Drive, Newby, Scarborough, Yorks.
2BGP.—D. C. PARKER, 139, High Street, Witham, Essex.
2BOF.—F. G. HARRIS, 143, Collingwood Road, Sutton, Surrey.
2BOR.—J. A. DODDS, 138, Trafalgar Street, Sheffield.
2BPX.—L. A. REYNOLDS, 60, Herbert Road, Oldfield Park, Bath, Somerset.
2CDA.—D. WHITE, Derwent House, Chislehurst, Kent.
2CNR.—R. ROBSON, Radio Villa, Naburn, York, Yorks.
2DTC.—A. MILLER, 17, Brindley Street, Holderness Road, Hull, Yorks.
2DYV.—J. CASTLE, 49, King Street, Lancaster, Lancs.
2FAX.—M. KEATING, 4A, Falkland Road, Newbury, Berks.
2FHK.—D. SMITH, 11, Meadow Way, Eastcote, Ruislip, Middlesex.
2FHP.—G. MOON, 12, Arley Park, Redland, Bristol, 6.
2FMF.—F. J. RUTTER, Merivale, Wigan Road, Standish, Wigan, Lancs.
2FMM.—JOHN DAIN, "Gorse Hill," nr. Conway, N. Wales.
2FPM.—S. MEADOWCROFT, 29, Shakespeare Drive, Councillor Lane Cheadle, Ches.
2FPV.—W. P. VINCENT, The Grange, Warwick Road, Solihull, Warks.
2FQA.—A. J. MEADS, 47, Monks Close, North Farm Road, Lancing, Sussex.
2FQQ.—J. A. T. BOUSFIELD, 131, Bedford Hill, Balham, London, S.W.12.
2FSC.—E. H. PERCY, Cheltona, 36, Cheltenham Road, Parkstone, Dorset.
2FSL.—N. E. R. VAUS, 54, Bingham Road, Winton, Bournemouth, Hants.
2FTR.—ALVIN PRYOR, 693, Finchley Road, Hampstead, London, N.W.3.

CANCELLED: G2PP, G2YM, G5KZ, G6NJ, G8RP, GW8RS, 2AGK, 2AGV, 2AIW, 2AJM, 2ALO, 2ALZ, 2AMV, 2ARI, 2ARO, 2ASA, 2AVN, 2AXS, 2AYS, 2BBV, 2BGT, 2BIC, 2BLV, 2BLY, 2BNZ, 2BPH, 2BPW, 2BUH, 2BUN, 2BVA, 2CAN, 2CBA, 2CBJ, 2CBL, 2CBV, 2CFA, 2CGK, 2CJO, 2COW, 2CPA, 2CTO, 2CTQ, 2CVF, 2CVG, 2CVW, 2CWV, 2CXB, 2DCK, 2DDZ, 2DHX, 2DKR, 2DLT, 2DMB, 2DOP, 2DRM, 2DVL, 2DZU.

Re W7BJS

We have been asked to give publicity to the fact that details concerning this call sign have been omitted from the current issue of the Radio Amateur Call Book. The full QRA of this station is: G. D. Johnson, Telephone Exchange Building, Afton, Wyoming. Mr. Johnson has recently given first contacts with Wyoming to several British stations. He is active on 29,460 kc. at week-ends and other times.

Contemporary Literature

By L. Fryer (GM2FR)

An Auxiliary Transmitter for 1.7 and 3.5 Mc. Work. Don H. Mix (W1TS). *Q.S.T.*, September, 1938.

The author describes a compact 50 watt self-contained unit with ganged tuning for quick frequency change. The transmitter uses a type 89 as electron coupled oscillator, followed by a type 807 as output with an 83 and a pair of the new VR150 gaseous voltage regulator valves in the power supply the regulation of which is held to within a few per cent. of 300 volts. The whole unit, including aerial tuning, is housed in a metal cabinet measuring 16¾ by 8¾ by 10 inches.

* * *

The Permatron. *Q.S.T.*, September, 1938.

This short but interesting article discusses the use of a new type of magnetically-controlled gas-filled valve produced by the *Raytheon Production Corporation* as a keyed rectifier.

A De-Luxe Rotary Antenna Structure. Byron Trowbridge (W9TMP). *Q.S.T.*, September, 1938.

The author describes the building of a supporting assembly for rotary multi-element directional aerials. The supporting structure described is self-supporting, requiring no external guys, and occupies a ground area only six feet square. Very full constructional details are given.

RECEPTION CONDITIONS ON SHORT WAVES—

(*Continued from page* 325).

the often heard remark that reception peaks at full moon. The great fade out in May occurred at full moon, also the April fade out. It is, however, feasible that peak reception will occur at full moon for a month or two, owing to the fact that the moon cycle is longer than that of the sun (about 30 days), and there will naturally be times when full moon and peak reception will occur together for two or three months. It is understandable that the sun's huge mass of flaming gaseous substance and intense heat should have the power to affect our ionised layers. The moon, however, is a cold body and whilst having a physical effect on the earth, has not the means or the power to affect us electrically or magnetically, both these phenomenon being closely associated with heat.

There is still much steady and intense work to be faced up to in this absorbing subject, much of it being beyond the scope of the average amateur. What we can do, however, is (1) study phenomena and their effects on the short waves; (2) determine ways and means of establishing reliable communication between any two points during severe storms; (3) discover a frequency that will be effective at various levels of the Heavyside layer, *i.e.*, a frequency not subject to diurnal variation, and a method of propagation. Finally, what are the nature of the changes that take place in the Ionosphere during sun spot activity that cause variations in radio reception? Why should fading occur? Investigations into critical frequencies and their seasonal and diurnal variations and other more complicated subjects give a wide field for further activities.

TRADE REVIEWS—

(*Continued from page* 335)

ensure complete electrical stability; separate earthing tags are fitted to each section.

The capacity of the condenser renders it very suitable for inclusion in modern superhet receivers operating on high frequencies, for which purpose it was evidently specifically designed. There is no reason why the condenser should not be employed in transmitting apparatus—notably in a "signal shifter"—since the vanes are double-spaced, enabling high voltages to be withstood without breakdown.

J.N.W.

SNOWDON TESTS—

(*Continued from page* 340)

co-operation afforded by all participating stations, without which these tests would not have been possible. They also thank the many receiving stations who sent in reports; the Radio journals who gave the tests valuable publicity; the Snowdon Mountain Railway, Ltd., who kindly attended to the transport of the equipment; and last, but not least, Mr. and Mrs. Gibson and the staff of the Summit Hotel, who showed great kindness and extended many facilities.

NEW EXCITER UNIT—

(*Continued from page* 348).

output is low; it is not, and is, in fact, sufficient to drive an RK23 buffer stage with 100 volts grid bias to a far greater grid current than is ever required. This applies to both fundamental and harmonic operation.

Fixed coils may be employed in place of the plug-in types mentioned in a previous paragraph, with a consequent saving in space—in fact, the only reason for using detachable coils was the case with which preliminary adjustments could be made.

Although used at the author's station as a multi-band exciter, another use would be to provide rapid frequency-change from one part of a band to another by employing, say, four 7 Mc. crystals in the holders.

THE 56 Mc BAND—

(*Continued from page* 353)

General

An earnest appeal is made for photographs of 56 Mc. interest. These need not be topical for the month so long as they are good, clear prints of gear, aerial systems, portable apparatus, etc. It is hoped that this appeal will meet with a ready response so that, each month, the text of these notes can be illustrated.

The Schedule Scheme will be launched early in December, but it is anticipated that a larger scheme can be circulated when the present one is revised. The response however to the present scheme has been very poor indeed.

The writer wishes to convey his grateful thanks, and also those of Mr. Blundell, to all contributors to these notes during the past year. A Merry Christmas to all and a Happy New Year, with lots of 56 Mc. DX in it!

CALIBRATION SECTION

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

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

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

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

Calibration Fees.

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

EXCHANGE AND MART

(Continued from Back Cover)

WANTED.—A few Ex-W.D. 250 or 500-watt Bottles.—Box 59, " PARRS," 121, Kingsway, London, W.C.2.

WANTED.—Hammarlund Comet Pro., good condition essential.—State lowest for cash to 2DGX, 40, Barkhill Road, Liverpool.

WANTED.—RFP. 15, RFP. 30, Valves; Ham Band Tuner, 20, 40, 80, 160 metres.—G6ST, 23, Albert Road, Witham, Essex.

WANTED.—COMMUNICATION TYPE RECEIVER, 5-2,000 metres, 230-volt A.C. Superhet, Crystal gate.—SMITH, 31, Firs-Park Avenue, N.21.

INDEX TO DISPLAYED ADVERTISEMENTS

EXCHANGE AND MART.

RATES.

Members' private advertisements 1d. per word, minimum 1s. 6d, maximum 10/-. Trade advertisements 2d. per word, minimum 3s. First line, if desired, will be printed in capitals. One inch Semi-Display, 10s. per insertion. Terms: Cash with Order. All copy and payments to be sent direct to Advertising Manager, Parrs, 121, Kingsway, London, W.C.2, not later than the 30th of the month for the following month's issue.

AVOMINOR TEST METER, 27s.; Ferranti m/a Meter, 0-150, 3-in. flush mounting, 17s. 6d; Super-quality Transformer, 500-0-500, 175 m/a, 5-v., 6.3-v., 7.5-v. C.T., 20s., all new recently.—H. GREENWOOD, 54, Castle Street, Bolton.

BARGAINS.—Valves, Transformers, Chokes, Condensers, Meters, Crystals, M.C. Speakers, etc. Write, stating requirements and request for list.—G2DZ, 11, The Inlands, Daventry, Northants.

DB20 PRESELECTOR, 12 months use, as new, £10, or nearest. Ref. L/G, New House, Hatton Garden, E.C.1.

DB20 PRESELECTOR, as new, bought in September, £10.—Box 58, "PARRS," 121, Kingsway, London, W.C.2.

FOR SALE. Bulgin HTV1 Vibrator, MT5 Transformer, Polar and Eddystone Dials. RI Class B Transformer and Output Choke, Valves, T25D, DN41, HA1, Set Wearite "P" Coils. Many other components. Offers. Betty, Pilning, Bristol.

FOR SALE, D.E.T.1, 10s.; B.T.H. Transverse Mike, 30s.; Key (Brass), 6s.; AC/DC 6W. Amplifier (complete), 90s.; 2-L.S. 6 A.S., 20s.; Folding Camera, 7s. 6d.—G8SL, 29, Agate Road, Clacton-on-Sea.

FOR SALE.—Standard Rack and Panel mounted 10 to 50-watt Transmitter; 6L6, 6L6, PP. T20s. Class "B" Modulator; all bands.—Particulars from G8FQ, Stafford.

G5AC.—HALLICRAFTER SKY CHIEF, 1938 want trimming carriage forward, £6 19s. 6d.; 500-0-500 250 mls. 7.5, 6, 4. L.T. Input 200-250, with rect. valve; carriage forward, £1; 350-0-350 120 mls. 2.5 L.T. Power Pack complete 200-250 input 16s. 6d.; Fil Trans 4v. 3a. 200-250, 7s. 6d.; Vibrator, new, 7s. 6d.; Mullard SG.3, no neut. required, cost £5 10s., a gift, £1; Osram PT.45, as new, 15s.; Marconi Morse Key, FB job, 7s. 6d.; Brown's A type Phones (one side gone), 7s. 6d.—QRA, 93, Mount Road South, Sunderland, Co. Durham.

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.

HALLICRAFTER SKY CHAMPION, £12 10s. DB20 Preselector, £10 2s. 6d. Brand new condition. Bought last September, now moving.—QRA, White House, Wych Hill, Woking.

"HAM-AID" QSL CARDS are The Best.—Samples from G6XT, TILLOTSON BROTHERS, Commercial Street, Morley, Yorks. (State G or BRS, etc.)

HAMMARLUND COMET PRO. A.V.C. and Crystal. Requires external power supply. Crackle finished cabinet. £12 10s. Peak regenerative preselector to match, £3.—COURSEY, Christ Church Vicarage, Cheltenham.

HIVAC D210SW, SG220SW, PX230SW for 12s., Cost 30s., used under 2 hours.—2DOK, 18, Orchard Rise, Kingston, Surrey.

LATE 1936 HALLICRAFTER SUPER SKYRIDER, nine-valve, crystal filter, etc., speaker and power supply built in; first £12 10s. 5NI Nineplus two-stage regenerative preselector, brand new, £4 10s. Super bargains.—GW8NP, 19, Penhill Road, Cardiff.

MAINS TRANSFORMER, 350-350-v., 100 m/a, 2.5-v. 4-a, 2.5-v. 2-a, 4-v. 2.5-a, 10s.; Universal A.C./D.C. Battery Eliminator, 120-v., 25 m/a, 10s.; 6L7, unused, with base, 5s. 6d.; A.C. 2/Pen., 6s.; 1W3, 4s. 6d.; Hivac A.C./V.P., 4s.—G2YN, 51, Woodhall Lane, Welwyn Garden City.

NORTH OR NORTH-EAST MIDLANDS.—Wanted early January, home for cheery bedfast invalid; little trouble; own sickroom requisites; pay around 35s. weekly.—Write, BRS3156, 16, Hazelbadge Crescent, Frecheville, Sheffield.

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

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

RAYMART 9 plus PRESELECTOR, as new, few hours' use, £6 or offer.—G5BR, 6, Highbury Road, Streetly, Birmingham.

RME 69, with RME Speaker, very little used, recently overhauled, aligned and fitted with latest type crystal filter, nearest £30 secures; 3530, 3726, 7010, 7130, 7226, 7263 Crystals, in holders, 12s. each; Haynes' Big Rigchecker, used as field strength meter, modulation indicator, etc., with coils, 10-160 metres, £4 10s. Offers invited for 60-watt 6L6 Modulator with Thordarson Transformers throughout, power pack on separate chassis.—G8UJ, Carleton, Pontefract, Yorks.

SURPLUS.—Two TZ05/20, 10s. each; two LS6A, 5s. each; Raytheon 6L6G, unused, 6s. Modulation Transformers, Epoch, push-pull, PP5/400's to TZ05/20, 12s.; Thordarson type T72M02, 12s.; Eddystone Coils, 4-pin types, LB, Y, R, G, BR, GY, two of each, 10s.—COOPER, Smeeth, Kent.

TELEVISION.—Unused 7-in. tube, time base, power pack with all valves, 3,000-v., 1,000-v., all filaments, 8-valve vision receiver less four valves, first offer near £12.—INCHLEY, Chester Road, Castle Bromwich.

TOBE Amateur Communication Receiver 7-valve Superhet. 20, 40, 80, and 160 metre bands, beat note oscillator. H.T. switch, complete with mains energised speaker. £5 for quick sale. Mains transformers and smoothing chokes at less than half price.—SIMPSON, Clers., Largs.

(*Continued on page* 380)

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