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Hon. Editor: H. BEVAN SWIFT. General Editor: JOHN CLARRICOATS

Advertising Manager: HORACE FREEMAN

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TIME MARCHES ON

JULY 5, 1913, saw the birth at Hampstead of the Wireless Club of London, the forerunner of the present nation-wide Radio Society of Great Britain. Twenty-five years ago wireless telegraphy was understood only by a small and select group of scientists and those few enthusiasts who formed the background of the present amateur movement.

The War, and all that it brought with it, contributed more than any other factor to the speeding up of radio development. The task undertaken by our own Society in restoring amateur activities at the cessation of hostilities is well known, as is the knowledge that the R.S.G.B. was responsible for bringing to fruition the public demands for a National Broadcasting Service. Not so well known to our newer members is the fact that for the past fifteen years the Society has been sponsoring, without flourish of trumpets, the advancement of radio *communication*. It is of little value to design transmitters and receivers which never progress beyond the laboratory stage. The amateur, no less than the professional has to prove that the gear which he has planned and constructed will produce practical results.

In face of intense difficulties we amateurs have with limited power and restricted space for our aerial systems, shown that it *is* possible to obtain consistent results over long distances with input powers which, in other quarters, would be regarded as useless. But what of the future ?

Ever optimistic, we venture to suggest that the amateur will continue, to the best of his ability, to tackle each new problem as it arises. With possible new restrictions in frequency allocations to contend with, his untiring energy will continue to be devoted to the dual problem of further improving the selectivity of receivers and the stability of transmitters. The ultra-high frequencies too will engage his attention more and more, for in the years to come these frequencies will become even more valuable than they are to-day.

At the beginning of this, our 14th volume, we should do well to take stock of our position, tightening up our armour where chinks are now appearing, so that as time marches on we shall be well equipped to hold our own against all who attempt to belittle the amateur radio movement.

J. C.

Series Modulation

By E. B. Vass (G8AD)

Modulation Principles

MODULATION is the process whereby the audio frequency electrical oscillations produced by the microphone circuit are superimposed on the carrier. The intensity of the audio frequencies at any instant is represented by the difference between the actual amplitude of the carrier at that instant and its unmodulated amplitude.

In a telephone transmitter any stage following the modulated stage must be Class A or Class B; Class C should not be used in this case, because such a system is not then linear, and it is essential that the amplitude of the oscillations in the anode circuit shall be exactly proportional to the excitations applied.

For 100 per cent. modulation the amplitude of the modulated carrier varies from zero to double its unmodulated amplitude, in other words, the instantaneous maximum value of the oscillations is twice the mean value of the carrier. Hence, the instantaneous power radiated is four times the carrier power.

Modulation Methods

It is necessary to examine briefly the various modulation systems employed by amateurs in order to appreciate the many advantages of series control.

The three methods of control most popular at the present time are choke or plate modulation, grid modulation, and recently, suppressor grid modulation.

Choke (or Plate) Modulation

In choke modulation, the anode supply to the modulating amplifier is obtained through a low frequency choke, which also supplies the anode of the modulator valve. This choke should have a high impedance for audio frequencies, and has to be specially selected, as the efficacy of this system depends upon the choke presenting a high impedance (compared with the valve) over the whole range of modulation frequencies. Variations of the grid voltage of the modulator cause variations in the anode voltage, and as the anode of the modulated valve is tied to the modulator anode, the voltage varies in the same manner and so modulates the amplitude of the high-frequency oscillations.

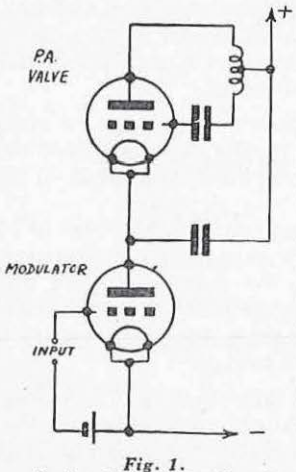

Fig. 1.
Series Modulation Circuit

For 100 per cent. modulation, the modulated audio voltage applied to the amplifier plate circuit across the choke, must have a peak value equal to the d.c. voltage on the modulated amplifier. To obtain this without distortion, the modulator must be operated at a d.c. plate voltage greater than the amplifier plate voltage. This is generally effected by a resistance in the anode circuit of the modulated valve. The anode dissipation of the modulator valve is several times greater than that of the modulated valve. Thus it is generally necessary to use a number of modulator valves to modulate fully one valve of the same type.

Grid Modulation

In grid modulation the grid bias is caused to vary in accordance with the modulation, and this alters the amplitude of the signals in the plate circuit. Although this method consumes very little energy, and does not require large modulating valves it gives a large amount of distortion, particularly at higher values of modulation. The grid modulator furnishes relatively small power to the radio frequency amplifier. The carrier plate efficiency of the modulated stage is extremely low, about 30 per cent. Similarly the efficiency of a modulated amplifier is also low.

Suppressor Grid Modulation

Suppressor grid modulation is similar to grid control in so much as the modulating signal is applied to a grid, but of an r.f. pentode; the r.f. excitation being applied to a separate grid. The carrier plate efficiency is about the same as with grid modulation, but by suitably selecting valves, linear modulation can be obtained, up to nearly 100 per cent., with very little distortion.

On examination of series modulation it will be seen that a number of the above inherent difficulties can be satisfactorily overcome, and that the actual apparatus required is of a very simple nature.

Series Modulation

Series modulation is actually a modification of the choke control method, and is shown in Fig. 1.

Here the high tension supply to the r.f. amplifier is obtained through a modulator valve in series. Thus the varying impedance of the modulator valve, brought about by the audio frequencies of modulation applied to its grid, alters the effective high tension voltage applied to the r.f. amplifier valve, so causing modulation of the carrier wave.

Before undertaking any experiments in modulation it is necessary to have radio-frequency equipment capable of transmitting a perfect C.W. signal; also it is very important that the P.A. stages be correctly neutralised to avoid any tendency to self-oscillation.

As has been explained the valve to be modulated must have linear characteristics, in order to modulate fully and without distortion. One method of determining this is as follows:—

The transmitter should be working with the drive running, and an artificial aerial should be used to minimise radiation. Place resistances of known value, or preferably a calibrated variable resistance, in series with the filament supply of the valve to be modulated, joining the grid to earth through suitable decoupling. Plot resistance against plate current, between the maximum dissipation of the valve and cut-off. If the curve is fairly straight through the major part of its travel, it can be series modulated without difficulty. It is essential that the high tension volts be kept constant during these tests, otherwise the curve will not be linear. If the

curve was perfectly linear right down to cut-off, the valve would be capable of 100 per cent. modulation with no distortion, and although this does not actually appear in practice, results very near to this desirable state of affairs can be obtained as will be shown later. Generally the curve bends slightly the whole time and flattens out near cut-off. The carrier level should be set at the mid-point on the straight portion of the curve.

The modulator valve must also have linear characteristics, and must be capable of modulating the r.f. amplifier equally either side of the midway point on the curve. If, for example, the resistances required to vary the r.f. amplifier between maximum current and cut-off were, say, between 100 ohms and 10,000 ohms, the modulator valve should be capable of causing the same variation, by means of the varying voltages applied to its grid. The modulator valve must of course be capable of passing the same current as the r.f. amplifier, and its impedance should be somewhat lower than the resistance required to bias the r.f. valve to the centre point of its curve. In the circuit to be discussed the impedance of the modulator valve, a *Mazda* PP3/250, is about 1,000 ohms. This valve is suitably biased until the unmodulated carrier is about 50 per cent. of its maximum instantaneous value. With 42 volts bias the impedance of the modulator valve is made approximately equivalent to that of the r.f. amplifier.

It is now necessary to connect the proposed modulator valve in series with the r.f. valve. Connect the grid of the modulator to various grid bias tappings and take a further set of anode readings between maximum current and cut-off, and the greater part of this curve should be linear.

Fig. 2 is a proposed basic layout for push-pull enthusiasts. With this arrangement each amplifier valve receives half the available voltage from the drive, the two halves always being in opposite phase.

The resulting out-of-phase anode currents, which would cancel one another if passed in the same direction through the tank coil are made to add by virtue of the fact that they are caused to flow through separate halves of the centre-tapped coil; hence the current flowing in the aerial circuit is due to the combined currents in the two valves.

The r.f. amplifier valves V_1 and V_2, although in push-pull in respect to radio-frequency amplification, would be virtually in parallel in respect to the modulator valves. Therefore, as far as the modulation is concerned, the impedances of V_1 and V_2 are in parallel, and it is necessary to use two modulator valves in parallel to modulate them. The resistance R_2 is to obviate any tendency to squegger.

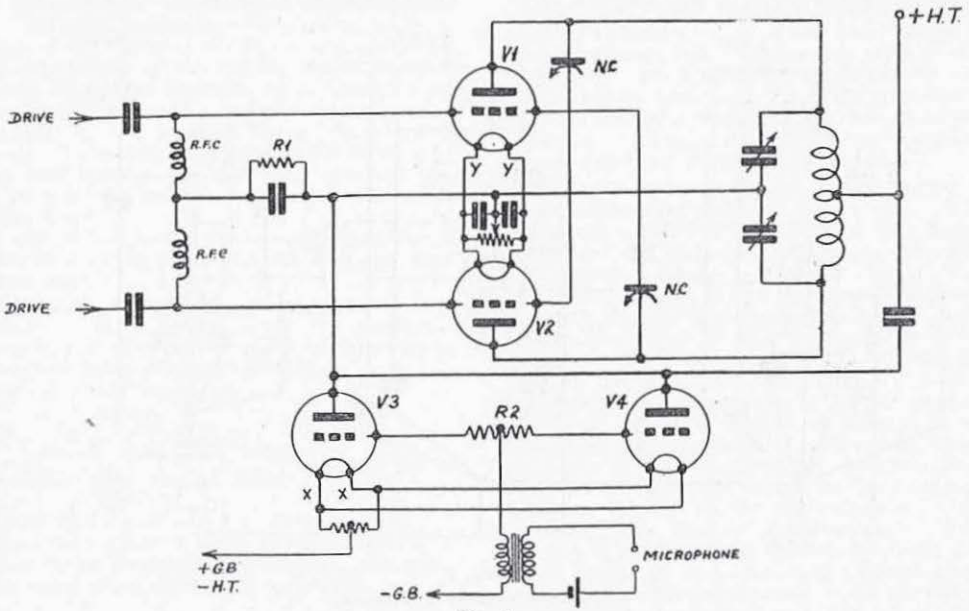

Fig. 2.
Push-Pull Circuit.

V1 and V2 P.A. valves. *R1=10,000 ohms.*
V3 and V4 Modulator valves. *R2=20,000 ohms centre tapped.*
All fixed Condensers '002 μF

Fig. 3 shows the completed transmitter on which tests have been carried out. This layout was chosen on account of its popularity with the majority of low-powered amateurs. The circuit is quite orthodox, using a PT4, crystal oscillator with about 20 volts bias, a PM 24 D as frequency doubler with 100 volts bias (a PT4 will operate quite well in this stage, however), and an LS5 as power amplifier.

The LS5 of course requires a separate filament winding as it has a 5 volt filament; even so, when this stage is being modulated, it is essential that it has a separate filament winding, and also that this

winding is one of low capacity. The latter is very important, because if the low-tension winding has a high capacity in respect to the primary winding, this will introduce a capacity across the modulating valve and reduce the high note response. It is advisable to wind a low-tension transformer with the secondary winding well spaced from the primary winding, if a low capacity filament transformer is not available. Insulation should also be good on this transformer, as the low-tension winding is at a high potential above earth. All decoupling components are taken to the centre point of a 50 ohm filament resistance, which should be wired straight on to the filament connections of the valve, as shown in Fig. 3.

A B C D E, Fig. 4, is the actual curve taken of the transmitter, and it can be seen that this curve is nearly linear. In order to modulate equally either side of the carrier level, the mid-point on the straight part of the curve must be taken as carrier level, and this shows the grid-bias necessary for the modulator, which in this case is 42 volts, the plate current at this point being about 33 mA.

All that is required now is a microphone circuit which will give a peak voltage of 42 volts to modulate fully the transmitter. It will be obvious that a larger peak voltage will over-modulate the carrier, and a lower peak voltage will under-modulate the transmitter.

The Microphone Circuit

Various microphones and transformers were tested for suitability with this transmitter, and it was found that the average carbon-button type microphone and transformer was quite capable of fully modulating the carrier without the use of a speech amplifier.

The transformer decided on had a step-up ratio of 22½ : 1, the output being measured on a cathode ray oscillograph. For close speaking the peak voltage was over 100, and when speaking four inches away from the microphone the output across the secondary of the transformer was over 40 volts peak. Higher ratio transformers up to 70 : 1 were tested which gave a considerably larger output, but the response at higher frequencies was attenuated. However, if the microphone to be used should be found insensitive a higher ratio transformer could be used with advantage. By using a crystal or ribbon microphone with one or two stages of speech amplification, it will be seen later that the transmitter is capable of almost perfect quality.

Second Harmonic Distortion

Second harmonic distortion can be examined from Fig. 4. It has been shown that for 100 per cent. modulation the peak excitations will rise to the maximum current of the valve, and fall to the minimum current. To "show up" the non-linearity of the curve a straight line A Y E joins its extremities; now if the curve were perfectly linear it would follow this path. The divergence between the current at the actual working point C, and that shown for the same bias on the straight line at Y, is the measure of the second harmonic distortion.

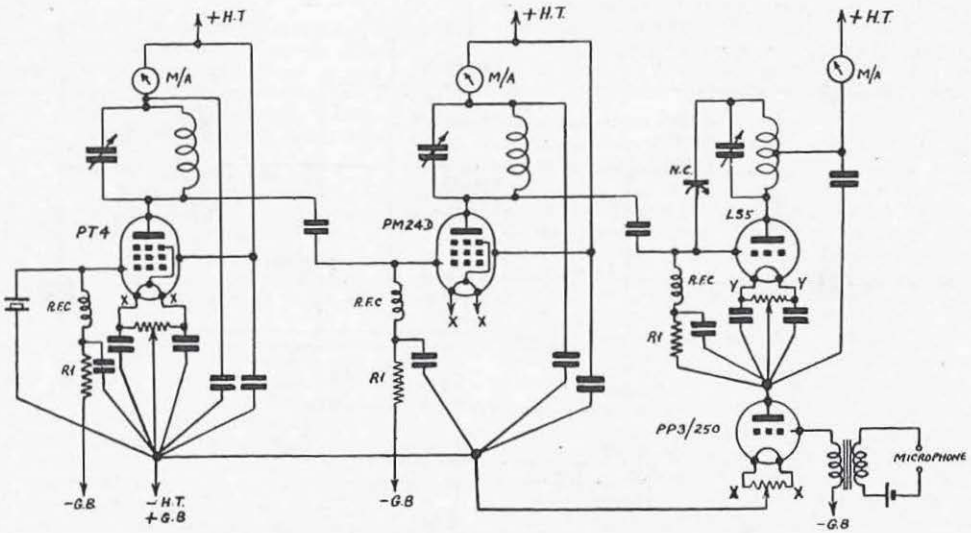

Fig. 3.
Circuit of Complete Transmitter.
R1 = 10,000 ohms.
All fixed Condensers ·002 μF

Calling the currents at E and A respectively I max. and I min., that at Y is midway between the two, or ½ (I max. + I min.). The difference between this and Ic the actual current at C, divided by the total current swing (I max. — I min.) gives the proportion of second harmonic.

Therefore the percentage of second harmonic distortion is :—

$$\frac{\frac{1}{2}(\text{I max.} + \text{I min.}) - \text{Ic}}{\text{I max} - \text{I min.}} \times 100$$

On the curve shown, the actual harmonic distortion

for 100 per cent. modulation is $\frac{2.5}{72} \times 100 = 3.4\%$

For 80 per cent. modulation only part of the curve would be modulated, viz., B C D. A straight line joins B to D and shows the amount of deviation in this case to be Z C, and the second-harmonic distortion being $\frac{1.5}{56} \times 100 = 2.7\%$

From the above conclusions it will be seen that the second harmonic distortion is extremely low with this circuit.

Frequency Response

The frequency response of the transmitter was measured by using a tone generator and a cathode ray oscillograph, and was taken at 80 per cent. modulation.

The tone generator was adjusted to give 33 volts peak. The modulated signal was superimposed on the grid of the modulator valve. A pick-up coil was placed near the tank coil of the transmitter, and connected to the oscillograph. The frequency of the tone generator was then varied between 5 cycles and 12,000 cycles, keeping the voltage output constant. No variation whatever could be noticed on the oscillograph, and as 2 db. variation can easily be seen, the frequency response curve must be within 2 db.

The transmitter could not be modulated above 12,000 cycles as this was the limit of the tone generator used.

Estimation of Percentage Modulation

Various methods are employed for measuring depth of modulation, and it might be appropriate to enumerate a few of them herewith.

Heising Formula is given by :—

$$M = \sqrt{2\frac{(I\ mod^2)}{(I\ car^2)}} \times 100$$

Where M is depth of modulation

I car = H.F. Carrier current.

I mod = Current under modulation.

In this method the increase in output power is measured when modulation is applied, and from this the depth of modulation is calculated.

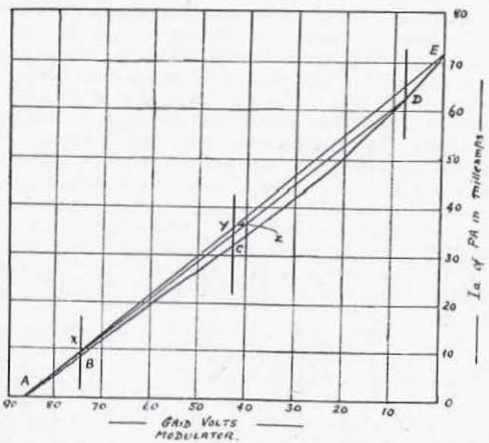

Fig. 4.

Curve of valves operated in Class A.

Where it is not possible to obtain access to the low-frequency modulating voltage, the modulation depth can be estimated by noting the change in the operating current when the circuit is modulated. Although the mean value of a modulated current is the same as the normal carrier wave, the r.m.s. value increases, the rise being about 23 per cent. with full modulation, and can be measured by a thermal meter. This is quite a good indication, especially if the transmitter is of low power and small variations in aerial current cannot be seen easily.

The percentage of modulation possessed by a wave can also be determined by rectifying with a linear detector, which gives a current that varies with the carrier, the direct current component of the rectified wave being directly proportional to the carrier. Thus the modulated signal can be applied to a detector valve, and the changes in d.c. anode current, and alternating annode current, measured. The alternating anode current may be estimated by measuring the modulation frequency voltage across a resistance in the anode circuit. The a.c. component divided by the change in d.c. current gives the depth of modulation.

A simple diode circuit can be used, with a resistance R across the plate coil and cathode. A microammeter is inserted in series with this resistance, and the low frequency voltage is measured by connecting a valve voltmeter across it. The h.f. voltage across the tuned circuit will produce a current through the diode which will charge a condenser across it to a voltage approximately equal to the peak value of the applied E.M.F. During the next cycle this charge will leak away through the resistance R until the next peak, when the diode will again conduct and the charge will be restored. If the signal is modulated, the time constant of the resistance and condenser must be such as to allow the charge on the condenser to vary as rapidly as the highest modulation frequency. This involves relatively low values of R and C, but the leak cannot be made smaller than about .25 megohm or the damping on the tuned circuit becomes serious, while the condenser must be large compared with the self-capacitance of the diode or an appreciable fraction of the voltage is lost. A value of about 100$\mu\mu$F. is usual. The rectification efficiency is given by R/(R + r), where r is the diode resistance.

The modulation depth will be given by :—

$$M = \left(\frac{\sqrt{2}\beta . V_{LF}}{I_R . R}\right) \times 100$$

where β is the rectification efficiency of the diode.

In Fig. 3 the total high-tension volts used for amplifier and modulator valves were 450, yet with this low power a large number of stations have been contacted, practically all remarking especially on the extremely good speech quality.

It must be emphasised that a low powered transmitter, fully modulated, is far superior to a high powered transmitter in which only part of the carrier is modulated.

It is hoped that the above notes will be of assistance to amateurs who, although wishing to experiment in speech modulation, have refrained, being under the impression that it involves the use of costly and complicated apparatus.

The Single Wire Matched Impedance Feed Aerial

By C. F. TURNER (ST2CM). *

UP to the present time, the great disadvantage of the type of aerial known as the Windom, has been the fact that operation is possible on the fundamental frequency only. It is, however, a fact that G2BI produced a variation which was capable of operation on two bands, but in the opinion of the writer, this aerial was, at its best, only a compromise, since on the lower of the two bands, it was called upon to operate as an end-fed aerial, and not as a true Windom. The main reason for the presentation of this article is to show that it *is* possible to construct an aerial of this type, capable of effectual operation on all its harmonic frequencies, and one which, although not a true Windom, still comes within the category of the single wire feed aerial.

It is proposed in the first place to deal with the ordinary Windom and illustrate why it fails to operate correctly on its harmonic frequencies. Fig. 1 represents a 7 Mc. Windom, 66 ft. in length, and on it are superimposed three current distribution curves (*a*) for 7 Mc., (*b*) for 14 Mc., and (*c*) for 28 Mc. Books of reference, such as the *Radio Amateur's Handbook*, give the position of the tapping point P as 9 ft. 6 ins. from the centre point C.

They also state that the ratio of the distance between the centre point of a half-wave, and the tapping point to the length of a complete half-wave is constant, irrespective of frequency. Hence, if we wish to work this aerial at its second harmonic frequency, then for correct matching conditions :

$$\frac{P\ D}{A\ C} = \frac{P\ C}{A\ B}$$

But AC is obviously half of AB, therefore :

$$PD = \tfrac{1}{2}\ PC, \text{ that is } 4 \text{ ft. } 9 \text{ ins.}$$

Now if we examine the figures we find that, under actual conditions, PD=7 ft., and since the feeder is terminated by an impedance higher than that required, standing waves and consequent radiation,

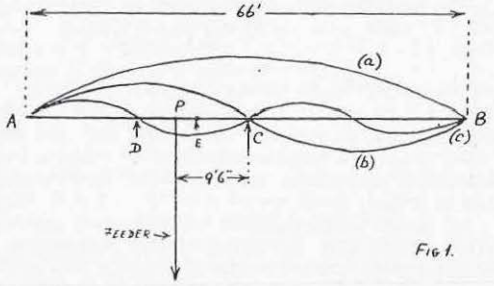

Fig. 1.—Current distribution curves for a 66 ft. Windom (a) 7 Mc., (b) 14 Mc., (c) 28 Mc.

will appear in the feeder. Similarly, for the 4th harmonic frequency the correct value for EP is 2 ft. 4½ ins., whereas the actual value is 1 ft. 3 ins. Further consideration of higher harmonics will show that in no instance, does a correct tap appear. Now consider Fig. 2. Here we have a very similar aerial, except that P is required to be at the same part of a current loop on both the fundamental and second harmonic frequencies. From the previous paragraph it will be seen that DP must be one-half of PC, which makes it one-third of DC. This leaves PC equal to two-thirds of DC, or one-third of AC.

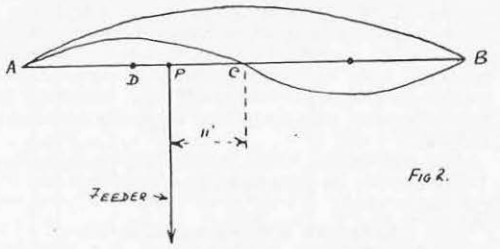

Fig. 2.—Current distribution curve showing the feeder tapped at one-third the length of the aerial.

The tapping point is therefore one-third of the total length of the aerial.† If we now consider AC as a separate aerial, which we are quite entitled to do, since the portion CB plays no part in the matching for the 2nd harmonic, we find, as shown previously, that CP is one-third of the total length AC. Consequently, matching will also be correct for the 2nd harmonic of AC, which will be the 4th harmonic frequency of the whole aerial. Investigations for all even harmonics will show similar tapping points in each case.

The next factor to be considered is whether the impedence presented by this new tapping point can be made to correctly terminate the feeder, and thereby avoid standing waves upon it. Compared with the Windom tapping point, the impedance is somewhat greater, and consequently it becomes necessary to increase the surge impedance of the feeder to correspond. As the surge impedance of a single wire is an inverse function of its diameter, the easiest way to increase the surge impedance is to decrease the diameter of the wire employed. Unlike tuned feeders, this is in no way detrimental (within reasonable limits) since the current in the feeder is considerably smaller than at certain points in the aerial.

For a practical test of this system a 33 ft. top of 14 S.W.G. supplied by a feeder of 18 S.W.G. was erected at the writer's station and excited at 14 and 28 Mc. Using a thermo-milliameter shunted across about 6 ins. of the feeder, a comparison of the feeder current was possible at various points throughout its entire length. No variation could be detected on either frequency, indicating that a fair approximation to a correctly matched system had

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* R.E.S. Member.

† As pointed out by VS1AA, T. & R. BULLETIN, November, 1936, p. 193.

been obtained. Results, when compared with the 33-ft. centre fed Hertz, were very gratifying. An input varying from 15 to 20 watts to an RK25, used as a straight amplifier on 14 Mc. and as a doubler on 28 Mc. was employed, and much DX was worked.

The writer will be very glad to compare notes with readers of this article who decide to give this aerial a trial.

Technical Note.

The " one-third " tap position has already been discovered, but the method of matching the feeder to this point, suggested by ST2CM is believed to be an important contribution to aerial design. There are still one or two points which call for further experiment. In the first place, we are inclined to doubt the statement that CB plays no part in the matching for the second harmonic, since it is known to affect the current distribution (the radiation resistance of a full-wave aerial is higher than that of a half-wave), but the general change of characteristic impedance with varying frequency, may counteract this. The chief difficulty of the multi-band aerial has still to be met, namely, that the length of top varies with the order of the harmonic. There are two ways of dealing with this. The first method is to employ a longer top, so that it is only used on the harmonics as the length tends to a more finite value. Our own experiments using a 136-138-ft. top confirm this. The second method is to make the tuning of the top very flat, so that the length is of less importance. This can be effected by the converse of ST2CM's method, increasing the size of the top, rather than by reducing the diameter of the feeder, possibly by employing two wires in parallel. It should be quite possible in this way to make a Windom which is practically aperiodic. We should be glad to co-operate with anyone who would care to experiment in this direction.

G6CJ.

A 6L6 Modulator

By J. B. PARKE, D.Sc. (GI8PA).

DURING the past year designs for a number of relatively high-power modulators have appeared in the technical press, but the 10 and 25-watt station would appear to have been neglected to some extent. An efficient, but inexpensive, modulator is described below and it is hoped that this may appeal to those who are not blessed with many of this world's goods.

A single 6L6 is listed as delivering an output of 11.5 watts when used as a Class " A " amplifier with 375 volts on the plate and 250 on the screen. According to the formula M=

$$100\sqrt{\frac{2A}{W}}$$

Where M=% of modulation, A=the output audio watts of the modulator, W=the D.C. input watts to the modulated stage (see T. & R. BULLETIN, Vol. 13, page 481),

it should be possible to modulate a 23-watt carrier 100 per cent. with this valve, thus gaining all the advantages of plate modulation, i.e., high efficiency and ease of operation in the P.A. stage without its disadvantage—expensive high-power audio equipment.

The circuit diagram of the speech amplifier-modulator unit is given below, together with all component values. The modulator was built up on a mild steel chassis, 12 ins. by 6 ins. by 3 ins., and the power supply was constructed on a similar unit.

A 6F5 is shown as the speech amplifier and this gives ample gain when used in conjunction with a single-button carbon microphone. (A *G.E.C.* Home Broadcaster is ideal.)

The audio output of the modulator on test was found to be 11 watts, but it was noted that even a small error in matching the load to the valve resulted in a large drop in audio power output. The valve is very critical in this respect and the ratio of the modulation transformer should be calculated from the following equation :—

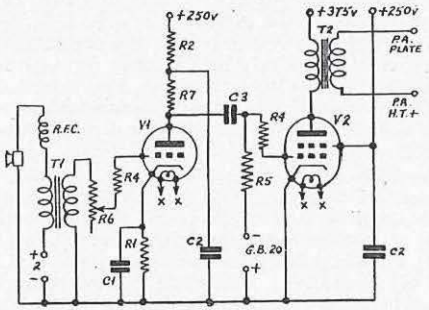
$$\frac{\text{Primary turns}}{\text{Secondary turns}} = 2\sqrt{\frac{\text{P.A. Current (mA.)}}{\text{P.A. Voltage.}}}$$

(The optimum load of the 6L6 is 4,000 ohms, and this expression holds only for this valve.)

With more than 250 volts on the anode of a 6L6 it is imperative that fixed grid bias should be used if maximum power output is required. Experience has shown that the use of cathode automatic bias leads to severe distortion and valve heating. The battery bias is not difficult to arrange as only 20 volts are required. The actual value should be adjusted until the 6L6 draws 57 or 60 mA.

The modulator was connected, through a suitable transformer, to a transmitter running with an input of 22 watts. It was found that the carrier could be fully modulated with negligible distortion, reports, even on gramophone records, indicating very satisfactory quality. The direction of the current through the secondary winding of the modulation transformer should be reversed and the effect on quality noted, the direction which gives the most satisfactory results being used.

If 60 mA. at about 400 volts are available from the main transmitter power supply this could be



A Low-Power Modulator

R1— 4,000 ohms 1 watt (Dubilier).
R2—200,000 ,, ,, ,,
R4— 5,000 ,, ,, ,,
R5—½ megohm 1 watt (Dubilier).
R6—¼ megohm volume control.
R7— 50,000 ohms (Dubilier).
C1—Bias electrolytic (T.C.C.).
C2—2 μF. 250-volt working (T.C.C.).
C3—.1 μF. Mica (T.C.C.).
T1—Microphone transformer (G.E.C. Home Broadcaster).
T2—Modulation transformer. (Premier Supplies or a small mains transformer of suitable ratio.)
V1—6F5 Raytheon (Raymart).
V2—6L6 Raytheon (Raymart).
XX 6.3 volts (1.2 amps. only required).
H.F.C. High-frequency choke (Raymart).
In the diagram the lower end of the volume control R6 should be connected to the bottom end of T1 secondary.

used on the modulator anode, the screen and the speech-amplifier anode being supplied from a small 250-volt power pack. (Care should be taken that voltage is not applied to the 6L6 screen when the anode voltage is removed.) Alternatively a power pack suitable for supplying the complete modulator could be constructed using a 350-0-350-volt transformer and a U12 or Type 80 rectifier. In this case the 6L6 screen and 6F5 plate would be supplied through a suitable voltage divider.

It only remains to say that this unit has been in operation during the past few months and the 6L6G shows no evidence of deterioration. The input circuit described in the May, 1938, BULLETIN, page 617, was used in the original amplifier, but that shown in the diagram above also gives very satisfactory results.

Radio at the Empire Exhibition

By JAS. B. DUNCAN (GM6JD).

IN view of the quite considerable number of amateurs who have signified their intention of attending the Scottish Convention to be held in Glasgow, which includes a visit to the Empire Exhibition at Bellahouston Park, a brief résumé of the various radio exhibits will no doubt be of some interest.

The General Post Office and the Admiralty have contributed the outstanding features in radio communication by presenting to the public faithful replicas of stations which are used by the respective services. The Admiralty exhibit, which is in the United Kingdom Pavilion, takes the form of the wireless office of a British destroyer, but as this was very fully described and illustrated in a recent issue of *The Wireless World*, it need only be said that, having seen this extremely interesting exhibit, a visit is well worth while.

In the G.P.O. Pavilion is housed a typical operating room of a coastal radio station, representative of such stations as Wick, Seaforth, Portpatrick, etc., where they are in constant communication with ships and trawlers and also provide direction-finding services.

The transmitter follows conventional lines, and consists of a pentode crystal oscillator, pentode buffer amplifier and triode power amplifier with an input of 1 kW. Six frequencies are employed, viz., 2,500, 1,837, 1,650 kc. (radio telephony), 1,520, 500, 447 kc (I.C.W.), a separate crystal being used for each frequency. Keying is done in the buffer amplifier stage, and the method adopted is similar in every respect to that used by most amateurs in their own transmitters. Regarding telephony the popular suppressor-grid modulation method is used in the buffer amplifier stage, rather an interesting feature. For modulated I.C.W. the tone frequency is 900 cycles. The transmitter is remotely controlled from a very neat panel on the operators' table and frequency selection, coil switching, choice of I.C.W. or telephony is done by a series of relays which are energised in the power circuit. The construction and operation of these relays are of great interest.

To come to the receiver, this is known as a W.T.G.A., and follows usual superhet design, consisting of an R.F. stage, triode pentode frequency changer, high-frequency pentode I.F. amplifier, duo-diode triode second detector and output pentode. A separate beat frequency oscillator is, of course, incorporated for the reception of C.W. signals, and is variable 5 kc either side of the I.F. frequency, i.e., 110 kc. The duo-diode triode, in addition to its function as second detector, acts as low-frequency amplifier and source of delayed A.V.C. voltage. High efficiency iron-cored coils are used in the I.F. transformers, and variable coupling is provided. Another point of interest, provision is made for a limited output by the use of two copper-oxide rectifiers across the impedance output. This limiter reduces large outputs to a fairly constant level, and consequently prevents acoustic shock from nearby transmitters. The receiver is intended for use on A.C. mains, and contains a built-in power supply, but can be operated from D.C. using accumulators for filament supply. The range of the receiver covers, in three steps, 100/300, 400/1,200, 1,200/1,800 metres.

For the foregoing information the writer is indebted to Mr. Bruce Mackie, of Wick Radio, one of the officials in charge of the G.P.O. exhibit, and this opportunity is taken of thanking him for the time and trouble taken in supplying these details.

There are other exhibits, interesting from the radio standpoint, such as the British Broadcasting Corporation Pavilion, wherein the method of broadcasting and evolution of radio is depicted by enlarged photographs, together with a considerable amount of valuable statistical information.

In the Army and Royal Air Force Pavilion a transceiver as used in service aircraft is displayed, and also apparatus for the recording and reproduction of speech, the purpose of which is to teach pilots clarity of speech for telephony communication.

One could go on citing other exhibits of equal interest, but those of paramount importance have been mentioned, and so in conclusion we express the hope that amateurs will take the opportunity offered them by the Scottish Convention to see for themselves this wonderful Empire Exhibition.

Oxford University Greenland Expedition, 1938.

This expedition, under the leadership of Mr. J. C. S. Sugden, of Jesus College, Oxford, will be transmitting experimentally in the 3.5, 7 and 14 Mc. bands from July 20 to October 1. The call sign will be OX7OU. Mr. Andrew Croft, Leckhampton House, Cambridge, will be glad to hear from members who hear or contact the Expedition Station.

Television Demonstrations

Provincial and Overseas members who wish to see a demonstration of high definition television are invited to apply to Headquarters for an invitation to the *Marconiphone Company* demonstrations which take place in London daily. We are indebted to Mr. A. C. Wilberforce (G2IY) for making these arrangements which we feel sure will be appreciated by members visiting London.

Band Spread and Creep

A study of the relationship between methods of band spreading and the cause of frequency drift in H.F. superhet receivers.

By R. H. Hammans (G2IG)

THE band spread of a super-het receiver depends entirely on the frequency coverage of the oscillator tuned circuit. It is well known that the L/C ratio of such a tuned circuit should be low for the following reasons :—

1. Valve input capacity is " swamped " because it becomes small compared with the tuned circuit capacity. This minimises creep of frequency in warming up ; modulation hum. etc.
2. Stray capacities across the tuned circuit, including the self capacity of the coil, are also swamped so that the stability (mechanical and electrical) of the oscillator is greatly improved.

It is seldom realised, however, what an important factor " high C " capacity is in determining the frequency coverage of the oscillator. Indeed, probably the most satisfactory manner of band spreading a super-het receiver is to increase the minimum capacity across the tuned circuit to such a value that the known variable condenser will tune over the exact frequency range desired.

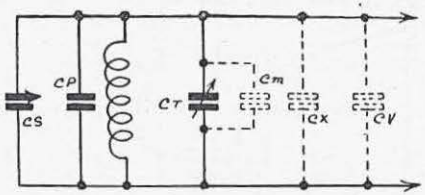


Fig. 1.
Cp="High C" padding condenser.
Cs=Semi-variable band setting trimmer.
Ct=Variable tuning capacity.
Cm=Minimum capacity of tuning condenser.
Cx=Unavoidable strays.
Cv=Valve input capacity.

Calculation will show what value this capacity may be, providing the following factors are known :

(*a*) The frequency limits of the band to be covered.
(*b*) The minimum and maximum capacities of the variable condenser.
(*c*) The inter-electrode capacity of the valve electrodes across which the tuned circuit is connected (i.e., grid to cathode or grid to anode capacity according to type of oscillator circuit).

The formula on which the calculation is based is :—

$$F=\frac{1}{2\pi\sqrt{LC}}$$

And since the value of inductance will remain constant over the frequency range concerned it may be re-written thus :—

$$F=\frac{K}{\sqrt{C}} \text{ or } C=\frac{K^2}{F^2} \text{ where K is a contant} \quad \ldots\ldots (1)$$

Now let F_1 be the maximum frequency of the tuning range,
and let F_2 be the minimum frequency of the tuning range.
Then C_1 will be the minimum capacity of the tuning range,
and C_2 will be the maximum capacity of the tuning range.

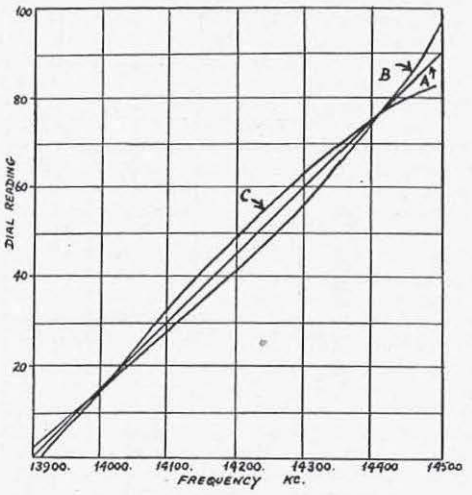


Fig. 2.
Curve A: Ideal " straight line " tuning.
Curve B: Oscillator tuning for high C.
Curve C: " Series condenser " bandspread tuning of R.F. circuits.

Let the variable capacity be represented by the symbol C_T.

Then $C_2=C_1+C_T$ ..... (2)

From (1)

$$C_1=\frac{K^2}{F_1^2} \text{ and } C_2=\frac{K^2}{F_2^2}$$

$\therefore$ $C_1 F_1^2=C_2 F_2^2$ and substituting the expression for C_2 as in (2)

$C_1 F_1^2=(C_1+C_T) F_2^2$
$C_1 F_1^2-C_1 F_2^2=C_T F_2^2$
$C_1 (F_1^2-F_2^2)=C_T F_2^2$

$$C_1=\frac{C_T F_2^2}{F_1^2-F_2^2}=\frac{C_T}{\frac{F_1^2}{F_2^2}-1} \quad \ldots\ldots (3)$$

As a practical example suppose a tuning condenser having a maximum capacity of 20μμf and a minimum capacity of 6 μμf is required to tune a circuit from 13,950 to 14,450 kc.

C_T will be 20—6 μμf+14 μμf.

$\therefore$ from (3) $C_1=\frac{14}{\frac{14{,}450^2}{13{,}950^2}}=195$ μμf approx.

This is the minimum capacity of the circuit and contains the minimum capacity of the tuning

condenser, the input capacity of the valve and certain stray capacities which as a rule can be estimated.

The figure which may finally be used in the design of the oscillator must have these subtracted, so that, pursuing the example, the parallel condenser should have a value equal to :—

195 μμf—6 μμf (the minimum of the tuning condenser)—8 μμf (a usual value for the input capacity of a valve)—5 μμf (an estimate of strays) Therefore the capacity of the " high C " condenser could conveniently be made up of a 150 μμf ceramic fixed condenser and an air dielectric semi-variable with a maximum of 65 μμf set to about one third full capacity.

condensers are used for tuning oscillator and R.F. stages, and that band spreading has been achieved on the R.F. stages by any of the well-known methods such as a small variable band spread condenser in series with the tuner or tapping the coil appropriately for the tuning condenser :—

Then Fig. 2 illustrates the practical curve of tuning condenser rotation versus frequency.

Curve A is the ideal straight line.

Curve B is the oscillator tuning for high C.

Curve C is the R.F. band spread tuning.

The tuning range chosen was 13,900 to 14,500 kc.

It is obvious from these curves that provided the circuits are all lined up accurately at both ends of the tuning range the amount by which the R.F.

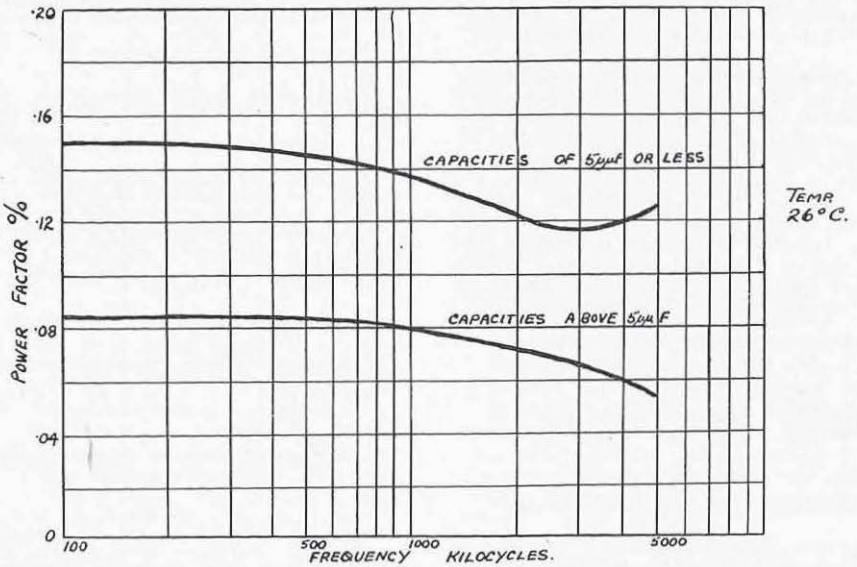


Fig. 3.

The complete circuit showing all the deliberate and stray capacities enumerated is given in Fig. 1.

It may be argued that an arrangement in which the oscillator has a very high C circuit while the R.F. stages, in the interests of efficiency, have low C, may be difficult to align when ganged tuning is used, but a compromise can be effected.

Suppose identical " straight line frequency "

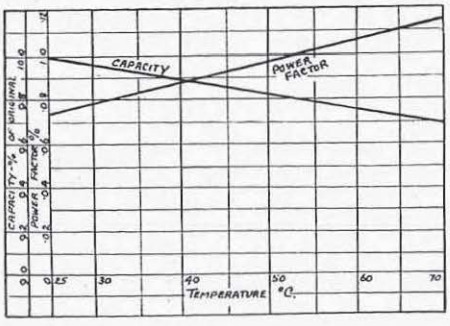


Fig. 4.

circuits are detuned is negligible at all points intermediately.

Calibration and Frequency Drift

It is important in a highly selective receiver to eliminate frequency drift due to rising temperature or other causes. There is little more annoying than a slow creep which necessitates constant re-adjustment of tuning in order to keep a signal on the peak of a crystal filter.

Now in the majority of receivers, where drift exists, the change as temperature rises is such as to decrease frequency. In other words, the *temperature frequency* coefficient is negative, and the re-adjustments to the tuning condenser are therefore towards minimum in order to maintain a constant frequency.

In effect, although the whole of the responsibility for drift is divided amongst a number of components, these re-adjustments form a close approximation to the equivalent capacity change owing to rising temperature.

For example, suppose the dial of the receiver is numbered 0 to 100 deg. and that from cold to a steady warm condition the dial reading has to be changed from say 40 deg. to 45 deg. to maintain resonance on a certain signal of known constancy

(assuming of course that the dial reads O deg. at the low frequency end of the tuning range) ; then the 5 deg. represents a decrease of approximately 5 per cent. of the total variable capacity. Thus, compensation could be achieved by the use of a fixed padding condenser having a positive *temperature-frequency* coefficient or a negative *temperature-capacity* coefficient.

Fortunately, a recent application of ceramic dielectrics in fixed condensers may successfully be used to compensate for the drift.

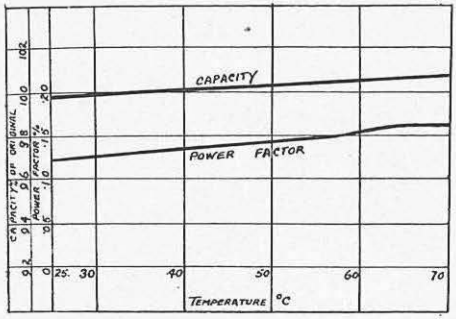


Fig. 5.

In the manner described above, the equivalent capacity change is estimated over a measured change of temperature and then, given the temperature coefficient of the ceramic dielectric, the proportion of ceramic to air dielectric condensers in the padding capacity may be calculated so that the combination results in an overall temperature coefficient of zero.

The ceramic materials commonly used as low loss dielectrics are titanium dioxide, and certain of the Steatite group. Now the former has a negative temperature-capacity coefficient, while the latter has a positive coefficient of rather less magnitude.

In order to compensate for the increasing capacity as temperature rises, a dielectric having a negative coefficient of capacity must be chosen.

Messrs. Erie Resistor, Ltd., manufacture positive coefficient units in values up to 5 $\mu\mu$f, which may of course be paralleled if greater values are required. 1.2×10^{-4} is quoted as the positive coefficient for 1 deg. C. rise of temperature. Units of up to 100 $\mu\mu$f are obtainable having a negative coefficient of 6.5×10^{-4} per 1 deg. C. rise, so that in whatever direction the drift occurs, compensation is possible by use of the correct dielectric. Figures 3, 4 and 5 show frequency characteristics, and power factor and capacity variations over normal ranges of temperature.

112 Mc. Activities

As a result of the note in the June BULLETIN of the possibility of transmissions on 112 Mc. from G5JU, two offers of co-operation have been received. To make the erection of the special aerial system and the arranging of definite schedules worth while, the co-operation of several more stations within 50 miles or so of Bristol is desired, and G5JU will be glad to hear from other interested members.

A wavemeter to enable the location of the band is available for loan.

First-class Operators Club

By R. B. WEBSTER (G5BW).

The following are the officers of the Club :—

President :— John Hunter (G2ZQ).
Manager :— R. B. Webster (G5BW).
Committee :— W. A. Roberts (G2RO).
E. F. Baker (G5OQ).
T. C. R. Littlemore (G8AX).
W. G. Gillan (EI5M).

It gives us considerable pleasure to be able to announce that the F.O.C. is now well and truly launched. Perhaps the most gratifying feature of our correspondence is the interest displayed by O.T.'s and newcomers alike, showing that the idea of such a club appeals to all. We should like to point out here, however, that all members of the Club have to *prove* their ability, and membership of a similar organisation or a popular reputation will not provide an " Open Sesame " to F.O.C. membership. We mention this because many people have written to us asking to be enrolled and enclosing the subscription, apparently under the misapprehension that such a procedure is all that is required. Interested readers are requested, in the first place, to send for details of the Club, study the rules, and then, if they are still interested, to make official application for membership. On receipt of such official application their names will be placed before the Selection Committee and a decision communicated to them as soon as possible.

Several members have written to us on the subject of the 1.7 Mc. band, and appealing for more widespread use of same. May we draw the attention of *all* readers to the possibilities of this band ? It is ideal for local contacts, and at present is being grossly neglected in comparison with the higher frequencies. The average amateur, apparently taking B.C. QRM for granted on 1.7 Mc., simply stays off the band until about 22.30 B.S.T., and neglects its possibilities during the rest of the day. There is no reason whatsoever why steps should not be taken to reduce B.C. QRM so that 1.7 Mc. is workable at all times.

A certain amount of confusion has arisen over the new interpretation of QRK ? and QSA ? The majority of British Amateurs are still using the old meanings, but quite a number have adopted the new. These innovations are official and have come to stay, so the sooner everybody adopts them the better. QRK ? now means " What is the *readability* of my signals, 1-5 ? QSA ? means " What is the *strength* of my signals, 1-5 ? ", although for amateur purposes the latter scale will be modified to 1-9.

In conclusion, may we correct a very common error in the use of QSD ? This has absolutely no reference to the quality of sending, but refers purely to the keying from an electrical point of view. There is no Q signal dealing with sending nowadays, but about ten years ago QSC meant " your spacing is bad," and was in popular use by certain coast stations who did not like to ask for QRS when a ship station had got them under the table.

Members elected during the month are :— G8SD, G5IH, G8AB, G5DQ, GI6TK.

Address all correspondence to R. B. Webster (G5BW), Willingdon, Eastbourne.

The Dawn of International DX

By W. E. F. CORSHAM (G2UV).

It is appropriate that in this issue, which appears shortly after the completion of twenty-five years of Society activity, we should publish an account of the epoch-making events which led up to International two-way communications by amateurs. The author was closely associated with the many important pioneer developments which stand to the credit of British amateurs.

IN preparing the article which follows, an attempt has been made to describe, from a somewhat personal point of view, the early developments of organised experimental work in this country and abroad, leading up to the period which has been so aptly described elsewhere as the Dawn of International DX. The writer's interest in radio (wireless as it was then called) dates back to 1913, when, as a schoolboy, he began to experience an urge to find out more about the mysterious science which had just brought Crippen to justice, and salvation to many of the passengers of the ill-fated *Titanic*. He was not, of course, aware at that period of the formation of the Wireless Club of London, but it is with pleasure he notes that the twenty-fifth anniversary of that Club's formation coincides with the foundation of his own personal interest in the science of Radio research.

Post-War Experiments.

Opportunity to enlarge both technical and practical experience came his way during the Great War, and on return to civil life a permit to carry out individual experiments in wireless telegraphy was sought, and obtained, as soon as the restrictions were modified to give amateurs freedom of movement once more. Lifting the first wireless aerial over the rooftops of Willesden (greatly to the alarm of anxious neighbours, who for many years viewed wireless with grave suspicion) was the first operation, and now came the snags. Valves could not be obtained for love or money (despite the official permit, to buy wireless parts, issued by the Government), so for some time the writer had to rely upon the humble crystal detector, and really wonderful results were obtained with this medium. Coast stations as far distant as 1,600 miles were clearly picked out of the QRM on 600 metres, and many were the mine warnings received to show that the aftermath of war was still, in some instances, as deadly as war itself. Army, Navy and Air Force stations were still very active. All these things helped to keep interest alive, and maintain practice in interception and apparatus reconstruction. Some of the circuits in vogue soon after the beginning of these early experiments differed vastly to the published diagrams of early crystal circuits. Personality in construction had begun, in order that the range of one's set could be extended from 50 miles to 1,600 miles, and so on. Moscow and the Eiffel Tower were the standbys on the long wavelengths for comparison purposes.

Early Construction Difficulties

At last, French " R " valves became available, and station ranges increased enormously. Now stations such as Annapolis and Bilboa became common. Telephony and C.W. were the order of the day. Difficulties in coil construction and the making of fixed and variable condensers presented no obstacles to the amateur of 1920 and were little thought of. Coils had to be wound by hand and were, in the writer's case, wound on old Edison Bell cylinders, bought during the early days of the phonograph by thoughtful parents. Also deserving honourable mention was a variable condenser cut out of a condensed milk tin, which gave good results. As a general rule, your true amateur in those early days was forced to cut his condenser vanes out of any piece of metal available, stamp them flat, and solder or bolt them to the home-made spindle. All this primitive but strikingly efficient apparatus served its purpose, until the arrival on the market of Government war surplus apparatus dropped most of it into the junk heap, thereby providing the delighted amateur with first-class components, ready to his adaption.

Interest Grows.

Few amateurs who heard the Chelmsford Telephony tests in 1920 will readily forget them. Another interesting item was the first direct transmission of news to a newspaper office from a DH6 in flight over the Thames. To realise the actual importance of these transmissions one has to remember that to the great majority of people, without class or distinction, wireless telephony was still very much of a novelty. These tests received much advertisement from the amateurs who received them, thereby starting a new branch of amateur interest. In addition the concerts from The Hague began to draw larger audiences.

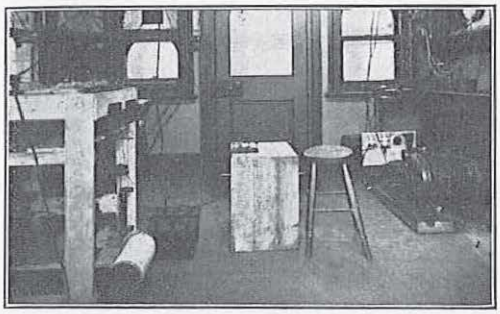
As a result of a petition from the Wireless Society of London, Writtle was called into being, transmitting for one hour per week. Although this station certainly was one of the first commercial stations to carry out a regular service, it played only a very minor part in keeping and feeding the interest of the rapidly growing amateur movement. Here in Great Britain the part played by the amateur in the development of the Broadcasting Saga appears to be something that must not be brought into the light of day. Many will remember the epic broadcast from Writtle which was underlined by the inclusion of a specially prepared record, but no mention was made at the time of the very important part played by amateur stations in providing a keen and quite critical audience for the arrival of 2LO when the commercial interests decided that the time was ripe to feel their way. Many amateurs were transmitting speech or music practically every day and night, and especially at weekends, to an ever growing band of enthusiastic listeners to whom the Writtle performance meant absolutely nothing. The B.B.C. owes the amateur movement much, and no record of the early days of

broadcasting would be complete without their acknowledgment of this debt.

Examination of our " fan mails " of that period show that listeners have changed little in the passage of years, and one remembers the Press arguments that went on as to the respective merits of amateur transmissions versus broadcasting. Here the amateur played his part with small recognition from a service that found the spade work efficiently performed for an immediate success. It would be only fair, and just, if the commercial interests of the country remembered these facts when dealing with the history of broadcasting in Great Britain.

The Dawn Foreshadowed.

Surely one of the most fascinating memories in the mind of a child are those early stories, read at school, of intrepid adventurers setting out in the dawn of the conquest of the world, to discover and place upon the map those parts of the earth un-



G5WS.
The R.S.G.B. station at Wandsworth during the time of the 1922 Transatlantic tests.

known prior to their day. Most certainly it could not have been foreseen that, seated in comfort in the security of our own homes, some of us would follow " de luxe " the path of these same explorers, opening up, in our turn, by the medium of wireless, a world hitherto inaccessible. Ready for the coming of international communications, binding together the peoples of the world as the staccato of morse was replaced by the spoken word. All this the amateur did, using in place of the cumbersome and highly expensive apparatus of the commercials powers from 10 to 50 watts, the while possessing an extraordinary confidence and optimism that left the theorists high and dry. Bridging with ease, distances that up to their intervention had only been covered by high and widespread aerial systems, fed from apparatus supplied with power measured in terms of kilowatts. From the moment American and British amateurs tackled the problem can be traced the beginning of the end of the long wave era for long distance communication. A new chapter in the history of wireless communication had dawned, thanks to the amateur. That chapter opens with the first successful Trans-Atlantic Tests.

The 1921 Trans-Atlantic Tests.

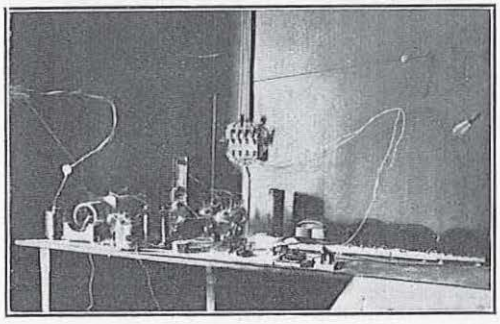
No adventurer of ancient days set out with greater determination to discover an easier path to the New World than did that band of amateur Columbuses who spent the long night watches from midnight to 6 a.m. during December, 1921, listening for signals from their fellow amateurs in America. The writer was, at that time, occupied from 4.15 p.m. to 11.35 p.m. daily on Post Office duties, very often reaching home on the stroke of midnight to take up an immediate watch on the 200-metre band.

As usual many doubts had been cast upon the chances of the success of the tests, because the 1920 tests had not borne fruit. Certainly if it had not been for the insistence of the American Radio Relay League, and the earnest co-operation of Mr. Phillip Coursey, backed by the ever useful propaganda of the *Wireless World* under the editorship of Mr. Hugh Pocock, little interest would have been taken in the tests themselves, and progress would have stood still for a few more years, until chance itself would probably have intervened to provide a signpost to the undiscovered paths that were only awaiting the arrival of research to be thrown open to commerce. The proof of the pudding is always in the eating, and the miracle came off.

That short wave radio stands where it does today is, without any possible doubt, due to the perseverance of the untiring amateur. The 1921 tests caused a remarkable revolution in the ideas of both the amateur and commercial fraternities, spurring on the former to new successes and final achievements in their day and night efforts to contact their fellows in distant lands, setting the later, pretty problems for research and reconstruction of ideas and stations. From this time onwards efforts to proble the usefulness of the new discoveries were redoubled. How did it come about ?

The Americans were covering huge tracts of land areas by their transmitters, and they were firmly of the belief that these distances could be covered over sea areas as well. The A.R.R.L. decided that the failure of their signals to cross the Atlantic in the 1920 tests was due largely to the inexperience of the British amateur on short wavelengths. It must be agreed that there was considerable truth in this point. The regulations in America enabled the American amateur to conduct short wave research much more easily than was the case in Great Britain, consequently our American friends had no idea of the difficulties that beset us when they decided to send over a very famous amateur, Mr. Paul Godley, equipped with the latest and best American equipment, to see what he could do.

Mr. Godley came first to Wembley, two miles from G2UV at Willesden, and here is his statement as to how he found conditions in Britain at the end

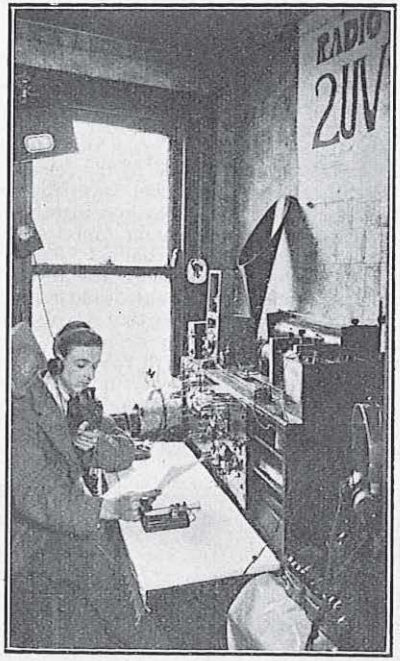


F8AB.
This famous station, operated by M. Deloy, at Nice, made the first European contact with North America on short waves.

of 1921. " Initial tests with the equipment which I brought with me were instituted at the station of Mr. Frank Phillips at Wembley Park, and after four or five nights ending usually about four-thirty in the morning, I was greatly discouraged on account of the presence of vast numbers of harmonics from single circuit tube transmitters, and the Poulsen arc, as well as the strange action of atmospherics of a type which I have never before encountered." He went on to say, " Five nights of this sort of thing was quite enough, and I came to the conclusion that the vicinity of London was no place for me, and immediately arranged to proceed to Scotland."

So he took his 10-tube receiver, and 850 feet of aerial to Scotland. As we know, the weary hours of listening were finally rewarded to the mutual satisfaction of the American and British amateurs engaged on the tests.

An ordinary 100-foot aerial, and a 1921 version of the straight three was used at the writer's station. Signals from 1AFV of Salem. Mass, were received on this apparatus so loud as to be readable on two valves, despite the handicap of the separate heterodyne. This was the first time that amateur signals had been received on everyday apparatus from so great a distance. The first link in the



G2UV.
The author's station at the time of the first London-Scotland contact.

International chain of DX had been forged, and immediate interest in the study of short wavelengths shook the amateur world.

Amateurs hitherto only interested in wavelengths above 200 metres began to think in terms of 200 metres *and below*. The prizewinners in these tests of 1921 were Messrs. W. R. Burne, 2KW, of Sale; H. Whitfield, 2LG, of Birmingham; W. E. F. Corsham, 2UV, of Willesden, London; and D. Spence, 2JZ, of Huntly, Aberdeenshire. Others who received signals in this country were Messrs. A. E. Greenslade and E. McT. Reece, of Clapham, London; T. Cutler, of Southampton; and R. Forshaw, of Liverpool. Actually the first station to receive American amateur signals in Britain was that of Mr. W. R. Burne, 2KW, whose reception on December 8 beat Mr. Godley's by two days.

Mr. Godley commented just before he left England on the discouraging conditions under which, from the American point of view, the British amateurs were forced to work. Quoting from his remarks, he said, " By this I mean their confinement to a power (input) of 10 watts, and the illegality (as I understand it) of any exchange of communications relative to things which have no connection with any tests that are being carried out." He also commented on " the great number of harmonics which fly around from various European stations." He said, " The 600-metre stations FFU and FFH are particularly bothersome, both in the vicinity of London, and further North. Harmonics from the single circuit valve transmitters at Devizes are also numerous. Poldhu is also a serious offender by re-radiation on about 225 metres, while all the ships which carry the valve sets have harmonics swinging in and out, as they work on their 2,000 odd metre wave. Clifden and Eiffel Tower and several other arc stations which I was unable to identify were also bothersome in all localities where I listened, but the worst offender of the lot was some C.W. station which transmits high speed, and from which I counted up to the 39th harmonic." When he heard of the success of British amateurs in the tests he said, " British amateurs have proven their mettle, and there are many who at this moment are being joyously welcomed into the 'Glorious Order of the *Hard Boiled Ham*!' "

Pastures New.

So much for the 1921 tests; in them the amateur set the pace for the present network of International communications. Attention now began to centre on the question of *two-way working* between England and America on short waves. Tremendous difficulties were being experienced on the 1,000-metre band and Croydon airport spent a considerable amount of time complaining to local amateurs of QRM.

Still full of the enthusiasm engendered by their success in the tests, G2JZ and G2UV commenced a series of tests that resulted in final achievement, and this interesting contact was fully reported in the *Wireless World* of July 29, 1922. The first London-Scotland contact was an established fact. Before long two-way communication was established with G2KW in Manchester, and G2LG in Birmingham. So the prizewinners of the Trans-Atlantic Tests linked up; no mean feat in those far-off days.

In the meantime we had passed through the 440-metre stage, down to 360 metres. Up to the time that 2LO made its casual appearance on the air, G2UV was using a wavelength of 365 metres, radiating speech and music daily, and sometimes nightly, for the benefit of listening amateurs, alert for any unusual signal or report. So also were 2ON, 2OM, 2SX, 2TI, 2NH, 2KT, 2SH, 2VN, 2OD, 2NM, 2KF, 2QQ, 2FQ, 2DF, 2DX, 2LI,

2PX, 2TA, 2VJ and 2VW, to mention most of the active London and suburban stations of that day. 2VW deserves special praise because he used to record our transmissions and play them back to us over the air. Surely the first amateur to do so. Now that the counties were linking up, the flood of morse signals began to give way to the introduction of speech as transmitters and receivers improved in efficiency. The calls of the Provincials became familiar to Londoners. Much activity began on 200 metres, and the stage was set for the 1922 tests.

G2UV was badly handicapped by lack of supply mains (electricity was not installed in those days without very considerable expense), so he was compelled to rely upon dry batteries for telephony transmissions. He evolved from a ¼-inch spark coil a fearful transmitter employing a Tonic Train system. The coil was worked from a 6-volt accumulator and, without smoothing, was fed into the plate circuit of the transmitting valve. How many Old Timers remember this transmitter? The note was controlled by an ingenious adjust-

G2KF.
Jack Partridge, who made the first England-North American contact in 1923.

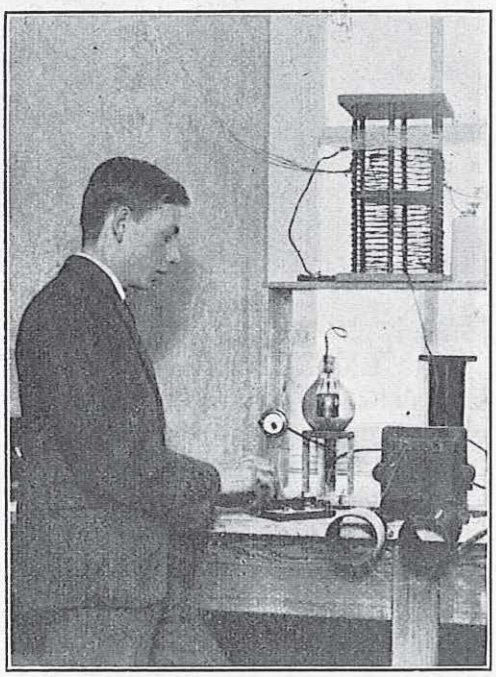
ment on the contact breaker, manufactured out of a piece of elastic and a match stick. Thus the note could be high or low pitched as required. It is interesting to note that a pitch could be found that cut through QRM like a knife. G2UV was heard all over Europe and in parts of America, and the input was well below 10 watts at all times. The station's best effort was a contact of just over 4,000 miles made in the early months of 1924.

The writer issued the first QSL card in January, 1921, and various cards began to arrive afterwards from others who took wholeheartedly to the idea. French amateurs became licensed in February, 1922, at least the first of a series of lists was published, and some of their voices were heard soon after. F8AB, 8AD, 8AE, 8AH and TSFM were well-known calls. In the July, remarkable low power results were being obtained at various stations. G2UV established communication on telephony with G2OD at Gerrards Cross, G2SX at Putney, and G2VW at Chalk Farm, using 12 *volts* to the plate of a French "R" valve. This work is mentioned to show how far we had advanced in efficiency in the few months after the tests. Early in December the writer heard, for the first time, WJZ broadcasting from the United States on what is now the medium band, and as the 1922 tests approached the reception of signals from American amateurs became a nightly occurrence. In one case a QSO between G2OD and G2UV was heavily QRM'd by W2AWF, one of the most unusual of unusual occurrences at that period. This augured well for the coming tests, and their success is ancient history.

The 1922 Trans-Atlantic Tests.

On the best nights of the tests, the condenser dial was so covered with American signals that it was difficult to log them all. The writer heard 161 American stations all told, whilst 38 other British amateurs received signals from the States. The names of many present day amateurs appear in that list. During these tests, the official station of the Wireless Society of London, G5WS sent out messages from this side. This station, specially built by a committee of the Society, was operated by Messrs. Coursey (chief organiser of the tests), Hamilton, Lee, Child, Phillips and Blake. Coded signals from G5WS and F8AB, the station of Mr. Leon Deloy at Nice, were correctly received by American amateurs.

Amateur radio owes Mr. Phillip Coursey and Mr. Hugh Pocock a great debt for their work in organising the tests, for the clarity of the preliminary details, and the speed with which the final results were circulated to all concerned. *The Wireless World* was in those important nursery days the handbook of amateur radio in this country. We

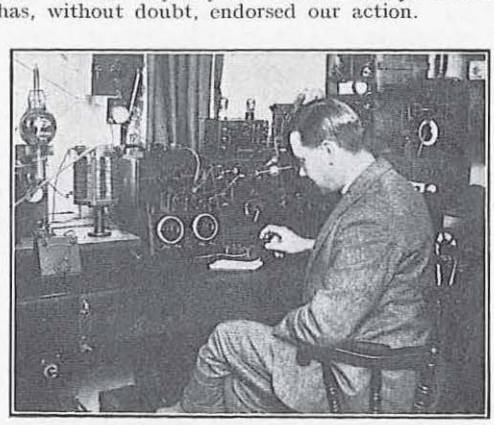


G2SZ.
Cecil Goyder, then at Mill Hill School, made history in 1924 by effecting the first two-way contact between England and New Zealand. Mr. Goyder is now Engineer-in-Charge of All-India Radio.

looked to it, and never in vain for general knowledge and up-to-date news.

Amateur Organisations.

Now came a period of trouble and strife in the amateur world. No one can follow the history of the merging of the Transmitter Societies that sprang up overnight, without realising that the good sense of the amateur prevailed at a time when he was flushed with success in a rising tide of victories over what had seemed insurmountable difficulties. The Constitution of the Wireless Society of London, renamed in November, 1922, the Radio Society of Great Britain, was quite unable to cater for this new type of amateur, therefore the difficult position arose of some half-dozen transmitter Societies being in existence. There could be no doubt in the minds of all sound thinking amateurs that the time had come for the formation of a strong Society to represent their united interests, for if the Wireless Society of London was bewildered with the new position in the amateur world, so were the Post Office authorities, the Services and the commercial interests. The fact that fusion took place in so short a time showed that the amateurs of 1922 and 1923 had decided at least one point very definitely, that the policy of " United we stand, divided we fall," was the only way out of the difficulty. History has, without doubt, endorsed our action.



G2OD.
Another famous pioneer amateur station was that operated by our Vice-President, Mr. E. J. Simmonds (G2OD). Mr. Simmonds made the first England-Australia contact in 1924.

The British Wireless Relay League, which was formed in September, 1922, was undoubtedly the first Society to cater for the new amateur. Early in 1923, Mr. Hugh Pocock took over the Hon. Secretaryship, and *The Wireless World* was adopted as its official organ. The Society carried out several tests, but it was finally decided at a meeting on January 11, 1923, that the Radio Society of Great Britain should be approached with a view to fusion of interests. This led in July, 1923, to the formation of the Transmitter and Relay Section of the R.S.G.B., which section was, of course, the forerunner of our present flourishing Society. The first committee members of the R.S.G.B. (T. & R. section) were Messrs. P. Coursey (G2JK), Maurice Child (G2DC,) W. Winkler (G2TF), and W. E. F. Corsham (G2UV).

In the meantime other clouds were looming upon the horizon. The Amateur Radio Research Association was born in Cheshire in October, 1923, and the Radio Transmitters Society in London. The Radio Transmitters Society had disagreed with the T. & R. section of the R.S.G.B., and a conflict between the two bodies seemed at hand. The R.T.S. in October, 1923, petitioned the Post Office for permission to directly represent their members, but the good sense of all concerned prevailed however, and in February, 1924, the final merger took place between the R.S.G.B. (T. & R.) and the R.T.S. The combined societies met under the chairmanship of Capt. (now Sir) Ian Fraser, Mr. G. Marcuse became Hon. Secretary, whilst Mr. W. K. Alford and the writer were appointed traffic managers. From that time the amalgamated body took the title of the T. & R. Section R.S.G.B., and most of the members of the A.R.R.A. joined the Section, which quickly moved forward. Daylight tests were arranged immediately, and the first organised linking up of the country under the control of the traffic managers was soon an accomplished fact.

The writer remembers very clearly Mr. J. A. Partridge (G2KF), of Merton, asking him during a QSO to listen for his signals on 100 metres, complaining of the lack of interest amongst fellow amateurs. The fact was, of course, that few people could get receivers to work on what was, at that time, a very short wavelength. Shortly afterwards he made his wonderful two-way QSO with the American station IMO, thereby anticipating the 1923 tests by some weeks. This was the first England-America two-way short wave contact. A very fine performance and one he richly deserved, for G2KF was always a good all-rounder when serious work was in the air.

The 1923 Trans-Atlantic Tests.

The first actual two-way Trans-Atlantic Transmitting Tests of an organised nature began in December, 1923, when many British stations had their signals and code words correctly received in the New World. After the success of the tests, individual tests between England and America became the feverish endeavour of the winter nights. All sorts and kinds of transmitters filled the band. The writer's 5-watt Tonic Train transmitter established contact in the general course of things, and a record was established by putting over signals on the same transmitter, fed by a hand generator. Details of the incidents recorded during this period would fill many pages. G2OD and G2UV logged the first South American signals in May, 1924. The station concerned (CB8) was situated in the Argentine and operated on 125 metres. The Americans had, in 1923, bridged the Pacific, and had also been heard in the neighbourhood of Australia, so that towards the end of 1924 it can be safely said that the world stage was set for the fulfilment of International DX. British amateurs had contacted most of Europe, America and Canada, and were looking for fresh worlds to conquer.

The writer feels that a fitting end to this article will be to produce an extract from an S.B. talk he gave on behalf of the R.S.G.B. from the 2LO studio on Thursday, June 12, 1924. Many letters were received from amateurs after this broadcast. Some went so far as to say he had thrown down a definite challenge to the Post Office that they were

likely to accept, in view of the fact that a definite ban had been placed on indiscriminate working with stations abroad. Others stated that he had used the purpose of the broadcast to exaggerate the possibilities, some sending him arguments to prove just how impossible it was for his prophecies to be fulfilled. He leaves readers to judge how close he was to the recorded facts. It was his view that the time had come to deal with plain facts in the amateur world, and to give the public information as reliable as possible regarding the work the amateur was performing for the community at large. The broadcast was used to make this point, and most of the radio papers of the day printed this extract.

" In conclusion, I would like to make a few remarks about experiments with overseas stations. Numbers of our stations have been in constant communication with amateurs in all parts of North America, Canada, France, Belgium, Holland, Denmark, Switzerland, Luxemburg, Italy, Germany and Finland, which I think you will agree are excellent performances. The recent reception by G2OD and myself of a South American amateur has opened up a new field, and brings the prospect of communication at a distance of 7,000 miles much nearer, especially as G2OD has been heard in California, and French 8AB in Brazil. So the amateur goes on from success to success, *and I have no doubt that in the very near future we shall be able to place on record the reception of an amateur station in Australia.* Certainly a very formidable task, but one which the amateur is even now tackling in his usual optimistic manner. Perhaps, therefore, the day when the British amateur will have encircled the world is not so far ahead after all." That prophecy, despite the gloomy arguments of the critics, was fulfilled, for in October of the same year, four months after the broadcast, Mr. Cecil Goyder (G2SZ) contacted New Zealand from Mill Hill School, to be closely followed by Mr. E. J. Simmonds (G2OD), who in November also contacted Australia.

We have reached the milestone year in amateur radio 1924, and with it the end of this article. A serious illness prevented the writer from joining the mad rush to QSO " Down under " and he had the mortification, yet joy, of watching the fulfilment of his prophecy from a sick bed on which the hold on life itself was touch and go. It was long before he was able to return to key and microphone, but when he did the scramble for DX was on, and it was indeed a different world he returned to.

In compiling this article, the writer has endeavoured to give an authentic story, essentially from a London view-point, of the Dawn of International DX, but in preparing it many shadows of cheerful wholehearted friends of those past days have marched with the writer. Some have gone for ever from the comradeship of Ham Radio, but their work lives on, and their presence is with us in the pages of our log books, and the niches of the mind from whence they sprung. To recount their stewardship as individuals would require a book in itself; it is only possible to touch the surface of the ground in the present article. The torch of progress still flames high in the hearts of the amateur fraternity, fanned always by the Ham Spirit that lit it in those far-off days when the amateurs of the world first stretched across the lands and seas of the world the hand of friendship and co-operation. We have far to go, progress must be the life blood of the amateur movement if we would still further justify our craft amongst the ranks of those who hold its destiny in the hollow of their hand. See to it that we each in our place and time put our shoulders to the wheel, so that the spirit of independent research may flourish strongly on the site of the foundation stone laid by the post-war amateurs, who first flung a girdle round the world, during the Dawn of International DX. The writer wishes to thank the Editor and publishers of the *Wireless World* for their permission in allowing him to reproduce the photographs illustrating this article.

Ham Movements

Capt. Stanley Thorpe (ZS1AH) has recently left South Africa, and is now resident temporarily at St. Albans. He wishes to thank all those who gave him QSO's during his stay in South Africa, and hopes to operate an English station at an early date.

AN N.F.D. SHOCK

During N.F.D. a Russian station was called by G5UKP, G5VQ being at the receiver. Judge G5VQ's surprise when he heard the station in question come back to " G5VQ " ! G5VQ listened to the whole of the QSO with this pirate. He would be pleased to arrange a sked with his competitor, and on receiving his full QRA would be glad to forward the unwanted QSL's which have been accumulating recently.

A Crystal Hint

Probably some members possess a 7 Mc. crystal which has become of little use owing to a regular source of QRM (such as Spanish 'phone !) which has started since the particular crystal was obtained.

A simple and effective method of shifting the crystal frequency, instead of the more usual and somewhat messy method of grinding the crystal on plate glass with valve grinding compound, is to use an ordinary oil stone such as is used for sharpening carpenters tools.

Having on hand an India stone, M.O. fine, a 7 Mc. crystal was changed 30 kc. in steps of about 5 kc. in 20 minutes.

The stone should be first cleaned with paraffin, then smeared with thin oil. The crystal is placed on the stone and rubbed in a circular motion by means of the forefinger for about half a minute, but care should be taken in removing the crystal from the stone as it sticks due to vacuum effect. Wipe the oil off the crystal and clean with carbon tetrachloride, then test for frequency. The largest change in one rub lasting about a minute was 10 kc.

The operation was repeated four times, until a reasonably quiet channel in the band was found.

G2CF.

Stray

G5AN informs us that VU2FZ is the portable call of VU2FV.

Fresh Air and Good Company

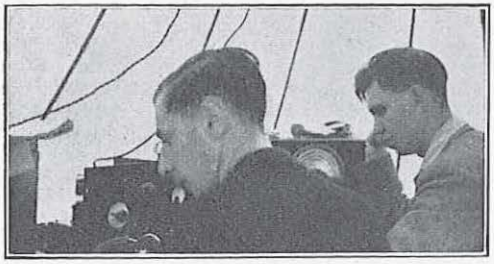
Being a Brief Account of N.F.D. in and Around London

FRESH air, sunshine, congenial company—what more can a man want? Your scribe who pens these few words enjoyed all three during another unforgettable N.F.D. week-end.

Thanks to the generosity of the *Agfa Film Company*, it became possible to film upwards of 15 London and Home Counties stations this year.

An evening spent poring over a batch of Ordnance Survey maps paved the way for the visits. From past and bitter experience we knew only too well how precious minutes can be lost through ambiguous or incorrect directions. Forewarned is forearmed, but even the most carefully laid plots of men and mice come unstuck, as we of the North London party were very soon to discover.

It was decided prior to Field Day that the film work should be split up into four sections, on the Saturday a tour would be made of the four North London stations, on the Sunday the South London party in charge of Ham Whyte would visit as many stations south of the Thames as possible, whilst the North Londoners would break new ground by looking in at some of the District 8 stations. It had also been planned to cover the Middlesex District 15 stations, but to our regret this was not possible.



" G5WWP showed that true portables are still not quite dead." G5WW in pensive mood on the right, with G5FA also deep in thought.

Around District 12

Sharp on 4 p.m. three car parties moved off from Hatfield Station Yard. Welwyn Heath was the first scheduled stop, at which site we were due to make some shots of G5UMP going into action. Armed with the most detailed instructions the party arrived at 4.20—G5UMP was located at 4.55 p.m.! Yes, you've guessed it, our map-reader-in-chief was unfortunately *not* a thought reader. By the greatest good fortune a brace of hikers eventually put us on the track of " the men with a wireless set and a tent."

Less than 200 yards from where the party had stopped at 4.25 the merry men of Welwyn were located, but there was something wrong—all wrong—for instead of finding half a dozen lads straining every nerve to get their " stick " in position our eyes descended upon a few well-dressed " gentlemen of Hertfordshire " sitting in comfortable *arm* chairs in snug retreat with their station fully installed and ready for the witching hour of 1800 G.M.T.

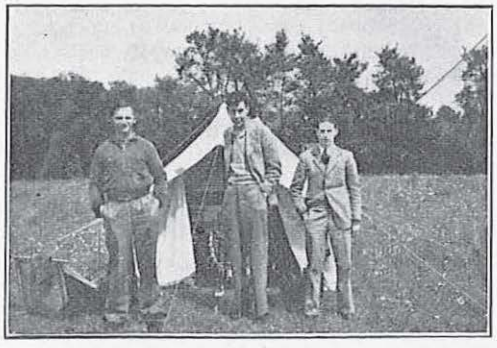
In the brogue of his native Ireland which has not lost a scrap of its guile, an old friend in Cecil Cleland (G2CN) was the first to greet us, followed a second later by his henchman Jack Hum, the chief operator, and presumably head cook. Photographs were taken, a series of shots placed on the celluloid spool, and the party were away carrying with them memories of that 35 minutes' ramble amongst prize pigs, chickens and bramble.

Back along the famous A1 road, past Brookman's Park (one of the District's pet fixed stations) to a way-side café, for tea and scones. More pictures, more films.

With an hour to go before kick-off the party arrived on the site of G6PIP, but in spite of the omnious call sign we saw no sign of " pippiness," in fact the greeting here at Potters Bar was even more vociferous than at Welwyn for the reason that the staff at this station seemed to run into a few dozen. After introductions, our camera man settled down in great style to film the bewildering scene presented to us. G6PI, the operator in charge, calmly informed us that the weight of the accumulators installed in the marquee exceeded *half a ton*; further, he impressed us with the fact that on full load the station would be consuming 31 amps! Did we hear a still small voice say something about N.F.D. being a portable station event!

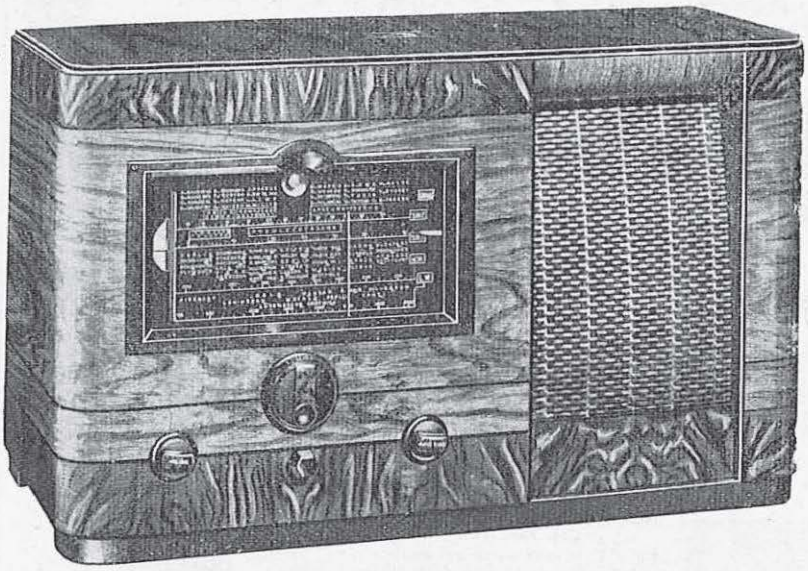
Two beam aerials nicely labelled up, a huge amount of most efficient-looking gear and a view to the west (or was it north ?) second to none left us convinced that here was a 7 Mc. station that would show 'em all how it was done. We hope the results justified the Titan work which had been put in by G6PI and his assistants, many of whom are members of the Kentish Town Radio Society.

Through country lanes until the Barnet By-Pass was reached, thence to Mill Hill, site of G2AIP. We had no right whatever to have been where we were when the signboard to the station was located, because our pilot, assuming that the site was the same as in 1937, intended approaching it from a direction roughly 180° degrees from the one we found accidentally. (Incidentally, when we eventually finished the day's run a postcard was awaiting us from one of the operators giving us the new location !)



" G8ABP showed some signs of the vigil which had been kept."

BRIEF TECHNICAL DETAILS OF "H.M.V." MODEL 656 FOR A.C. MAINS



"HIS MASTER'S VOICE"

MODEL 656

Cash price 14 GNS.

or by hire purchase.

Pre-released from our Radiolympia range

"HIS MASTER'S VOICE"

6 VALVE · 4 WAVEBAND · FLUID LIGHT · ALL-WORLD · SUPERHET RECEIVER

CIRCUIT. The aerial socket is taken to a 7.5 m.m.f. condenser the other side of which is connected via a 35 m.m.f. condenser to the grid of the H.F. amplifier (KTW63) valve. The first tuned circuit is connected across the H.F. amplifier, between grid and chassis. All tuning coils are individually trimmed, a practice adopted throughout the H.F. circuits. Amplified signals from the KTW63 are converted to an I.F. frequency of 465 kc by the triode section of the triode-hexode mixer-oscillator. The hexode section provides I.F. amplification and is coupled to the first I.F. transformer. A second stage of the I.F. amplification follows (KTW63) valve, and thence, from the second I.F. transformer H.F. signals are converted to L.F. impulses by one diode of a combined double diode triode valve (DH63). The second diode provides AVC volts to the previous 3 valves across a delay network. From the rectifying diode the L.F. pulses are built up across a resistance and condenser load and passed to the grid of the triode section of the DH63. A resistance capacity network couples the triode L.F. amplifier to the KT63 output valve. The visual tuning indicator is controlled from the AVC line. H.T. current is obtained from a U50 H.T. rectifier, adequately smoothed by the loudspeaker field and electrolytic condensers.

VALVES

K.T.W.63	..	H.F. amplifier.
X.65	..	Frequency changer.
K.T.W.63	..	I.F. amplifier.
D.H.63	..	Detector AVC. L.F.
K.T.63	..	Output.
U.50	..	Rectifier.

WAVE RANGES. 13–30, 30–92, 195–580, 725–2,000 metres (approx.).

SCALE. Illuminated and marked with L.W. and M.W. station names and short wave stations. Alphabetical key on short wave stations.

TUNING INDICATOR. Single pointer moves across length of scale fitted with fluid-light tuning.

VERNIER SCALE. A vernier tuning scale is visible through an aperture on the left-hand side of the scale.

WAVEBAND INDICATOR. Each waveband is clearly indicated, and the one in operation is illuminated.

CONTROLS. Single speed tuner. Combined volume on/off switch. Wave-change switch. Tone control.

OUTPUT. 3.25 watts undistorted.

LOUDSPEAKERS. Mains energized moving-coil speaker with elliptical cone, fixed in upright position and canted at an angle. Extra loudspeaker sockets are fitted and arrangements made to cut out the internal speaker.

GRAMOPHONE. Fitted with pick-up sockets and controlled by wave-range switch. No separate volume control required for gramophone.

VOLTAGE RANGE. 195 – 255 volts AC., 50–100 cycles.

CONSUMPTION. 80 watts.

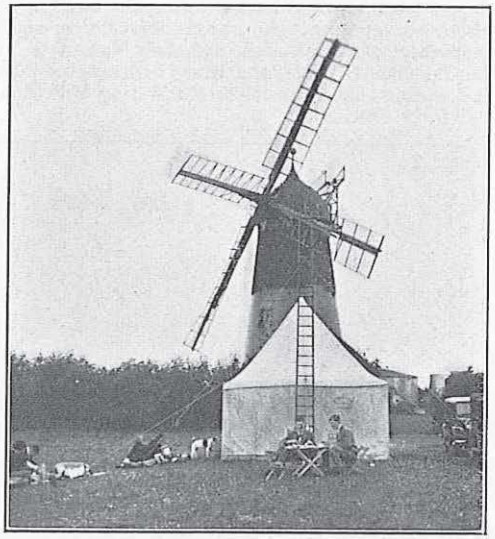
CABINET. Is of the horizontal type and finished in figured walnut in contrasting inlays. The bronze loudspeaker grille is slightly curved and forms a relief from the simple lines of the modern design.

DIMENSIONS. Height, 14 in. Width, 23½ in.; Depth, 11½ in.

If you would like to receive a copy of the "H.M.V." illustrated catalogue of RADIO *receivers and Radio-gramophones write to* "HIS MASTER'S VOICE," 108P Clerkenwell Road, E.C.1.

The cars had no sooner turned into the field than "Test de G2AI" came winging its way across the open country. The chief op. having been home for a few spares, was giving us greetings on his Klaxon horn. The next ten minutes were spent in climbing up some few thousands of feet (or so it seemed to one member of the party). After admiring the distant view of Harrow as an excuse to regain our breath we arrived eventually on the site of the District's 14 Mc. station. The great rush for points had just started, and with bated breath the camera man and his followers approached the holy of holies to get a few close up shots of "hams at work." As the films will ultimately portray they also show certain "hams at play."

Our ears ringing with high-brow dope about beams, matched impedance feeders, matching stubs and half waves in phase, we toiled slowly down hill to the cars. Scarcely had we reached them when the cry range out "Excelsior, we've hooked Iceland!" The nearest thing to Iceland that



"Mustill's Windmill, rendezvous of many successful District 8 activities."

interested us at that moment was something in a long glass with *ice in it*.

And then off to Arkley—Barnet Gate, if you wish to be academically correct. Once again the old wind-mill site had been chosen by Five Wicked Willies. Always among the leading 3.5 Mc. stations G5WWP showed that true portables are still not quite dead. In a small bell tent set out in all the majesty of its 25 watts was the same old transmitter which had helped the District three years ago to go cock-a-hoop by winning N.F.D. Paul Carment, assisted by Bert Mathews, G6QM, and Paul Stein, G8NY, were already knocking off the other portables when we arrived, and judging by the keenness and enthusiasm which was shown we should not be at all surprised if G5WWP is not once more well up amongst the 3.5 Mc. stations.

Thanks, Paul, for an entertaining half hour, but do *please* label up the tent pegs next year!

Journey's End—or nearly so. What was that we heard G6WU say, "The Cock at Cockfosters." "Sorry, Bill, but we're all *tea*totlers in our car, but if you insist, well, just one." And just one it was—one at a time.

With 53 miles on the clock your scribe returned to his own shack to listen to the lads on 3.5 Mc. who were forgetting to sign "3!"

And then—to quote Samuel, son of Pepys—to bed.

Into the Home Counties

Sunday, June 12, in London broke warm and clear giving hopes of another fine day. Little did we know then that our colleagues in the Midlands and the North had been slogging through muddy fields as a result of heavy rain on the previous evening.

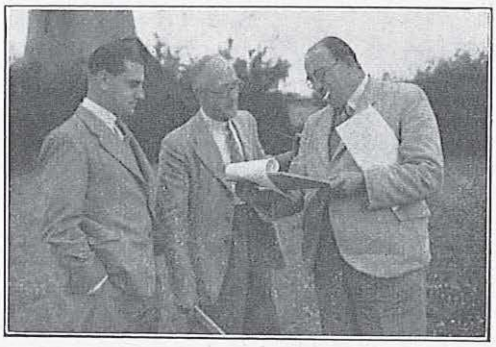
Our maps showed that Harlow, in Essex, would be the nearest station site on our route into Cambridgeshire. Right on the schedule hour of 10.30, the party arrived at the Rainbow and Dove, after having hit the right turning from Epping, thanks to the sketch map which ordered us to watch for The Waggon and Horses. (How is it that so many stations are located near country inns?)

Station G8ABP, under the care of Mr. Railton, showed some signs of the vigil which had been kept so keenly during the night. A small bell tent, a very simple transmitter and receiver were the only visible signs of radio activity, but the score sheet showed that the gear had stood up well to what had then been nearly 16 hours' continuous operation.

On the road again at 11 a.m. The knowledge that 50 miles lay ahead of us before the next station could be reached provided our pilot with the opportunity of demonstrating that with "four-up" his Vauxhall could show a pretty pair of back wheels to anything on the road. Cambridge came into view at 12.15 p.m., and our camera man could not resist the temptation to film a few outstanding beauty spots in this famous seat of learning. King's and Trinity provided some excellent shots, but time prevented a longer stay.

Out on the Huntingdon Road for some seven miles and then a turn right into Swavesey. Mustill's Mill, rendezvous of many successful District 8 activities in past years, presented a grand picture standing out clear against the surrounding country.

Lunch *al fresco* was under way as our party arrived. Greetings from G2XV, 2PL, 5OV and



"A glimpse of the careful spadework put in before the event." G2XV (centre) explains the schedule board to G6CL while G6LL looks on.

many others, a brief examination of the gear and the cameras were again in action. Ever alert for good "copy," the cine-operator and our pilot, greatly daring, climbed to the top of the windmill and proceeded to take shots and stills from their superior elevation.

In ideal surroundings G5JOP was fast knocking off points on 3.5 Mc. with the aid of a most efficient looking 132 ft. aerial neatly suspended at one end from one of the sails of the windmill.

At this station we had a glimpse of the careful spade work which is put in by Gerry Jeapes and his colleagues long before the first Test N.F.D. call is

"The spaciousness of the tents used in District 8 was not lost sight of." Here are some of the operators at G6WAP, near St. Ives.

sent out. Each station in the District had been supplied with a double foolscap sheet of paper drawn up into columns and headed with the prefixes of the countries likely to be worked. In addition, the left-hand side of the sheet gave a complete list of every other known portable station operating on the band used by each particular District 8 station. The value of such a sheet should be obvious to everyone, for numerous instances occur every year of new operators taking over and unknowingly wasting time by calling stations previously worked.

After a most enjoyable stay the party moved off towards St. Ives, breaking their journey for a well-earned meal at the pretty Huntingdonshire village of Fen Stanton. Lunch over, we headed for the site of G6WAP, passing *en route* over the quaint and very narrow bridge across the Little Ouse at St. Ives, the only bridge to our knowledge which has a chapel built upon it. Reluctantly the fishermen in our party were induced to continue their journey after a few brief impressions of this interesting old town had been recorded on the cameras.

Joined at this spot by G2XV little time was wasted in locating the District's 14 Mc. station which, like G5JOP, was in open country and in ideal surroundings.

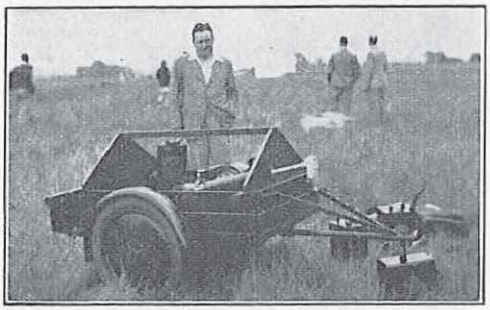
The spaciousness of the tents used in District 8 was not lost sight of by the visitors, who had in past years encountered N.F.D. stations in huts, tumbled down barns and summer-houses. For comfort we can recommend a spell of duty amongst the Home Counties stations.

In like manner to the "Windmill station" G6WAP had the advantage of an excellent site for its aerials. During our visit the Windom was in action, but a matched impedance system had also proved its worth during the early hours of the day.

Time was passing all too quickly and another long journey lay ahead, because we had promised to look in at the Bedford station G5PAP before returning to town. Piloted this time by G2XV, the party made good progress *via* Buckden on the Great North Road, eventually arriving at Bedford around 5 p.m.

The station was some three or four miles from the town and in a fine location. Here it was that our eyes fairly bulged, for we were seeing for the first time an all commercial N.F.D. station. To add to this surprise we discovered some 100 yards distant a completely self-contained petrol-driven generator equipment which during the night had delivered enough power to light a fair size 240v. electric lamp in addition to supplying power to the transmitter.

One may perhaps hold decided opinions about the use of commercial gear for N.F.D., but here was a station which, if an emergency arose, could be depended upon to do its job really well. The operators, many of whom were, we believe, new to field day work, showed by their keenness and businesslike attitude, that they had not been long in learning that to be successful during N.F.D. one has to be efficient.



"Located some 100 yards distance from G5PAP was a completely self-contained petrol-driven generator equipment."

Amid a chorus of good wishes, the film unit (as it had now been christened) got under way for home shortly before 6 p.m. Taking tea by the river-side at Bedford, our minds went back to those we had met during the week-end. Old friendships had been renewed, new ones created. Good fellowship was in evidence on every hand. N.F.D., whatever its critics may have to say about it, has the virtue of bringing to the fore the best in everyone who assists.

And so back to London with our precious spools of film. Two hundred and twenty miles on the clock and not one single hitch—technical or otherwise.

The writer desires to record his thanks to Mr. H. A. M. Clark, G6OT, the pilot of the party, and to Mr. Jordan, of the *Agfa Film Co.* for contributing to a most enjoyable week-end.

Stray

Mr. W. Hartley, 4, Greenfields Avenue, Starbeck, Harrogate, asks us to mention that he has recently been allotted the call G8UY. Mr. Hartley was active some years ago as G6YR.

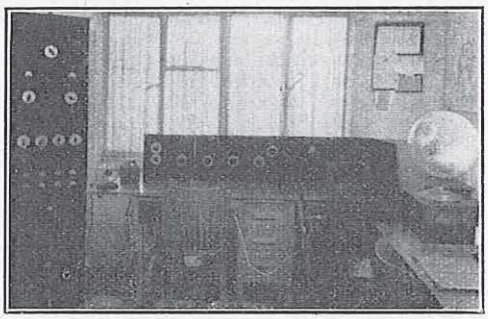
A Modern A.A. Station

By G. S. Woollatt (2DGB).

SOME idea of the experiments carried out at this station, and also a description of the gear in use, may be of interest to other A.A. licence holders. The transmitter is a 10-watt job, built with a view to the future and one eye on the regulations, and although at first sight it may appear to be somewhat pretentious for this purpose, it was found that an expansive layout was necessary to obtain the most efficient spacing and at the same time leaving room for expansion in the future, without having to rebuild from power packs to aerial unit.

Description

The lowest deck of the transmitter rack contains the power and filament supplies. There are three of these, one each for exciter, P.A. and modulator, together with separate filament transformers for all stages. Indicator lamps and separate switches for each unit are incorporated, although these are subsidiary to, and controlled by, a master remote control switch which will be described at a later



A general view of the station described in this article. The neat layout would do credit to many fully licensed operators.

stage. Adequate smoothing is provided for throughout, and although the actual components are not the most expensive on the market, absolute hum-free and reliable D.C. is always available. Above the power panel we have the modulator. This is a hefty job with a maximum output of about 34 watts. It is, however, run much below this figure and is certainly one of the units that will not require to be rebuilt or added to for a considerable period. Two-channel input is provided for; when a crystal microphone is used, the output is fed into a 6J7 and thence to a 6C5. When a transverse current microphone is used, the feed is straight to the grid of the 6C5, via the usual transformers and volume control. A multi-pole jack is used in this position, and when the microphone plug is inserted the potentiometer lead to the anode of the 6J7 is broken and switched to the secondary of the transformer, and the microphone energising battery is also brought into circuit. The 6C5 drives a pair of 6L6M valves in class AB, using a 1 to 1 *Thordarson* transformer.

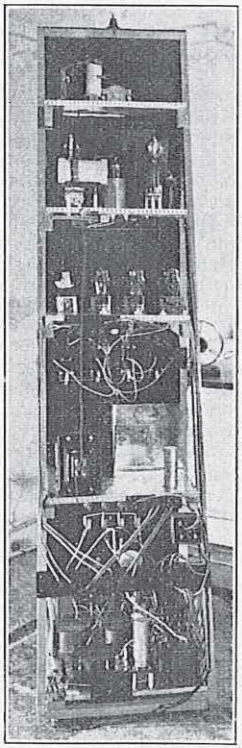
Metal valves are used throughout and some very intricate shielding has had to be devised to prevent any hum pickup from the power supplies situated underneath. This was the only difficulty experienced in the whole of the construction of the transmitter. The microphone jacks are screened, as are all grid leads; in fact, most of the wiring of this unit was effected with lead-covered, single-core electric cable. The 6J7 valve itself is completely screened from the rest of the modulator and a sheet of iron under the modulator deck completely isolates it from the power stage.

The exciter unit consists of a 42 C.O. used in a regenerative pentode circuit, and this is capacity coupled to a series of doublers each being capacity coupled to the next one. 6A6 valves were found to give a good performance here, since the drive required by the P.A. was only small. Capacity coupling was again chosen on account of its simplicity, only one tuned circuit being required for the grid and plate of the preceding valve. As the cathode circuit of the C.O. is used for keying, a combination of cathode and grid leak bias is used throughout and this has also given satisfaction.

The bank of meters between the modulator panel and exciter unit consist of anode and grid current meters to each exciter stage. The large number of meters was decided upon in order that all necessary readings could be taken at once, without having recourse to plugs and jacks for various stages.

The C.O. is controlled by a 7 Mc. crystal, and the doublers give more than sufficient output on 14, 28 and 56 Mc. to drive an RK25 to its proper operating factors. Link coupling is employed to the final stage and is of a very simple design. Each tank coil of the exciter has a two-turn link wound on the same former, just below the "cold" end of the coil, the ends being taken out to a jack on the front panel. The four jacks may be seen just under the tuning dials in the photograph, with the link from the P.A. plugged into the jack controlling 14 Mc. operation. Insertion of the jack controls the high tension supply to the following doubler stages.

The P.A. stage is a straightforward single-ended tank pentode power amplifier. The



A rear view of the transmitter in use at 2DGB.

RK25 required careful screening, and much experimental work was put in here to eliminate feed-back or self-oscillation and all grid leads, both above and below the chassis, are screened. The P.A. stage is plate and screen modulated and very good patterns were finally obtained on the small oscilloscope. The drive from the exciter is taken to a variable link coupling and interesting graphs were plotted showing relative power output, with varying values of grid drive, grid bias and load. Whatever the values of load and bias used, there was always a point where increased drive produced practically no increase of power output, and, having due regard to tube life and "cool grids," this point was never exceeded for long periods. The RK25 appears to be a very efficient Class C amplifier.

Grid leak bias is normally used in this stage for telephony, but a switch has been fitted on the panel which brings into circuit about 45 volts of negative battery bias for phone work; a further movement of this same switch places 45 volts on the suppressor grid for CW working.

The aim throughout all the construction of the gear has been to obtain maximum efficiency of operation, consistent with low power and 100 per cent. quality. Whether this has been accomplished remains to be seen when the transmitter is connected to a radiating aerial.

The remote control switch is located to the left of the operating position, just under the top, and is very simple in operation. In the middle position the receiver is in operation. From the receiver position the transmitter filaments are switched on by a master switch and the L.T. supply is switched to the receiver, which is battery operated. The remote control switch is now brought into circuit and in the "send" position switches on the high voltage to the transmitter, monitor and also the oscilloscope, if required. The switch also operates an aerial relay. When the switch is moved to its "receive" position, the high-voltage supply is cut off, the monitor is disconnected, the aerial is changed over and the receiver high-tension supply is switched on. Rapid changes from send to receive are thus possible by this method.

Battery operation of the receiver may seem somewhat out of date, but for a really quiet background the writer is of the opinion that it is the best method to employ. The receiver consists of two tuned regenerative stages, regenerative detector, two audio stages and B.F.O. injection. A *Celestion* moving-coil speaker is used. The selectivity, contrary to general opinion, is very good and the DX abilities of the receiver are amazing. There appears to be a fearsome array of dials on the receiver panel, but actually most of them are set at an optimum position and tuning carried out by two main dials. Everything that could be controlled manually was fitted with a knob and, when the occasion arises, they can all be used to some purpose. A converter for 28 and 56 Mc. has been tried, but has not been very successful; accordingly, a special unit using Acorn valves is in course of construction. In conclusion, a great amount of enjoyment has been derived and much has been learnt during the few months that the writer has held an A.A. licence and much more is being looked for in the future.

Dorothy

By S. W. L. CORA.

NO doubt, at some time or other, while tuning over the 14 Mc. band most readers have heard W2IXY, one of the most outstanding amateur 'phone stations in the United States to-day.

Before entering the "shack" the first point that attracts attention are two 66-ft. steel masts which can be seen for miles around, towering above everything in the immediate neighbourhood. To these is attached the unique aerial system, the credit for which goes to Capt. Hall, who prides himself in being able to lay out an aerial with extreme precision from compass bearings. Apart from the aerials slung from the steel masts, there is one for 56 Mc. transmissions attached to the side of the house looking like a huge fork with only two prongs. This extends above the roof of the house, and can also be seen for some distance. The arrays as seen by the passer-by are a very elaborate and impressive piece of work, and incidentally these are the factors which enable W2IXY to contact so successfully her innumerable friends in all parts of the world.

Inside the shack, which is 12 ft. square, are four transmitters and three communication type receivers neatly arranged, but the transmitter which stands out above all the rest is the new 1-kW. job finished in a dark mottled grey, with black and silver trimmings.

There are also two all-wave receivers as well as several others located in different parts of the nine-room residence.

Beside the foregoing, there are recording and play-back equipment, barometers, charts, maps and clocks. A particularly interesting clock is one highly prized by Capt. Hall, having been the only article saved from a ship lost at sea many years ago.

Gazing around the walls, one cannot help admiring the extremely neat arrangement of QSL cards. Among them are eight sets of W.A.C. cards, which represent contacts made on two-way 'phone only. While W2IXY has been operating on 14 Mc. 'phone for only about 18 months, she has to date worked nearly 80 countries, most of which have been verified.

Experimenting is a never-ceasing task at this station. One of her most recent achievements was the re-broadcasting, over the 14 Mc. transmitter, of 56 Mc. signals from an amateur station installed in a plane flying 10,000 ft. over New York. This re-broadcast was transmitted to Great Britain, and the contact between the amateur in the plane and the one in Great Britain was maintained for about half an hour. Since then very successful 56 Mc. transmissions have been relayed through W2IXY to Australia, as well as to SV1KE, in Athens.

Other attractions to be seen at this fascinating station are "Mike" (the monkey), three beautiful cats, and a Boston bull-dog ("Smutty"). Those who contact W2IXY will be in touch with a very charming personality as well as a most efficient operator.

Experimental Section

By A. M. H. Fergus (G2ZC).

General.

THE Section has been fortunate in obtaining the services of Mr. M. Eskdale (G2SU), who has undertaken to sub-edit all matter submitted as articles for possible publication in this journal. Articles should, of course, be sent either to the G.C., or the G.M., and not direct.

We have had the misfortunate to lose, through resignation, the Managers of the Aerial and Receiver Groups. Both G5KG and 2BIB have had to undertake private work, the nature of which curtails their amateur activities, and in thanking them for the work they have put in on our behalf, we can only regret their passing out of the Experimental Section. The Groups concerned will be notified direct when new appointments have been made.

It should be pointed out to those in doubt, that there is no objection to a person being a Group Member of one group and an Individual member of another.

The Transmitter Section has now been formed into Groups of members, with Individual Members attached, and a list is published in this issue, showing the allocation.

Membership.

The following have become members of the Experimental Section since the last lists were published :—

Group Members : T. Brackenbury, G8BB (P), A. R. Donald, 2DGQ (P), E. A. Hayward, GW2UH (A), F. B. Holt, 2BGF (R-P), W. A. D. Howes, G2CF, (A), W. F. Miller, 2AAH (P), F. A. Robb GI6TK, (A-P), G. R. Silverthorne, GW2BG (T-P), L. Tranmer, G6TG (T-P), H. H. Phillips, 2BQB (T-P), K. Gooding, 2ARI (T-P), W. A. Rack, 2DDO (A-T), F. W. Garnett, G6XL (A-P), N. C. Campbell-Hobbs, G8AA (P).

Individual Members : H. G. L. Barnett, 2AIQ (P), T. R. Blakemore, BRS2368 (R-T), H. G. Carter, G3AI (P), E. R. Cook, ZS6BT (A-P), H. E. Daft, G5NP (A-P), W. Fraser, GM3BL (T), C. Gregg, G5CG (P), A. J. Hill, 2BLY (A), H. G. Laurisden, OZOR 001 (T-P), W. Lumb, 2ALU (R-T), F. C. Marchant, BRS3295 (P), L. S. Norman, BERS424 (A), S. M. O'Neill, BRS3163 (P), J. Orr G8JO (A), C. J. Peach, ZB1P (T), R. W. Rogers, G6YR (P), J. Scholefield, G2TR (A-P), A. V. Spray, 2AVR (R-T), J. A. Sey, GM8MJ (P), M. S. Trpkoviè, YT7MT (T-P), D. M. J. Tyre, GM5TY (T-P), F. A. Vost, G2DF (A-P), E. R. Whitehead, 2BNP (R-T).

Transmitter Group.

The following Groups have now been formed :—

Group 1 (1.7 and 3.5 Mc.) :—G.C. : P. M. Carment (G5WW) ; Members : G8MO, GW3GL, 2CSD, 2BDA, 2BLA, G8TK.

Group 2 (7 and 14 Mc.) :—G.C. : E. R. Radford (G2IM) ; Members : 2DFJ, G3AZ, G6MF, 2BRI ; Individuals : G8LO, 2AAS, G5QF, G3FB, G8IU, BRS1550.

Group 3 (7 and 14 Mc.) :—G.C. : H. H. Phillips (2BQB) ; Members : G8SF, 2ARI, 2AVI ; Individuals : G2SQ, G6CX, G5LG, G3HP, ZB1E.

Group 4 (7 and 14 Mc.) :—G.C. : C. M. Derrick (2AJP) ; Members : G8KY, 2DDO, 2CJH ; Individuals : 2AZQ, G8TR, 2APF, G8RP, G8UF, GM5TY.

Group 5 (28 and 56 Mc.) :—G.C. : H. J. Sherry (G6JK) ; Members : G8TX, 2BVX, ST2CM ; Individuals : G6GR, G5CV, 2BIB, G5BX.

Group 6 (28 and 56 Mc.) :—G.C. : Dr. E. S. G. K. Vance (G8SA) ; Individuals : G8AF, GI6TB, OZDR001, G8DB, VE3AU, G8OL, G6PK, ZB1P, 2CIL.

Group 7 (28 and 56 Mc.) :—G.C. : J. E. Squire (G6ZQ) ; Members : G5NG, 2ACY, 2CZQ ; Individuals : G5TN, GM6ZV, G8PX, 2AQO, G6FO.

Group 8 (28 and 56 Mc.) : J. M. R. Sutton (GW2NG) ; Members : G6TG, 2CAX, ON4AU ; Individuals : 2BNP, G8SJ, 2AVR, BRS981.

Propagation Group

G5JL has been appointed Group Centre of the 3.5-1.7 Mc. Group.

Barometric Group : This enterprising group publishes a monthly journal, " Barometric News," which outlines the most important observations made by its members. Already some interesting results have been obtained.

56 *Mc. Group :* G8OS draws attention to the difficulty of keeping a record of conditions due to many stations using rotatable beams. Several members found April 15 and May 10 good days for local signals, signal strength being well above the average. It is noticed that in both cases a magnetic storm took place on the next day, but whether there is any connection is not known.

28 *Mc. Group A :* Most members comment on the poor conditions which accompanied the Aurora Borealis and magnetic disturbance of May 11-12. The very good U.H.F. conditions of May 22-24 coincided with " quiet " magnetic conditions, and the same may be said of the good spell on 28 Mc. on May 7 and 8.

28 *Mc. Group B :* G2XC, who keeps the 28 Mc. Groups supplied with sunspot and magnetic data, gives prticulars of conditions during the magnetic disturbance of May 11-12, and during a smaller disturbance on May 24-25. He considers that " scattering " is responsible for the results obtained in the 28 Mc. tests using GM6RG's rotatable beam.

Transmitter Group

All members, with the exception of a few recently joined, have been allocated to groups and have been notified of their Group Centres. A small number failed to advise the G.M. in which frequencies their interest lay, and these have been allocated to groups dealing with 7 and 14 Mc.

Will all members please get in touch with their Group Centre as soon as possible, and advise him of their activities ?

The groups have been formed according to frequency because the problems involved in designing transmitters for different bands vary quite

(*Continued on page* 64.)

Sunspots, Magnetic Storms and Radio Conditions

By E. J. Williams, B.Sc. (G2XC). *

THE following is a brief account of an attempt to correlate the three phenomena — sunspots, magnetic disturbances and short-wave radio conditions. The writer wishes to acknowledge the assistance received from the 28 Mc. R.E.S. Propagation Groups, the Bulletins of Cosmic Data broadcast from station W1XAL, the "Bulletin of Character Figures of Solar Phenomena" published by the *International Astronomical Union*, and information on radio conditions supplied on several occasions by members of the South Hants Radio Transmitting Society.

A few details of the sources of the data and the methods employed in collecting them may be of interest.

Solar Data

The solar information for 1937 was obtained from the Bulletin mentioned above, but recently observations of the sun's face have been made at the author's station. The apparatus is far from elaborate or expensive, but is sufficient to show the larger spots. The largest number of spots seen on one day has been 15. One side of a pair of binoculars is used, together with two lenses, a convex lens (focal length 15 cms.) placed close up to the binocular eye lens and a concave lens of similar focal length placed about 9 ins. from the convex lens. The image of the sun is then formed on a screen some 3 ft. away, the focusing being done by adjusting the position of the concave lens. The image is of the order of 2 ins. diameter.

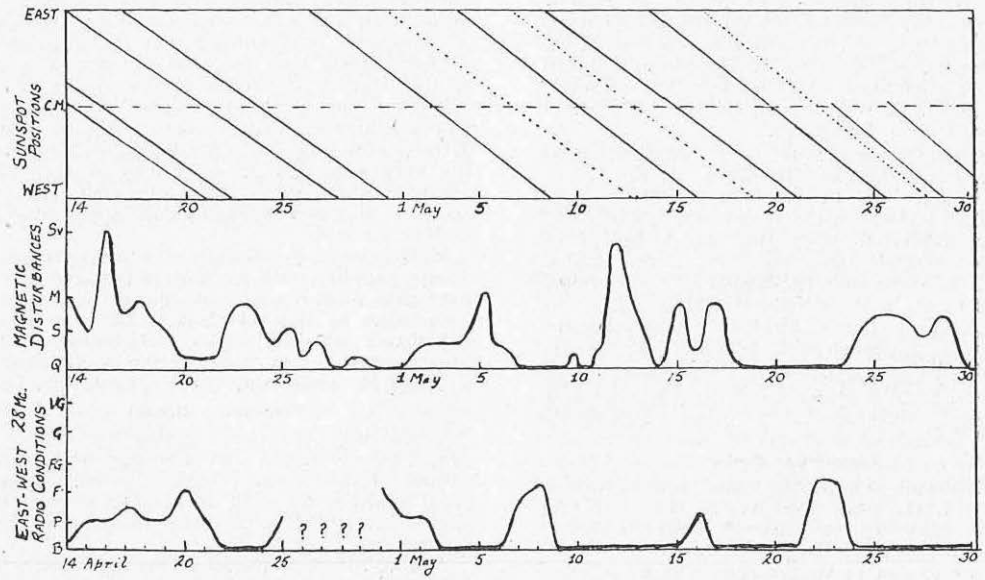
Magnetic Data

Magnetic data have been obtained from the National Bureau of Standards at Washington and from the Ursigram broadcasts from W1XAL and from Press reports.

Radio Data

Radio conditions are best studied on frequencies above 20 Mc. The reasons for this are: (*a*) on poor days the upper frequency limit for long-distance transmission is of the order of 20 Mc.; (*b*) the higher frequencies are the first to show the effects of disturbances (the Dellinger effect is an exception); (*c*) the fewer signals make it easier to check on definite stations without interference, etc. However, disturbances such as are to be discussed in this article are found to affect all short waves to some extent, e.g., a decrease in the ionisation density of the upper layers causes a decrease in the upper frequency limit for distant signals and an increase in the skip distance on lower frequencies. The radio observations are somewhat incomplete, being usually confined to evening conditions. Readers whose hours of listening cover the morning and afternoon periods may therefore find additional information concerning the various dates mentioned. The writer

* Member R.E.S. Propagation Group.



Graphs showing Radio Conditions, Magnetic Disurbances, and Sunspot Positions for the period from April 14 to May 30, 1938.

The sloping lines are intended to show the position of various spots on the Sun's face each day. Spots travel from the East limb of Sun, across the central meridian (CM) to the West limb. Note the tendency for magnetic disturbances to occur one to two days after the central meridian passage of the spots. Also notice that a rise in the Magnetic graph usually corresponds to a fall in the Radio graph.

Notation:—B, bad (no signals); P, poor; F, fair; FG, fairly good; VG, very good; Q, quiet; S, slight; M, moderate; Sv, severe; ?, no observations. The dotted lines represent smaller spots.

would be very pleased to receive such information.

Even if the radio data are incomplete, the solar data are very extensive, and after a short study of the I.A.U. Bulletin one feels that there is too much data, and the task is one of sifting out what matters from what does not.

Storms and Sunspots

The magnetic storm of April 16 was known to have followed the passage of a very large sunspot across the sun's central meridian early on April 14. A moderate magnetic disturbance on May 4 followed the passage of a spot across the central meridian on May 2 to 3. When a very large spot, close to the sun's equator, was observed on the eastern limb of the sun on May 5 it was calculated that its date of central meridian passage would be May 10. This was probably the same spot that caused the storm of April 16. Accordingly a magnetic disturbance was forecast for May 11 to 12. This proved to be correct, a severe storm with an auroral display occurring. Many other spots were seen during May, but in most cases were about 20° from the sun's equator. On May 24 a group of large spots was seen to be almost on the central meridian but not so near the equator as the spot of May 10. These spots were newcomers to the sun's face, for they had not been visible on May 22. May 23 was cloudy, so no observations had been possible that day, but it is presumed the spots were formed on May 23. The group was very large and it was therefore not surprising to find that a disturbance in horizontal intensity of the earth's magnetic field started on May 24 and continued through May 25. It was realised that these observations were insufficient to enable any conclusion to be drawn, and the sunspot data for 1937 were examined to ascertain the dates of C.M.P. of large and important spots. These are listed in the accompanying table, together with details of magnetic and radio conditions on following days (if known). It will be seen that the days following the C.M.P. are in several cases days of magnetic storms. It should be noted that for 1937 the only magnetic data available to the author are the dates of the storms and smaller disturbances may have occurred on some of the other dates. The word "poor" seems to occur very frequently in the radio condition description. The conditions referred to are, of course, those on 28 Mc. and neighbouring frequencies. It must be admitted that poor conditions also existed on other dates. Closer investigation may show these to be the combined effect of a number of spots or to a possible lack of ultra-violet light radiation from the sun, and hence a low ionisation density.

Storms and Fade-outs

The relation between magnetic conditions and long-period fade-outs is fairly close, but it is noticed that radio conditions are slower than the magnetic elements in returning to normal. East, west and northern conditions are most affected. During May, this year, the reception of 28 Mc. signals from these directions has always coincided with quiet magnetic conditions.

PASSAGE OF LARGE SPOTS ACROSS SUN'S CENTRAL MERIDIAN, 1937

Date.	Lat.	No. of eruptions.	Imp.	Effects.
Jan. 31.2	11° S.	8	—	Magnetic storm February 3. Poor radio conditions F3.
Mar. 2.4	9° N.	6	—	No particulars.
Apr. 22.5	8° S.	12	R	Several bad storms April 24 to 30 and May 5 and 6. Poor radio conditions.
,, 24.7	20° N.	32	V	
,, 29.6	21° S.	29	I	
May 10.6	13° N.	2	R	Poor radio conditions.
,, 27.5	12° N.	7	L	Evening of 29 and morning of 30 poor.
June 4.9	13° N.	8	I	Magnetic storm June 6. Poor radio conditions.
,, 16.5	16° S.	29	—	Poor conditions on 18 and 19.
,, 21.1	14° N.	8	R	Fair conditions.
,, 27.8	16° S.	13	R	Poor conditions.
July 9.0	22° N.	9	I	10th poor conditions.
,, 29.1	32° N.	28	E	August 1 poor conditions.
Aug. 25.6	30° N.	4	V	Conditions deteriorated on evening of 27.
Sept. 9.4	9° N.	9	I	U.S.A. poor on 11.
Oct. 4.3	10° N.	15	E	Poor conditions with magnetic disturbances from 1 to 6.
,, 7.2	12° N.	1	R	No particulars.
Dec. 15.7	21° S.	1	R	No particulars.

Lat.=latitude, Imp.=importance, R=rather, V=very, E=exceptionally. Eruptions are bright chromospheric eruptions. The number is the total for the whole period the spot is on visible hemisphere of sun.

Cause of Magnetic Disturbances

The period of 24 hours or more which elapses between the time of C.M.P. of the sunspot and the start of the magnetic disturbance calls for comment. If it is assumed that the spot is responsible for the storm, then the agency by which they are connected travels at a speed considerably less than that of light. This suggests a corpuscular nature for the agency. The fact that high latitudes on the earth experience these disturbances to a greater extent is further evidence. Apparently the earth's magnetic field attracts these particles to the magnetic poles. The particles would probably be projected more or less radially from the sun, and it can therefore be seen why a spot near both central meridian and equator of the sun will tend to be most effective. The mechanism projecting these particles may be a strong magnetic field existing in the sunspot. Not all spots produce these disturbances, and occasionally a storm is

(*Continued on page* 64)

56 Mc. Relay Tests—July 24th, 1938

ALTHOUGH only about a dozen members have offered to co-operate in the above tests, it is safe to assume that many others will be active on July 24. The tests are being arranged so that all members who have 56 Mc. licences or receivers may take part.

The practical object of radio relays would appear to be the transmission of messages from fixed points by a series of stages to other points or districts which are beyond the range of a single transmission. By increasing the directional properties of the transmissions, the total area within which the message is receivable can obviously be reduced even though the signals may during their various " hops " traverse a roundabout path.

For the purpose of these experiments it will perhaps be sufficient if an attempt is made to relay each message as far as possible in a given direction, but to some extent the value of the tests as well as their success will be determined by the efficient use of directional aerials. Members are particularly urged therefore to use these tests as an opportunity for experimenting with highly directional aerial systems.

The general procedure will be as follows :

(1) Each originating station should prepare short " test " messages of about six or eight words in advance. Such messages must relate definitely to the tests or to apparatus, weather, locations, etc. This is necessary to meet the requirement of the G.P.O. licence.

(2) The general direction in which each message is to be sent is set out in the table below, and only stations situated within 90 degs. of the desired direction from the calling station should answer the calls. Thus, if a message is directed North, the letter N will be included in the call, and a station hearing the call should only reply if he is in a latitude North of the calling station, or, in other words, if he is situated North of a line drawn East and West through the QRA of the calling station.

(3) Stations seeking to relay messages should call (in the case of a message to be sent East) " Test E, 56 Mc. relay de G . . .," and so on.

(4) A message may be relayed to more than one station in the desired direction,but messages picked up from stations with which one is not in direct contact should be noted, but *not* passed on.

(5) Each station relaying a message should add, after the message, the call of the station from which it was received, so that eventually the message will carry with it the calls of all stations by whom it has been handled.

(6) All participants, including listening stations, are asked to send their logs, including copies of all messages originated or received, to Mr. W. A. Scarr (G2WS), Heanor Road, Ilkeston, by August 15, in order that a full report may be prepared for the September BULLETIN. Particulars of aerials and other equipment used in the tests will be of special interest, and members are specially invited to make suggestions and criticisms, which will be of use in planning similar events in the future.

Time of Despatch, B.S.T.	Station to Originate Message.	QRA	Direction.	Possible First Contact.	Possible Destination.
11.00	G2XC	Portsmouth	N.	G8LY	G6YL
11.15	G6FU	London	N.W.	—	GW6AA
11.30	G8NM	Barnsley	S.	G2WS	2AAH
11.45	G8LY	Winchester	N.	—	G6YL
12.00	GW6AA	Near Colwyn	S.E.	G6DP	G6FU
12.15	G6YL	Felton	S.W.	G5QY (?)	BRS1657
12.30	G2WS	Near Derby	S.	—	2AAH
12.45	G6QZ	Norwich	S.W.	—	2AAH
13.00	G6DP	Frodsham	S.	—	—
13.15	G5NG	Surrey	N.	—	G2WS
13.30 to 14.15	General QSOs by all stations.				
14.30	G2XC		N.E.	G5NG	G6FU
14.45	G6FU		N.	—	—
15.00	G8NM		W.	G6DP	GW6AA
15.15	G8LY		N.E.	G5NG	—
15.30	GW6AA		E.	G6DP	G6QZ
15.45	G6YL		S.	—	—
16.00	G2WS		W.	—	GW6AA
16.15	G6QZ		W.	G2WS	GW6AA
16.30	G6DP		S.E.	—	G6FU
16.45	G5NG		N.W.	—	G5DP
17.00 to 19.00	General QSOs by all stations.				

Broadside Radiations

By "MR. JUSTICE 'G'."

MR. JUSTICE "G" has spent the past month examining the reports of Inspector Wotcher and Constable Urcher, and checking the same against observations taken "on the air."

It has become most apparent that there are a number of offences which, although not classified as major crimes, constitute, nevertheless, grave misdemeanours. It is notable that newly licensed stations are the most serious offenders, probably because they have been misled by listening to older amateurs with low standards of operating. To list some of the offences:

(*a*) One of the worst is the use of the expression "HI" during telephony transmissions. The letters HI are purely a *CODE* group adopted by *morse* operators to signify laughter or amusement. If a phone operator wishes to laugh, let him, for he has a microphone at the end of his nose, and, if he is capable, he has only to let drive to send his merry peals into the ether. To say "HI, HI" *means* nothing, but it sounds like Farmer Giles' boy calling the prize pigs in to feed.

(*b*) Another slavish adaptation of morse technique is to say "dah de dah" or "tiddle de dah dit dah" at the end of a 'phone transmission. Such terms are suited to certain babies of moronic outlook, but on the air they sound as if Colney Hatch had started up a station. The proper terms are "by" and "over." An equally stupid practice is the one adopted by certain operators who say "Ok, take it away K please, so and so standing by, over." This phrase constitutes four ways of saying the same thing, and a fourfold useless encumbrance of the ether.

(*c*) Much time is wasted due to bad planning and/or sheer laziness. The time that it takes for some stations to reply to a call would indicate that it is necessary to completely rewire the transmitter before putting it on the air. No immense technical skill and no expensive parts are needed to provide a rapid and positive change-over arrangement. A simple cure would be for all stations to allow the other fellow not more than thirty seconds to come back and then drop him. Life is short, and it is surprising how many hours those two or three minute waits add up to the end of a year.

(*d*) "Spitch." Most minds will automatically turn to some of our Continental playmates, but we have observed with remorse that on the 7 Mc. band there are still a number of G's whose "splash-splutter" exceeds any Continental efforts. The G stations have a reputation for good speech quality, and it would be a great pity to have it marred by a few oafs. When such stations are contacted, they should be told in no "milk and water" terms what they sound like.

(*e*) There is every good reason for instructing and encouraging the young. Cases have, however, been noted where the young operator constituted only *an audience*. This again would be admirable—for the young should attend to their elders—if the audience were listening to a discourse of value or interest. It is a misdemeanour to use these embryonic Marconi's as a target for bombast, and as a claque to praise the great know-all. You all know the type; he hooks up with some eager newcomer (bless his ten little watts, for they are often louder and better than the fifty they are working) and announces with no noticeable modesty that he worked nine PK's, seven VK's, and a couple of FI's the night before. The newcomer is impressed. His new communications receiver had heard not one spot of DX the previous evening. He asks how it is done; that is fatal. For hours the song goes on; technically it does not make sense. As elocution it is beneath contempt; as conversation it is horrible. One regrets only that the grandiose gestures cannot be seen.

Maybe the newcomer is impressed, or perhaps he dies of gas poisoning. The former is more likely, since these meetings are frequent, and sometimes there is an audience of several, all of whom politely chime in with their Ooh's! and Ah's! of admiration at odd intervals.

Aside from leading the young astray, this personal admiration technique fills a chunk of the band for hours (yes, *hours!*) of unnecessary blather.

We heard a "final authority" last week working a G3 on about the same frequency. The "final authority" delivered an epic oration about his aerial coupling network, its efficiency and his brilliance in designing it. The G3 replied that it was not technically sound. The "final authority," after explaining that he had been on the air for years and years (and for that reason was a great man), asked the G3 on what grounds he had the appalling, bumptious, ill-bred, impertinence to question the final authority. The G3 replied that as a newly-fledged amateur he was sure that the "final authority" *was* a great man, but that speaking as Consulting Engineer to.....and.....Radio Communications Companies, he could not agree with the "final authority's" final authority. Something must have blown in his transmitter, because the "final authority" did not reply.

We suggest that a suitable punishment for birds of that ilk would be to make them really learn something about radio transmission.

This Bench before adjourning, would like to place one simple fact before the amateur community: At Tatsfield and other centres, the Post Office maintain some of the finest monitoring equipment in the world. They have lots of operators, and lots of equipment, and some of the equipment covers the amateur bands!

C.U.A.C. ?

Our Thirteenth Convention

WE include in this issue a circular outlining the events and functions arranged for our Thirteenth Annual Convention. Members who intend to be present are earnestly requested to fill in the form and return it to Headquarters not later than August 6, 1938. With full information on hand, we can then proceed to assign members to the various parties, but as many of the attractive visits will be fully booked within a few days of this issue appearing, *it is essential to book your place at once*, for every function you wish to attend.

The Dinner

We wish to draw particular attention to the Annual Dinner. In past years considerable inconvenience has been caused because members have failed to purchase their tickets in advance, consequently congestion has resulted on the night of the dinner. To overcome this difficulty, it has been decided to issue a distinctively coloured ticket to the first 220 applicants. These ticket holders will be admitted without delay into the dining room, and all others will be requested to dine elsewhere in the building, rejoining the main party later.

The Visits

In regard to the Visits, we would ask all members who reserve to inform us at least 48 hours before the date of the visit if they are unavoidably prevented from attending. In past years parties have left on a visit several short, due to members failing to advise us that they cannot attend.

The Programme

We will now briefly outline our plans.

On Thursday afternoon, September 1, a party of 24 members will be taken by coach to the Royal Observatory, Greenwich. The cost of this trip is not expected to exceed 3s. per head, which will be payable in advance after notification from Headquarters.

During the afternoon of the same day a small party, limited to ten, will be permitted to visit the B.B.C. Television Station at Alexandra Palace. The members forming this party will be expected to make their own arrangements for proceeding to the Station.

On Thursday evening, the usual gathering of the clans will take place on the Society's stand at Olympia.

Another small party limited to six will, at 9.30 a.m. on Friday, September 2, be allowed to visit Alexandra Palace, whilst a party of 15 will be conducted on a tour of Broadcasting House at 1.30 p.m. In the afternoon a party limited to 50 will be taken by coaches to the General Electric Co. Research Laboratories at Wembley. The cost of this visit will, it is anticipated, not exceed 3s. per head.

Following this visit, the party will be conveyed back to the Florence Restaurant for the Conversazione and Film Show. A running buffet will be available at this function, and every opportunity afforded members for informal discussion. No advance booking is required, but in the interests of those present it is our desire to advise the caterers well in advance of the approximate attendance. We hope to see last year's figure of nearly 200 exceeded on this occasion. The price of admission will be 1s. 6d. per head, and the function will be confined to R.S.G.B. members and visiting Overseas amateurs only.

The programme for Saturday, September 3, will open at 10 a.m. with technical discussions at the Institution of Electrical Engineers, when it is hoped that several technical members of the Society will be available to lead the Groups. At 11.30 a.m. a short business meeting will be held at the I.E.E., and at 1 p.m. an informal lunch will be taken at Slater's Restaurant, 393, Strand, W.C.2.

Prior to the afternoon meeting, the usual Convention Photograph will be taken, a proof of which will be displayed at the Dinner in the evening.

At 2.15 p.m. our President will greet the company, and immediately afterwards the Trophies and Awards will be presented. It is hoped that during the afternoon a prominent London amateur will open a technical discussion on matters of general interest to the membership. Tea will be taken at 4 p.m., and the session will terminate at 5 p.m.

The chief event of the day takes place at The Florence Restaurant, where the Annual Convention Dinner will be held at 6.30 p.m. This function is, of necessity, confined to R.S.G.B. members and invited guests only, but lady friends of members can be accommodated elsewhere in the Restaurant. During the Dinner it is anticipated that the usual Draw for components will be arranged, but no variety programme will take place, as it was seen last year that members appreciated the opportunity of indulging in informal discussions with their neighbours.

Dress is informal for all Convention functions.

This, then, is our Programme, we leave it to the membership to see that our endeavours to provide an enjoyable function have not been in vain.

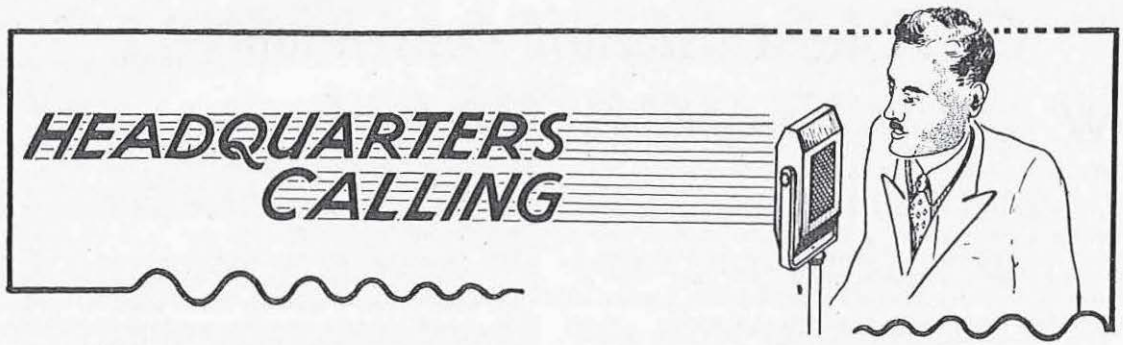
FILL UP YOUR FORM NOW.

OQ5ZZ

From Miss Dorothy Hall, W2IXY, we learn that the call OQ5ZZ will be used by the 10th Expedition led by Commander Gatti to the Belgian Congo. The transmitter is at present under construction in New York and it is hoped that the party will leave on August 9. The station will operate on 80 and 20 metres, the former for local contacts with the base camp, and the latter for amateur work. Miss Hall has been invited to handle the incoming traffic from OQ5ZZ and to that end a diamond aerial beamed on New York will be used by the Expedition.

The base station will be at Leopardville.

Owing to the difficulty of approaching closely to natives and animals, a powerful amplifier will be used in the jungle for recording sounds up to a distance of two miles.



New Society Publications

The Council have authorised the preparation of two new publications. The first, to be known as *The Helping Hand to Amateur Radio*, will contain several chapters based on Mr. Austin Forsyth's recent series of articles "The Helping Hand," published in this Journal. The price will be 3d. on the stand at Olympia or post free 4½d. Bulk quantities will be quoted for on application to the Secretary.

* * *

Members who have watched the growth of *A Guide to Amateur Radio* from a 48-page booklet to a 168-page textbook, will not be surprised to learn that it has been decided to publish this year the First Edition of the Society's Handbook. This will be known as *The Amateur Radio Handbook*, and the publication is expected to appear about the middle of November.

The Handbook will contain about 220 pages of up-to-the-minute technical and general information as a glance at the list of chapters given in page 32 will show. Council and Headquarters staff are sparing no pains to give members and all others interested in short-wave radio, a thoroughly comprehensive Handbook, and it is hoped that every member will, besides placing an order for his own use, obtain a copy for a non-member friend who is interested. The format, paper and cover are all being greatly improved and some 100 new or revised illustrations will be included.

Orders can be placed immediately. The price in Great Britain will be 2s. 6d., post free 2s. 9d. Overseas price 3s. 6d. post free.

Cover Design

We are pleased to announce that Mr. J. H. Payton, G2JB, has been awarded the prize of two guineas given by our Advertising Manager for the best cover design submitted by a member for what would have been the 6th Edition of "*A Guide to Amateur Radio*."

Mr. Payton's design will, it is anticipated, form the basis of the cover design to be adopted for *The Amateur Radio Handbook*, which is announced elsewhere.

The response to the competition was very satisfactory, nearly 20 entries being received, many of which reached a high standard.

We take this opportunity of thanking Mr. Freeman for his offer, and also those members who forwarded designs.

Society's Stand at Olympia

We have pleasure in announcing that Stand No. 10 on the *ground floor* at Olympia has been assigned to the Society. No gallery stands are available this year.

Members are urgently required to offer their services for stand duty, particularly during the hours from 11 a.m. to 5.30 p.m. Those undertaking stand duty will be provided with an official permit.

All offers of assistance should be made to the Secretary as early as possible.

Convention Questionnaire

The following is the result of the voting on Questions 3 to 6 recorded on the questionnaire included with the June BULLETIN :—

No. 3. Do you favour the holding of a Business Meeting on September 3 ?—34 "No."
If "Yes," please state Morning or Afternoon.—33 "Morning, 37 "Afternoon."

No. 4. Do you favour a technical lecture in the afternoon ?—44 "No," 65 "Yes."

No. 5. Do you favour technical talks in the morning ?—40 "No," 45 "Yes."
Or

No. 6. Would you prefer the morning to be left free ?—25 "No," 59 "Yes."

Analysing the returns, it would seem that the majority of members prefer to have the Saturday morning free, although 45 favour technical talks.

For the afternoon session nearly 70 per cent. prefer a technical lecture.

In view of the divided opinions expressed it has been decided to hold a brief business meeting in the morning. A technical lecture will be arranged for the afternoon.

Secretary's Vacation

The Secretary will be on vacation from August 1 to 15 during which time it will be appreciated if correspondence of a secretarial nature can be kept to a minimum. Normal routine matters will, of course, be handled as usual.

August Bulletin

The August issue of The T. & R. BULLETIN will be published on or about the 24th of that month. This date coincides with the opening of the Radio Exhibition at Olympia.

A New Sales Dept. Item

We illustrate a specially designed plaque now affixed to the door of the Scotland "C" District Assembly Room. Headquarters will be pleased to quote for similar plaques which may be required in other parts of the country.

B.E.R.U. Contest Results

The Awards Committee regret that owing to the amount of work involved in checking the entries, it has not been possible to publish the results of the Eighth Annual B.E.R.U. Contest in this issue.

A full report will appear next month.

Technical Information Bureau

We have to announce that Mr. J. N. Walker (G5JU) has taken over the charge of the Technical Information Bureau in place of Mr. Austin Forsyth, who has been compelled to relinquish this work. We publish below the rules of the Bureau and assure members that good service will be given to them, providing the questions are within the scope of our collaborator.

We shall be glad to hear from any member whose previous query has not been answered.

TECHNICAL INFORMATION BUREAU

The service is free to members except that a nominal charge of 6d. *per query* is made to cover clerical and postage expenses.

The Rules governing the service are :—

1. Questions must be written legibly and concisely on one side of the paper.
2. A sixpenny postal order must accompany each question.
   The postal order must be made payable to the R.S.G.B., and the letter addressed to Technical Information Bureau, R.S.G.B, 53, Victoria St., London, S.W.1.
3. The service is only available to fully paid-up members of the Society.

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

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

W.B.E.

Name.	*Call Sign*	1938
B. Coleridge ...	ZT6M ...	May 7
D. A. G. Edwards ...	G3DO ...	,, 16
H. E. Bennett... ...	G8PF ...	,, 16
A. G. Wood	G6TI ...	,, 18
B. Christian	G5XD ...	,, 19
V. I. Eloranta ...	OH2OB ...	,, 23
P. Caboche	VQ8AS ...	,, 23
P. Halligey	G8PI ...	,, 31
A. E. H. Cooper ...	G5VT ...	,, 31
J. Mead	VK6LJ ...	,, 31
H. G. Mappin ...	G3BS ...	June 3
J. Davis	G5XY ...	,, 9
V. J. Flowers ...	G8QM ...	,, 28
R. B. Wood	ZU6V ...	,, 28
J. A. North	G2KO ...	,, 28
G. F. Williams ...	W1APA ...	,, 29
28 Mc. W.B.E.		
G. Hutson	G6GH ...	May 4
Hans C. Deckel ...	D3BMP ...	June 15
TELEPHONY.		
R. E. Trebilcock ...	VK3TL ...	Mar. 2
(Missed in error from April list)		
A. D. Lamb	GM2UU ...	May 6
C. G. Allen	G8IG ...	,, 9
R. D. Tucker ...	G5LU ...	,, 13
J. Hearn	G8MA ...	,, 18
J. Scholefield	G2TR ...	,, 19
H. A. Bartlett... ...	G5QA ...	June 9
D. L. O'Brien ...	W6PB ...	,, 17

H.B.E.

J. M. Kirk	BRS1575 G6ZO ...	May 4
A. Taylor	BRS1558 2AHT G8TZ ...	May 12
J. C. Fletcher	BRS2908 ...	May 18

Our Silver Jubilee.

The President and Council wish to thank those members who forwarded telegrams and messages of good wishes on the occasion of the Society's Silver Jubilee, July 5, 1938.

NEW MEMBERS

HOME CORPORATES.

C. W. HOWES (G2CG), Kneesworth, nr. Royston, Herts.
J. F. LUCAS (G2HK), 42, Eldefield, Letchworth, Herts.
L. R. SEAL (G2OC), 119, High Road, Beeston, Notts.
F. H. LANE (G3GW), "St. Austell," Barton's Hill, Minster, Sheerness, Kent.
R. C. S. REID (G3IT), Imperial Airways, Hythe, Southampton, Hants.
J. POLLARD (G3IY), 425, Manchester Road, Burnley, Lancs.
J. STEPHEN (GM3JL), 168, Kenmure Street, Glasgow, S.1, Scotland.
K. D. JACKSON (G3KJ), "Selbourne," Hangleton Road, Hove, 4, Sussex.
E. A. THOMAS (G3KT), 231, Manchester Road, Burnley, Lancs.
H. E. JAMES (G5JM), 230, Sydney Road, Muswell Hill, London, N.10.
B. MORRIS (G5MG), 344, Finchley Road, London, N.W.3.
R. L. VARNEY (G5RV), Arvika, Galleywood Road, Chelmsford, Essex.
R. B. WILLIAMSON (G5RW), 4, South View Road, Danbury, Chelmsford, Essex.
A. J. PARRY (G5XP), 15, Sandon Road, Walton, Liverpool, 9, Lancs.
F. T. S. SMITH (G6FK), 131, Dudley Road, Wolverhampton, Staffs.
R. G. BAKER (G6QN), 1, Boundary Road, Colliers Wood, London, S.W.19.

W. HARTLEY (G8UY), 4, Greenfields Avenue, Starbeck, Harrogate, Yorks.
G. C. GEDDES (2ABZ), 421, Portswood Road, Southampton, Hants.
E. F. WATSON (2AGS), 11, Vicarage Lane, Water Orton, Birmingham.
D. G. FARQUHARSON (2AJN), "Invercauld," Coombe Avenue, Coombe Lane, Kingston, Surrey.
A. SCHOFIELD (2ALH), "Highfield," Inverness Road, Laindon, Essex.
S. E. LANGLEY (2BPN), 62, Dumbarton Road, Brixton Hill, London, S.W.2.
J. G. PRICE (2BUF), 23, Powell Street, Abertillery, Mon.
D. G. PRICE (2CTU), Atlas Cottage, Ryeworth Road, Cheltenham, Glos.
J. LOMAX (2DAD), 119, Belfield Road, Accrington, Lancs.
W. P. MITCHELL (2DJD), 11, Roe Lee Park, Blackburn, Lancs.
R. COWELL (2DLT), 45, Belgrave Street, Stepney, London, E.1.
G. L. BLAND (2DPO), 42, Kimberley Street, Norwich, Norfolk.
B. W. W. OLIVER (2DRM), Stratford Rectory, Saxmundham, Suffolk.
B. A. PARSONS (2DSD), 12, Howell Road, Ely, Cardiff, Glam.
P. C. SHENTON (2DSL), The Rectory, Graveley, Huntingdon.
D. SUMMERS (2DWH), Tobacconist Farm, Minchinhampton, nr. Stroud, Glos.
J. H. RITSON (2DWP), Plantation Hill, Scarborough, Yorks.
C. R. YOUNG (2DYG), 134, Old Shoreham Road, Southwick, Sussex.
R. WILSON (BRS3334), "D4 Flight," "D" Sqdn., No. 2 Wing E/W School, R.A.F., Cranwell, Lincs.
W. G. PIKE (BRS3335), Laburnums, Kilgetty, Pembrokeshire.
D. H. TAYLOR (BRS3336), 37, Acacia Avenue, Hale, Cheshire.
Mrs. E. MURDEN (BRS3337), 320, Bowes Road, New Southgate, London, N.11.
C. EWENS (BRS3338), "Glenside," Wendover Road, Stoke Mandeville, Bucks.
F. E. BARLOW (BRS3339), "Drakeford," Poolhead Lane, Wood End, Tamworth-in-Arden, Warcs.
J. BARON (BRS3340), 25, Wilworth Crescent, Blackburn, Lancs.
A. J. MEADS (BRS3341), 47, Monks Close, North Farm Road, Lancing, Sussex.
F. REID (BRS3342), 34, Darwin Street, London, S.E.17.
D. RYDER (BRS3343), 2a, Seddon Road, Liverpool, 19, Lancs.
E. G. W. MILLER (BRS3344), 1, Aldrich Terrace, London, S.W.18.
E. H. PAULTON (BRS3345), Inglewood, The Plantation, Worthing, Sussex.
D. L. WOOD (BRS3346), 72, Addington Road, West Wickham, Kent.
W. TINGEY (BRS3347), 99, Brownings Avenue, Chelmsford, Essex.
D. R. HEARSUM (BRS3348), 11, Maldon Road, Colchester, Essex.
W. A. HADEN (BRS3349), 91, City Road, Edgbaston, Birmingham, Warwicks.
W. ANDERSON (BRS3350), Hallpark, Abernethy, Perthshire.
J. DAIN (BRS3351), "Gorse Hill," nr. Conway, N. Wales.
J. M. WHEELER (BRS3352), "Redcourt," Lee-on-the-Solent, Hants.
T. G. EVANS (BRS3353), "Tramore," Glebe Road, Loughor, nr. Swansea, Glam.
R. J. GALLOP (BRS3354), Glen Cottage, Hoo, Rochester, Kent.

DOMINION AND FOREIGN.

G. W. B. POPE (CT1ZA), Avenida Pedro Alvares, Cabral 46, So.E., Lisbon, Portugal.
A. W. DICKES (VR4AD), The Treasury, Tulagi, British Solomon Islands.
G. F. WILLIAMS (W1APA), 170, Dixon Street, Bridgeport, Connecticut, U.S.A.
D. O. O'BRIEN (W7GPY), 3014 N.E. 20th Street, Portland, Oregon, U.S.A.
F. R. W. K. MANSELL (BERS445), Admiralty Electrical Engineer, Royal Naval Yard, Trincomalee, Ceylon.
S. C. HANFORD (BERS446), Cyprus Mines Corporation, Skouriotissa, Cyprus Is.
L. A. J. DEADMAN (BERS447), 9/14b Sda Cappuccini, Floriana, Malta.

R.S.G.B. Slow Morse Practices

Details will be found above of the slow Morse practices organised by the Society for those members wishing to learn or improve their code. As usual, test matter will be taken from recent issues of the T. & R. BULLETIN. The page number and month of issue will be given at the end of each test—by telephony. A telephony announcement will also be given at the commencement of each test to assist those interested in tuning in the sending station. It is emphasised that reports will be appreciated and are desired, in order to ascertain useful range and numbers utilising the service. If, however, a reply is desired, a stamp should be sent. Will stations in areas not at present served offer their services to Mr. T. A. St. Johnston (G6UT), "Normandale," Little Hallingbury, Essex. (telephone: Bishops Stortford 785.) It will be noted that Mr. W. M. Vendey (G6VD), 9, Cecilia Road, Clarendon Park, Leicester, is again included in the schedule.

	B.S.T.	*kc.*	*Stations.*	*Locations.*
Sundays	0900	1755	G8NF	Manchester.
Mondays	2315	1741	GI6XS	Bangor.
Tuesdays	2215	1792	G8PZ	Colchester.
Wednesdays	2315	1741	GI6XS	Bangor.
Thursdays	2215	1792	G8PZ	Colchester.
Sundays	0930	1792	G8AB	Loughton.
	1015	1920	G6VC	Northfleet.
	1230	1850	G6VD	Leicester.

The Manchester area will now be served by G8NF, Mr. H. Benson, Church Lane, Prestwich, Manchester.

Visiting Amateurs

Members residing in the London area who are anxious to meet visiting amateurs should forward their names and telephone numbers to Headquarters so that appointments can be arranged.

Thames Valley Amateur Radio and Television Society

The above Society have been unfortunate in losing both their Secretary and Assistant Secretary. Mr. J. N. Roe, G2VV, energetic and enthusiastic Secretary for so many years, found it impossible to carry on with his new business appointment, but it is hoped he will be active on Committee by the end of the year. Mr. Campbell, G8MK, is now with G.E.C. at Coventry, and for the time being is completely lost to us. We are greatly indebted to these two untiring members for their good work.

The new Secretary is Mr. L. Cooper, G5LC, 3, Summer Avenue, East Molesey, Surrey; and his assistant is Mr. A. Mears, G8SM, 34, Vine Road, East Molesey, Surrey.

The next meeting takes place on July 20 at 8.15 p.m. at the Albany Hotel, Station Yard, Twickenham, when the T.V.A.R.T.S. film of N.F.D. will be shown. Any member of R.S.G.B. is invited to attend. G5LC.

Public Schools Exploring Society

Surgeon Commander G. Murray Lerick, R.N., writes to inform us that the Newfoundland Expedition of the above Society will be transmitting from Newfoundland between August 7 and September 3, using the 3.5, 7 and 14 Mc. bands. We have no details of the call signs to be used.

Correction

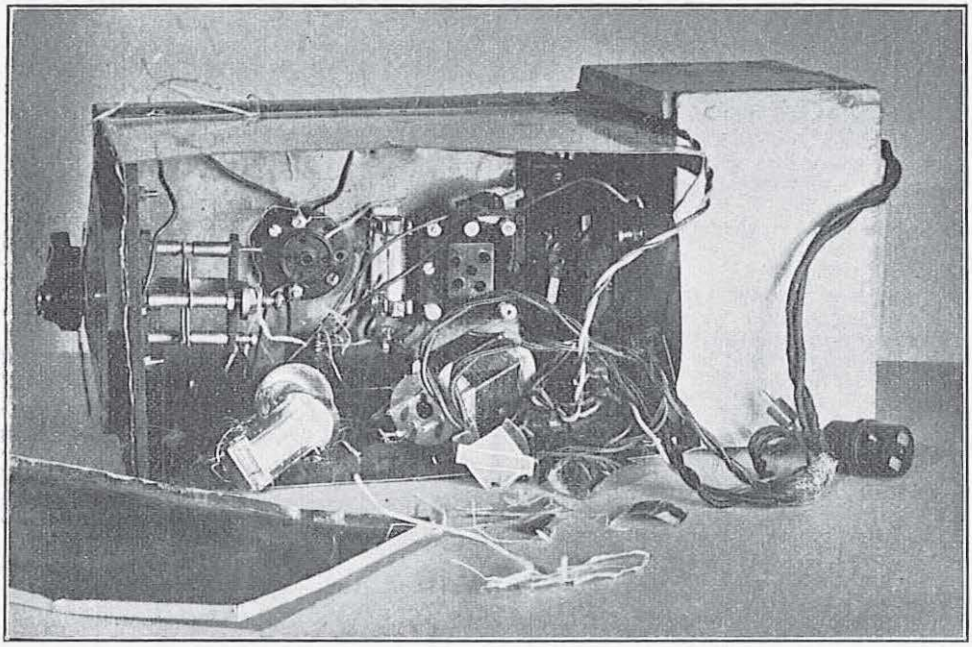
In Mr. W. H. Allen's article, published in our June issue, it was incorrectly stated on page 689 that Mr. L. W. Gardner (G6GR) was the author of an article in *The Wireless World* during 1936. The author was Mr. E. L. Gardiner (G6GR). Mr. L. W. Gardner holds the call G5GR.

Damage

We picture a frequency meter recently sent for calibration. The attention of members has frequently been called to the danger of sending delicate apparatus through the post insecurely packed.

meter, the Council expressed the hope that the lesson illustrated would prevent a repetition of this wasteful expense.

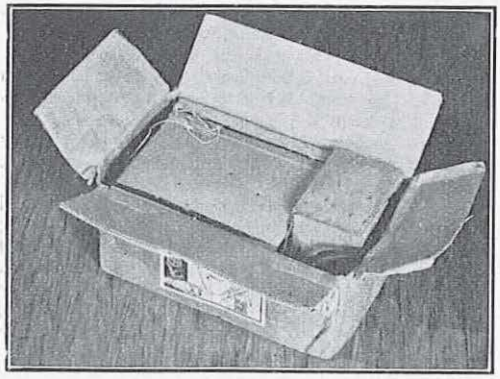
We would again urge members who wish to send apparatus for calibration to take exceptional precautions to prevent damage in transit.



A close up view of the " mess " which confronted Mr. Gay when he had removed the meter from the container. The top of the metal cabinet is badly bent, the valve is broken and sundry components are adrift

It may be of interest to record that in order to return this meter to the member concerned the Society had to purchase a wooden case, a saw, and nails. In addition to this expense, a further sum of 2s. 9d. was expended on return carriage.

When agreeing to photograph the carton and



The container in which the meter was despatched to the Calibration Manager. Note the bulge on the right hand side where a dial is pushing out the cardboard.

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. Day (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.

To The Editor

CONTINUOUSLY VARIABLE CRYSTAL OSCILLATOR

To the Editor, The T. & R. Bulletin.

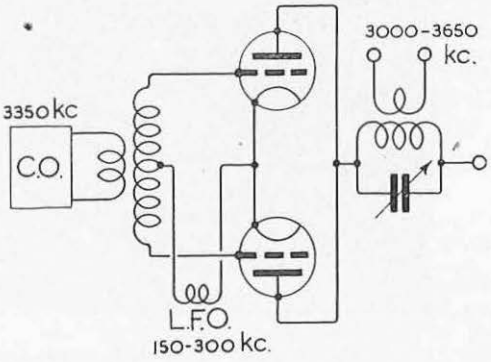
DEAR SIR,—I am disappointed to see that Mr. Clark's invention (described on Page 495 of the March BULLETIN) has not been appreciated by those correspondents who have so far discussed it, for it has, in my opinion, the making of an excellent drive unit. Possibly the author has not himself fully appreciated its possibilities.

No one will deny that the fixed frequency of a crystal is a serious handicap for work in a crowded band ; equally it is apparent that any improvement on the average E.C.O. would be advantageous. I will, therefore, try to show how much advantage can be obtained, and suggest a way to develop this " tuneable C.O."

The chief suspicion seems to be directed at the stability of the device, but it will be shown that this can be made to approach that of a crystal to any desired degree. As an example, suppose one had a crystal oscillator of 3,350 kc. frequency, and that the *variable oscillator* had a range of 150 to 300 kc.; the two being mixed in a suitable circuit to give a frequency range of 3,500 to 3,650 kc. (amongst others) in its output ; then this could be multiplied to cover the 7 and 14 Mc. bands.

Now an oscillator covering a range of 150-300 kc. can be made quite easily with a stability of one part in 1,000, *i.e.*, it can be relied on to within about 300 cycles at its highest setting. All one needs is good components and a little care in adjusting the feed-back or tap. This is what the oscillator of a modern superhet. *must* do against the handicap of tiny coils and multi-band switching. This 300 cycles is the extra instability which has been introduced into the 3.5 Mc. tuneable C.O., and represents an additional error of less than one part in 10,000, or 0.01 per cent. Thus the instability of the variable oscillator is reduced by the ratio between the two oscillator frequencies (in this case, about ten times); and all drift, chirp, buzz, etc., are reduced in the same proportion. A crystal may be more stable than 0.01 per cent., though it is not usually guaranteed better than this, and the additional error or drift in the worst case (when the oscillators drift away from each other) is still only 0.2 per cent. The " tuneable C.O." can thus bridge about nine-tenths of the gap between the common E.C.O. and direct crystal control.

Now for the circuit. There are two chief items to watch : firstly, the pulling between the two oscillators, and secondly, the removal of the unwanted beat frequency and the C.O. frequency. It is obvious that these latter must not leak through to the aerial. On the other hand, one can escape from the traditional superhet receiver circuit and low power valves, and build the unit with a circuit more adapted to its needs, with valves large enough to give an output of several watts. The pulling between the two oscillators, so widely separated in frequency, is negligible, and if there is any doubt about this, then a push-pull mixer, or *balanced modulator*, as it is called in communication engineering, will avoid this condition. As shown in the attached skeleton circuit, the C.O. is applied in push-pull to the grids of the mixer valves, whilst the L.F. oscillator is placed in between the grid centre tap and cathodes. The valve operation is almost exactly the same as in a push-pull doubler The C.O. being balanced in the circuit does not reach the L.F.O., consequently there is no pulling ; also its frequency does not appear in the anode tank circuit. The L.F., which is in the " parallel circuit," appears in the anode tank, but is so far removed in frequency as to be of no consequence. The important frequencies in the anode tank are, therefore, the *wanted sum frequency* and the *unwanted difference frequency*. As the latter is never nearer than 300 kc. to the wanted one, the use of a fairly high C/L ratio in the anode tank will remove it.



An alternative circuit might be a single-ended one, similar to that shown by Mr. Clark, but using a separate L.F.O. and a very large C/L ratio (say 150 μμF. capacity) in the output circuit, to remove unwanted frequencies.

In these circuits it would perhaps be preferable to use an L.F.O. tuning range of 300-450 kc. rather than the gamut given in the example, in order to keep it out of the range of the broadcast receiver. The necessary stability can be helped by using two sections of a 450 μμF gang condenser in parallel for tuning, and this in parallel with a fixed capacity of about 600 μμF and a medium wave tuning coil will give the necessary range. The coil should, of course, be screened.

In conclusion, I should like to add, without wishing to decry Mr. Clark's ingenuity in producing this scheme, that in co-operation with G6OT a similar scheme was attempted as long ago as 1930, but it was unsuccessful owing to lack of suitable valves and circuit knowledge. On the other hand, the idea has attracted attention in the U.S.A. Two models have already been described, and these will be found in *Radio* for June, 1936 and May, 1938. It is therefore up to us to develop Mr. Clark's suggestion, and if he or any other member wishes to carry on with the good work, I shall be pleased to give what help I may.

Yours faithfully,
F. CHARMAN (G6CJ).

A.R.P. AND THE AMATEUR

To the Editor, T. & T. BULLETIN.

SIR,—It is difficult to understand the mentality of the present advisers of the A.R.P. authorities in so flatly turning down the offer of assistance from the amateurs of this country, when approached, on their behalf, by the R.S.G.B. There is not one tittle of evidence to show that the authorities are right in that decision, but overwhelming evidence to prove that they are wrong. The only real argument seems to be that in the event of war, all present transmitting licences would be cancelled. This is agreed, but permission to use the specially constructed apparatus necessary for A.R.P. work would come under an Order in Council which would replace the usual form of permit.

The War Office is still increasing the use of radio, and its very obvious extension by the police authorities shows how important it is becoming in the everyday life of the community.

At the behest of the Government are a body of trained amateurs, some with war experience, accustomed to the reception under difficult circumstances of all types of radio signals. On the question of age, there must be many lay members of the R.S.G.B. who are too old for service with the colours, but well within the age limit of A.R.P. regulations. These men would be able to staff (or teach, if elder men outside the present amateur movement are considered necessary) the personnel of an A.R.P. network of communications. The apparatus required would not be heavier than the weight of a portable gramophone, further it would only require a dry cell unit in order that the destruction of power stations would not hinder the service. The range need only be 5 to 8 miles on telegraphy. An indoor aerial about 15 to 20 ft. long could be used and the set operated on 160 metres or any other wavelength suitable for low power reliable short distance communication. The wearing of headphones would shut out most of the external noises. The physical condition of the operators need not be taken into account, for no actual physical strain would be involved.

Consider the present scheme evolved by the authorities. A.R.P. Headquarters are to be linked by line telephone with their Wardens, and in the event of the destruction of this service (and the *first* bomb will probably do this) men on foot and cycles are to be the link between the stricken area and their Headquarters, which may be 6 miles or more away across an area still being bombed and with streets infested with falling shrapnel. These men will not be of the best physique, for most will be over age, and not in condition for service with the Forces. The loss of one single life will mean the non-arrival of the fire and gas fighting squads at the stricken area with consequences that may mean the further loss of life and property.

The use of radio will prevent this sending of the forlorn hope to probable death, and will also obviate delay in bringing the necessary assistance to the stricken area. The loss of *one* life is too high a cost to pay for that system when it can be so easily avoided.

Communication during air-raids is a very vital part of the safety scheme, and the use of radio is the only method that can be safe and sure. The amateur movement can organise and staff a scheme, and in neglecting their offer, the A.R.P. authorities are undoubtedly guilty of a lack of appreciation of the value of radio to the community. Perhaps if they read the details of the magnificent service rendered by the American amateur movement during the recent floods in America, they will obtain some idea of its value to the State when disaster confronts a nation. An organised amateur movement is to hand here in England in the ranks of the R.S.G.B., and the authorities will be well advised to use it before the advent of war scatters its members far and wide. It would be too late then. I would urge amateurs to press the matter on their Town Councils. It is time that the authorities in charge of A.R.P. in this country woke themselves up, and applied modern conditions to meet modern dangers. Their present scheme was out of date in the Great War.

Yours faithfully,
W. E. F. CORSHAM (G2UV).

MAGNETIC STORMS

To the Editor, T. & R. BULLETIN.

DEAR SIR,—In my letter (in the June BULLETIN), commenting on magnetic storms, I mentioned the possibility of a disturbance on June 5 or 6. This disturbance actually occurred on June 7 and 8. The error in the forecast date was due to the period of rotation being taken as 25 days, whereas it was actually the more normal 26 to 27 days. The correct date was forecast to headquarters as soon as the spot reappeared on the east limb of the sun. The spot seems to have decreased in size and the storm produced was less intense and the effect on radio conditions less marked. A decrease in the upper frequency limit, particularly for E layer signals with a corresponding increase in skip distance, was the most noticeable effect.

Another group of large spots travelled across the sun's visible hemisphere during the month and a forecast was sent to headquarters on June 6 that a disturbance would probably begin on June 12 or 13. This proved correct as a moderate disturbance characterised by a sudden change in horizontal magnetic intensity (74γ) began at 17.56 G.M.T. on June 12 and increased to nearly double intensity just before midnight. Flutter fade was noticed on 11, 15 and 17 Mc. broadcast stations from 21.30 G.M.T. and conditions on 14 Mc. seemed rather poor at that time.

The National Bureau of Standards, Washington, reports disturbed ionospheric conditions for June 11 and 12. The exact nature of these disturbed conditions is not stated, but it may possibly have been associated with Dellinger fade-outs preceding the storm which started on the 12th. A smaller magnetic disturbance on June 11 was probably due to a smaller spot which preceded the larger group already mentioned.

Another disturbance may possibly occur about June 20. (This is being written on the 16th).

Yours faithfully,
E. J. WILLIAMS, B.Sc. (G2XC).
(Member RES).

A slight magnetic disturbance began at 20.00 G.M.T. on June 20 as forecast. This was associated with a fall in the upper frequency limit from 48 Mc. on the 19th to 28 Mc. on the 20th and 25 Mc. on the 21st. The limit returned to 48 Mc. again on 22nd.—G2XC.

FAIR CRITICISM ?

To the Editor, T. & R. BULLETIN.

DEAR SIR,—Another N.F.D. has come and gone, and I suppose there must be many who, like myself, heaved a sigh of relief when the clock said 18.00 G.M.T. on Sunday, June 12. The painful truth is that, as an exhibition of puerile operating, the affair was unsurpassed, but as a Contest it has not yet passed the kindergarten stage.

I listened on all bands except 1.7 Mc. for several hours at various times throughout the contest, and only on very rare occasions did an example of real operating present itself. Perhaps I was unlucky in choosing my listening times, but on 7 Mc. I only heard *one* good operator, and he was a G8 (*verb. sap.*). Perhaps I had better make my meaning quite clear by adding that I logged in all 26 portables on 7 Mc. Why on earth cannot the best operators be obtained for N.F.D. ? After all, it is only once per year.

The chief faults I noted were as follows :—

(1) Far too much calling " Test " and not enough listening for calls.
(2) Complete absence of any indication of which end of the band listening was to start from (QLH, QHL, etc.).
(3) Failure to search the whole band, particularly on 7 Mc.
(4) Far too little use of QRZ ? after completing a QSO.
(5) Overcrowding one section of the band, *e.g.*, the L.F. end of 7 Mc.
(6) Almost complete neglect of " BK-in " operation.

The congestion on the L.F. end of 7 Mc. was very acute towards the end of the contest, as many stations had moved up from the H.F. half of the band owing to inability to make contacts there. The result was that the man with the lowest frequency was snatching contacts from everybody else, and if two stations answered a call the one with the lower frequency made the contact every time.

I know that criticism from the armchair is easy and can be very irritating to those at whom it is directed, but it is about time that an attempt was made to make N.F.D. a real contest, and not merely an opportunity for showing the rest of the amateur fraternity how little the average British amateur knows about the gentle art of operating. I do not know what the leading score will be, but I say without hesitation that, whatever it is, it could have been doubled at least by a staff of really first-class operators.—Yours faithfully,

R. B. WEBSTER (G5BW).

OPERATING PROCEDURE

To the Editor, T. & R. BULLETIN.

DEAR SIR,—Doubtless, some of your readers will be rather perplexed by the contradiction between GM6RV's article on " Operating Procedure," wherein he states that AR without K should be used at the end of a test call, and G5BW's article on " The First Class Operators' Club " which suggests that a test call should finish with AR-K.

I believe the generally accepted correct procedure, and that suggested in the A.R.R.L. handbook, is to finish a test call with K only. AR, by itself, is used when calling another station before contact has been established, and AR-K during the QSO.

I notice the list of first-class operators published does not contain a single G6 station, although from my experience there are probably more first-class G6 operators than in any other numerical series.

Yours faithfully,

R. W. ROGERS (G6YR).

BUSINESS INCREASING

DEAR SIR,—We have pleasure in advising that as from July 1 we shall be transferring our business to new and larger premises at 16, Gray's Inn Road, Holborn, W.C.1 (telephone Nos. Holborn 9894-5). This is opposite Staple Inn, just around the corner from High Holborn, and one minute from Gamages. We have made this move as we feel that we shall be in a more easily accessible position to serve the large number of radio amateurs in and around London.

As in the past we shall continue to handle all the well-known makes of communication receivers, together with a still larger assortment of valves and components for short wave receiving and transmitting gear.

Yours faithfully,
H. MILES,
Technical Manager,
A.C.S. RADIO.

CAIRO

To the Editor, T. & R. BULLETIN.

DEAR SIR,—Writing on behalf of the Thames Valley Amateur Radio and Television, I wish to record our heart-felt thanks for the excellent and untiring work done at Cairo by Mr. Arthur Watts, President of the R.S.G.B.

Although it is early yet to form opinions, we can see that Mr. Watts and Council have done a " real man's " job, and we thank and congratulate them all.

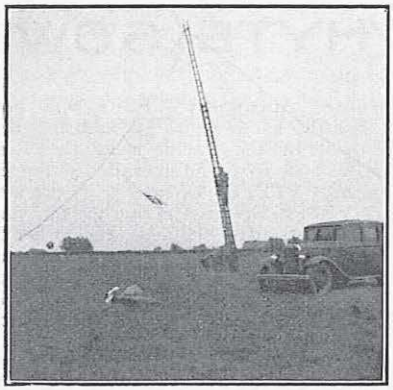
Yours faithfully,
LESLIE COOPER, G5LC,
Hon. Sec., T.V.A.R.T.S.

N.F.D. at Peterborough

There were two particularly interesting features about the 7 Mc. station operated by District 8 at Dogsthorpe, in the borough of Peterborough. One was the site, which during the Great War was used as a radio listening station for detecting the approach of Zeppelins. Subsequently Professor Appleton conducted experiments at the station. The only indication that anything unusual has existed there is a small brick building, minus its window, with barbed wire round the door (to keep away cattle) and an old pathway. The latter, was, we believe, used by sentries during the war.

The other feature was the novel aerial mast employed. This was an old escape belonging to Peterborough Volunteer Fire Brigade. The Peterborough group secured it in an interesting way. Having passed his Morse test, a local member decided to hold a little celebration and invited Mr. Harold Barfoot, who was one of the earliest members of the Society, and the writer to attend. N.F.D. cropped up during the chat, and the question of an aerial mast arose. It was then that Mr. Barfoot, who was formerly a member of the

Volunteer Fire Brigade, made the happy suggestion that the old fire escape might come in useful. A visit to the chief officer of the Brigade and the donation of a small subscription to the funds, resulted in the escape being placed at our disposal for N.F.D. How the escape was towed from the premises of a local butchery, through the streets of the cathedral city to the site could best be told by G3DY, who seemed to be an expert in shifting and handling it !



The Fire-escape doing its bit during N.F.D.

The task of climbing the escape and attaching one end of the aerial rope to it and the other to a high tree was carried out by the skipper (G2UQ), who went up aloft with the agility of a fire fighter.

As to the results obtained by the station (which by the way, was the first to be operated at Peterborough in the history of N.F.D.), we can only say that the total points scored compared most favourably with those of the leading 7 Mc. station last year.

G2NJ.

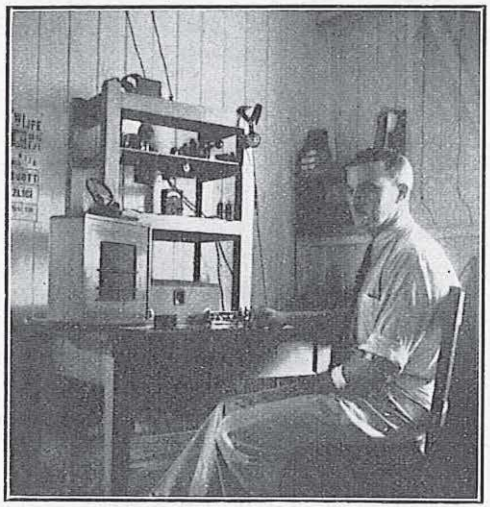
British Empire Amateur Stations—No. 1

VR4AD—British Solomon Islands.

THE British Solomon Islands are a large group of scattered mountainous islands fringed with coral reefs situated to the north-east of Australia. At Tulagi in these islands, A. W. Dickes operates Amateur Radio Station VR4AD.

The transmitter now in use utilizes a 6V6G as tritet oscillator driving a 6L6G in the power amplifier, which in turn is coupled to an ordinary Zepp aerial, 66 ft. in length. High tension for the oscillator stage is provided by a *Carter* Genemotor giving an output of 250 volts at 50 milliamps, whilst that for the final stage is taken care of by a similar machine rated at 350 volts, 100 milliamps, but which, after a retune by the owner some months ago, now cheerfully gives its 400 volts. The input on 14 Mc. is about 33 watts, on 7 Mc. 42 watts can be obtained if required. An *Eddystone* "All Wave Four" takes care of the receiving side of the station.

The best performance to date was on December 24, 1937, when W.A.C. was made in 7 hours. So far only one G station (G6GH, of Boston) has been contacted, but VR4AD is ever on the look-out for home stations, frequency is 14,285 kc., and the usual times of operating are from 08.00 to 11.00 G.M.T. Considerable difficulty is experienced in hearing Europeans, owing to the terrific QRM caused by W, ZL, and VK stations, but a directive array for receiving purposes is contemplated which should be of some assistance in this direction.

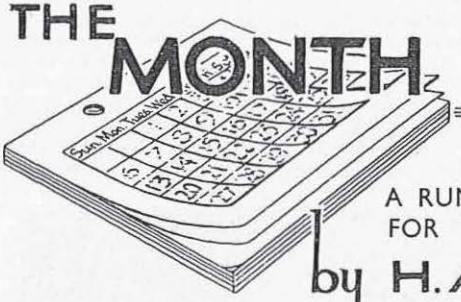


VR4AD—Station and Operator.

At the moment VR4AD is the only station in B.S.I. equipped for DX working on the 14 Mc. band ; another local station, VR4HR, is active on 7 Mc., with an input of 3 watts only, but there is some possibility that he may in the near future join VR4AD on 14 Mc. with higher power, thus making it easier for those G's who are looking for a contact with this rare prefix.

Lead-in at Rugby.
Hardly suitable for an amateur station, but viewed with envy by those who have memories of broken window panes.

THE MONTH ON THE AIR



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

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

THERE are many things of interest to report for the "summery month of June," and there is no doubt that a merry time has been had by most of us in the realms of DX working and listening.

Full marks must be given to S. Parker, G6QS, for being the first G to work all the United States of America; W9SRX in South Dakota completed the achievement and QS now awaits four cards, and on receipt of which he will immediately send to the A.R.R.L. to claim the W.A.S. certificate. It will be remembered that the Archduke Anton of Austria, OE3AH, was the first European amateur to obtain this award, and we believe that G6QS will be the second, unless someone slips in with a quick one!

Nevada has been the stumbling block for W.A.S. for years and has been the last remaining missing State for several amateurs, but our request for news of Nevada stations has brought some interesting reports. G6QS's contact was with W6LCJ on 14,030; G8GB worked W6HJZ in Boulder City on 14,308 as far back as July 15, 1937, while G3DO raised W6BYR in Reno on 'phone on June 15; all contacts have been confirmed. Any further news of Nevada working will be appreciated; in the meantime does G8GB's contact rank No. 1?

And now we come to a "puzzler"—LZ1ID. SU1WM reports receiving a card from him with a photo of his station. The QRA is Sofia, Bulgaria, and he would appear to be the first and only genuine LZ. The forwarding address is confusing; LZ1ID requests cards to be sent "only *via* WRLS"; can anyone help us, please, as we have quite a few cards at HQ for this station, and we are holding them pending further details. Another "puzzler" is our old friend TA1AA. G6WY worked him, and after much painstaking endeavour obtained the following address: Policaj Türk, Polkürte, Ancara, Turkey. Send cards to this address under cover with your own address written on the envelope—for return—just in case! The whole QRA appears to be a Police Station, not a ham station!

Those who wish to work AC4YN, the only station in Zone 23, should hurry. A letter from him states that he is putting up a flat top beam especially for Great Britain so that he can contact as many G's as possible before returning to India in a few months' time. After that happening, Zone 23 will exist no more in the active radio world, as AC4UU and AC4AA are unknown, and great suspicion must be thrown on any station claiming to be in Tibet.

Some interesting news has been forwarded to us by G6QS from VR2FF in Suva, Fiji, with whom he corresponds. Apparently VR2FF will be QRT for six months as he is to be transferred to an isolated spot in the Pacific near the Equator; however, his wife is second operator, so possibly we may still hear VR2FF. Of interest is the fact that although VR2FF has been active for ten years, he very rarely hears British signals, even when he can hear ZL in contact with G, so our chances of contact appear to be small. The transmitter consists of a 3.5 Mc. crystal oscillator, two FD's feeding two 210's in push-pull with 25 watts input. It will be remembered that the QSO between G6QS and VR2FF was the first between these two countries and the report QS received was 579.

Having cleared up certain mysterious stations, we must continue the good work of sleuthing the others. VR6AB is a case in point. This station was very active during the N.F.D. week-end calling and working G's and G portables on 14,360 with a T6 note. He claimed to be a portable on Pitcairn I. operated by a battery-driven rotary converter with W1BES at the key. However, G6KP worked W1BES in U.S.A. a few days later and asked him all about it, with the expected result that W1BES knew nothing—we repeat again, do not believe all you read in the popular press! Another mystery has been cleared; that surrounding ZA3X. Exactly three days after ZA3X (claiming to be in Tirana, Albania) was QSO by G6WY, a card from HRS-1548 in Sopron, Hungary, arrived, reporting the QSO with ZA3X. As this "report" card was sent direct and specifically mentioned the QSO, we feel quite sure that Albania still holds no amateurs. This is an old trick of unlicensed stations, to send a report card giving details of the QSO in the hope of getting a card from the station worked. It will be interesting to know if others who have worked ZA3X receive a report from HRS-1548. Other "funny ones" heard at G6KP are ZA1C and ZA1D.

The mystery of VP3TEST is cleared, thanks to a letter from VP2AT. The old VP3BG was operated by two operators, and now that new licensing regulations have been introduced, the elder and more experienced operator received the call VP3AA after using VP3NV for a while on 28 Mc. 'phone before the call 3AA arrived. The younger and less experienced was told that he could not have his licence until he could send and copy code at 15 w.p.m., and so he practiced on the air with the call VP3TEST (i.e., awaiting code test). VP2AT requires details of XX7B; we'll lay ten to one that call originates from a ship.

ZD4AA (Box 250, Accra) is active again; G6RH worked him, and we now learn from 2BNL that

ZD4AB is the newly-licensed call of G2TH, also in Accra, and will be used on 14,340. He will make a special endeavour to work G's from 17.00-18.00 G.M.T. Another new call in a rare country is XZ2KR, granted to GW8FG, who is being transferred to Alexandra Barracks, Maymyo, Burma.

The squabble over QSL's from Southern Rhodesia is still in our minds, and we are pleased to learn from ZE1JF that he intends to QSL everybody, even though he admits he is a bit behind. ZD2H in Lagos also informs us that he will QSL 100 per cent., so H.B.E. aspirants should note these calls. ZE1JF on 14,100 and ZD2H on 14,300. The other Rhodesia has been well represented by VQ2HC and VQ2FJ, both of whom seem to QSL all contacts and we hope, reports too.

An unusual 'phone schedule has been maintained between G5LU and XU8ET in Shanghai at 21.30 B.S.T., commencing May 22. Up to June 17, out of a possible 27 contacts, 17 were satisfactory and ten were missed, after that date G5LU could no longer hear XU8ET, until he discovered him in the American 'phone band. The explanation given by the Shanghai station when contact was re-established was that his crystal had " slipped " from its original frequency of 14,130 to 14,200 and would not " slip " back. The maximum strength obtained by G5LU was S7/8. The full QRA of XU8ET is: Norman Turnbull, c/o I.A.R.A., of China, Box 685, Shanghai, and this same address is suitable for all Shanghai stations worked.

From Scotland we receive news that GM6JD has worked OY4C, who gave his QRA as Faroes Is. and promised to QSL. We have a feeling that he will prove genuine. OQ5AQ and ZC6AQ gave new countries to 6JD and the best heard included PK1RI 14,360, VP7NT and CE3DG. The answer to the question, " does ZS3F QSL " appears to be " yes." We read from *Radio* that his log book carrying entries between January 1 to February 28 was accidentally burnt and all who worked him between these dates should work him again. G5HH received a letter from him and learnt that ZS3F has been slow in QSL'ing because of the enormous number of unwanted listener reports received. G5HH is of the opinion that this very fact keeps some DX stations from QSL'ing at all, because they get sick of the sound of " QSL card," and he even suggests that the remedy is in the transmitter's hands, for he considers that they should all take concerted action and refrain from sending listeners' verification cards. (What about the I.R.C.'s ?—Ed.) G5HH has another idea. Where a wanted card cannot be obtained for a QSO with a rare country (he cites CE7AA as a case in point), is it not possible for all G's requiring a card from CE7AA, or any other offender, to pay a small contribution of, say, 6d. towards the cost of the R.S.G.B. endeavouring to get a list from the station; cards would be better, but a list would be available for awards. It is interesting to record that the A.R.R.L. obtained a list from I7AA in Addis Ababa, Ethiopia, for the purposes of their DX Century Club members—G6WY scored one more by this means! G5HH worked VQ2HC and PK1RI to bring his country total to 82, but is still lacking a few cards—who isn't ?

GM8MJ is mystified about " OF6NG," but we wish to assure him that this was most certainly OH6NG sending badly, or with the " CQ swing."

G3BQ has found that " it never rains but pours "—he has waited months to work South America, and then raised two in one evening; he has, therefore, W.A.C. with 10 watts at the age of 16 and asks if he is the youngest to achieve this ? Other DX worked includes OY4C (QSL *via* E.D.R.), and EA7AV, who states he is in Cadiz, but refuses further details. AR8MK was heard on 14,400 by 3BQ and C6KP as well. We hope that he will prove to be genuine in Syria, as this country has been poorly represented for years. G6YR has now worked four VQ2's and put 'phone through to VQ2JC for a long QSO, TF5F (anywhere in the band) was a new Icelandic station to be worked, and he reports hearing K7AOC 14,150 ('phone), XU9MK, 14,100, LZ7AN 14,025, HK3AL 14,240 and 14,400, VQ2AG 14,040, VQ2PL 14,390, VQ4CRT 14,130, and on 28 Mc. LU4BC was received on 'phone at S8 at 22.00 B.S.T. on June 16

G3JR has only been licensed about three months or less, but produces DX QSO's with a single 6L6g CO and an honest 10 watts. Here are some of the stations who replied to him:—VQ3HJP, ZS6DY, TF5F, ZE1JI, VQ2HC, W7FWR, VE5SR, 5AET, U9MI, W6NPU (Utah), VQ4KTF, OQ5AQ and all districts W/VE. Total countries to date—45 in 16 zones. I2SL gave him visions of a new Italian Colony, but the QRA " Trieste " dispelled this illusion, U9MI actually sent a card *direct per return*. Oh my!!! The best heard by G3JR includes: XU8RL 14,300, CN1AA 14,320, EP5SO 14,265 T8, LX1AO 14,405, OY4C (QRA given as Nishen, Fernis, Faroes), PX1A 14,320 T7, J7CR 14,260, J8CD 14,320, VQ2GW 14,320, KA1BC 14,120, and XU8HM 14,040. G6LJ worked the elusive FM8AD and VK5JT, whom he thought to be in Central Australia, but we are sorry to disappoint you—his QRA is now at Adelaide, S.A.

Here is some news from Northern Ireland. GI2CC is working all the 'phone DX available to-day and he gives us details of HR5C. His card shows a picture of a mining camp where he operates the station; he is unlicensed and therefore QSL's should be sent under cover (with *no mention of the call on the envelope*) to either E. C. Connel or T. A. Knabe, N.Y. and H.R. Mining Co., San Juancito, Honduras Republic. The transmitter used at HR5C is a 350 watt Temco and the receiver is an HRO. GI6YW is once again chasing the DX after many years' absence from such follies! He tells us that following a QSO with VE3ADV, a QSL was received enclosing a card addressed to G5UP sent by 6YW twelve years ago when 5UP was his British call. Some old friends of G5UP will no doubt be interested to know that he is now operating VE3ADV on 14,366 with 100 watts input. GI6YW wants the rare stations listed with frequencies in a separate column. This is an idea which we may develop; so far we have tried to mention everyone who has reported, but this month we have had to abandon that method as we have had more notes than ever before; so many of the reports merely contain the same list of stations heard, especially in the case of 'phone reception logs.

G6CL, who apparently surprised a few old-timers by making the DX Century Club last month, has added CE1AO, VP9L, and AC4YN, to bring his total to 109 in 37 zones. He is still using a pair of

(*Continued on page* 64.)

THE 56 Mc. BAND

By L. G. Blundell (G5LB)

FROM reports tendered by those who make a habit of noting the daily upper frequency limit, it is apparent that the month of June provided many occasions when DX work *could* have been accomplished.

As will be noted from the following log extracts, there were days when a long-distance contact seemed almost a certainty, but alas! the lack of activity at suitable distances completely spoilt any chances of actually confirming the said conditions.

Several of the reports include an appeal for more activity during the daylight hours, the general opinion being that with activity now mainly concentrated between the hours of 22.00 and 24.00 B.S.T. on weekdays and 10.00 to 12.00 on Sundays (Saturday's usual degree of activity being negligible) there is little hope of striking a spell of favourable conditions. What is most necessary at the present time is a number of stations active between the hours of, say, 19.00 and 21.00 B.S.T. weekdays, all day, if possible, on Saturdays and Sundays.

European DX Reception

On July 2, as a result of a prearranged schedule, Mr. E. J. Williams (G2XC) received 56 Mc. signals from XI1ER, of Milan. Time, 14.50 G.M.T. Report 559.

On the same day and at the same hour, Mr. B. W. Mainprise (G5MP) received a 56 Mc. Test Call at 569 from G2HG. Above HG's frequency he heard two other stations, believed to be G5ON and G6HD.

Mr. Mainprise was at Chezieres-Villars, Switzerland, 3,700 ft. above sea level, although heavily screened from north-west to north-east by an additional 1,000 ft. of steep mountain which was in cloud level for 24 hours up to the time of reception. Visibility was only 50 yards.

Of course, such long spells of operation are impossible to all but a few, but could not those few sacrifice just one game of tennis, just one game of cricket or an hour with the YL, so as to put in that little extra on the band? On the other hand, those with more normal working (or playing) hours, could they not manage an hour or so during the early evenings and afternoons during the week-ends? We think they could, but maybe we think wrong (especially at this time of the year) and in such case apologise for giving that thought such freedom, *but if that thought is correct, please confirm it by putting in some activity at the hours suggested—you will earn unspoken but sincere thanks at the very least.*

After such an appeal, it is only fair to pass on to the reports, which in themselves are full of encouragement and promise of things to come. So here goes:—

G6YL logged commercial harmonics as follow: June 12, IBE 56 Mc. 579 between 17.05 and 17.20 B.S.T., fading out by 17.34. At this time IRX was 554 on approximately 60 Mc., this signal still audible at 334 at 17.53. On the 19th, IBE was 339 at 13.29 B.S.T. and at 16.56 FYR was 564 on about 58.2 Mc. and audible until 17.25. June 22, at 13.36, IBE was again logged at 549 until 13.45, when signals faded out. At 21.25, IRE was 564 on about 60.5 Mc., fading out at 21.45. On the 23rd, at 10.43, IRX was 44 on M.C.W. This station was checked again at 11.10, when signals were 55; again at 11.32, when they were down to 44 again. At 11.52, IBE again on about 56 Mc. at 229.

In addition to these signals, other but unidentified transmissions were heard, generally at the same times, giving the impression of an "open" band.

G6QZ, as usual, has been keeping watch on the upper frequency limit, and found several days on which conditions were such as to indicate DX possibilities. These days were: June 3, commercial harmonics audible up to 45 Mc. On the 12th, IBT was 449 on 49 Mc. between 19.00 and 19.45 B.S.T. On the 13th signals heard up to 40 Mc., and on the 15th up to 41 Mc. The 19th was also promising, with commercial signals up to 43 Mc., and it is interesting to note that on this day G6CW, in Nottingham, heard G6IH, of Malvern, 5IQ, of Wolverhampton, 5BM, of Cheltenham, and 5KH, of London!

The 27th of the month was even more encouraging when during the late afternoon, from 17.00, commercial signals were plentiful up to about 50 Mc. At 19.10 a fast auto CW signal was logged on 59.5 Mc. at S3/4. This signal was audible until 20.00 but could not be identified owing to QSB. A little later a CW signal was heard on 56.5 Mc., but too weak to copy.

G2XC made similar observations and found that the upper frequency limit exceeded 40 Mc. on 15 days in June. IBX and/or IRY were audible on approximately 48 Mc. on June 2, 15, 19, 22, and DFQ was S8 on 56.1 Mc. on the 24th between 16.10 and 16.30. Numerous tests have been attempted with various European stations, but without success so far. Local contacts continue with stations up to 50 miles distant.

G2HG hit a "high spot" (or should it be the "odd spot"?) when on the 26th, at 11.05 B.S.T., SM5SN was logged on 56.1 Mc. at S4 tone code. Signals faded completely out in the course of a minute or so.

Fading on strictly local signals was noticed on several occasions during the month at G5LB, the night of the 27th being particularly notable when, during a QSO with 6OT, in North London, signals each way were fading continuously from S7 to zero. G5LB is usually active on Monday, Tuesday, Thursday and Friday evenings between 18.45 and 19.30 B.S.T., in addition to the late evening hours.

Other reports indicate no lack of activity on the band at the usual hours. Several stations making portable tests in readiness for N.F.D., which by this time will be all over. How did C.W. fare this time?

U.S.A. Again Gets DX Conditions

As in previous years, our American friends experienced a spell of DX during May and early July, and, through the kindness of W9FM and G2YL, the writer was enabled to read through a very detailed account of the contacts made at this time. As it would require almost a complete issue of this journal to cover the report in full detail, it is only possible to pick out the " brass tacks " as follows :—

The band was wide open for 300 to 1,200-mile contacts from May 12 until about June 6, notable days being the 12th, when W6 and 7 were able to contact ; the 15th, with W4EDD working all N.E. districts ; the 19th gave W5EHM contacts (28 all told) with stations in W3, 8 and 9 ; the 27th enabled W9 to contact 2 and 3 and between the 30th and 31st W5EHM had numerous QSO's with stations in W8 and 9, and with some W4's between times. In fact, during the last two days of the month it seems that each and every district was able to work the others ! On June 2 more contacts between the 3rd and 8th districts were made, and on June 5 contacts were effected between W8 and W1, 2 and 3, and also between W8 and W4 and 5.

While a very large number of stations were using C.C. this year, the QRM, due to unstable and modulated oscillators, was intense, many DX contacts being spoilt or rendered impossible. An effort was made to check up on the polarisation of DX signals, and most stations making tests in this direction found that changes in aerial arrays produced little or no difference in the signals, thus proving that true upper layer reflection was taking place.

It was disappointing to note that out of the hundreds of stations active only four were known to be using plain C.W. These were given as W9NY, W5EHM, W9AHZ and W9ZJB, all these making a score in the International DX Contest organised by the R.S.G.B. The scores made by W9AHZ and 9ZJB are not at present known, but in W9NY's log for May is shown his score bearing QSO. This was with W5EHM, in Dallas, Texas, between 19.20 and 19.30 G.M.T. on May 31. The distance represented is 860 miles and is one point to 9NY's credit. W5EHM, being the other side of the contact, of course fares the same. Congratulations to all concerned ! The logs for June are not as yet available, but reading " between the lines," it appears that even better work was done in the first few days of this month, and it is certain that the rest of the world on " five " for the Contest will have to pull the proverbial socks up against a possible walk-over by America !

Those wishing to read up full details of these DX contacts can find same in the last issue of *Radio*. In the meantime, back to the shack and see if you can raise a point or so. Good luck !

THE 28 Mc. BAND

By NELLY CORRY (G2YL).

CONDITIONS last month were generally rather flat and the most outstanding days were June 15, 19, 26 and 27. G2XC and G6QZ, who keep graphs of the highest frequency heard daily, report that this reached 40 Mc. or higher on 17 days, up to June 27. So the lack of signals reported, particularly during the first half of the month, must be attributed principally to summer inactivity.

For the first time for two years not a single Oceanic or Asiatic signal has been reported during the month, though J commercial harmonics were occasionally logged both in the mornings and evenings. VU2AN has not heard a readable amateur signal since the beginning of May, but frequently listens at Summer Test periods. VU2FV is also co-operating in the Tests, and reports that at present there is little to be heard but commercials.

African signals were also scarce, but SU2TW, ZE1JI, ZE1JN and ZE1JZ could sometimes be worked in the evenings. South Americans heard included CE3BH, LU3DH, LU7AZ, LU9BV, PY3AB, PY8AG and an unidentified YV station. The three LU's made an unexpected appearance on the evening of June 19, when the band was thickly populated with loud European signals, till 22.00 G.M.T. or later. From further north, HI2L, K4FKC and K5AN were heard on several evenings.

At this time of year conditions are rarely suitable for communication with North America, and it would be interesting to know the cause of the freak conditions of June 26 and 27. G5BM, having erected a " W8JK Beam " for 14 Mc., tried it on 28 Mc. for the first time on the afternoon of June 26, and besides two normal contacts with D and F, he worked VE5CX (who reported him RST 589) and W6HYD ! On the following day G2XC heard the German Television S9 QSB and other U.H.F. signals up to 50 Mc. Up till about 22.00 G.M.T. European signals were numerous and loud and included many short-skip ones, e.g., EI9J, GI5WD, GM5SC, GM6IZ, GM8MJ, G2OA and PA0WI, who were good signals in the South of England. K4FKC and ZE1JZ were also logged, and after 22.30 G.M.T. many W1, 2, 3 stations came through. G5VU worked W2BQK (RST 579 both ways) and heard about a dozen W 'phones, mostly calling G6BW.

Europeans in about 20 countries were heard during the month, but activity could not be said to be great in any country except Germany, from where at least 20 stations were putting a good signal into Great Britain. It is interesting to note that among the most active European stations are several who were " Ten Metre DX " in 1933, e.g., F8CT, OK1AW, OK3VA.

Many thanks for reports received from G2XC, 3JX, 5BD, 5BM, 5VU, 6QZ, BRS25, 3179, VU2AN and VU2FV.

G2XC and GW2BG

Mr. E. J. Williams (G2XC) and Mr. G. R. Silverthorne (GW2BG) inform us that their transmitting activities are confined to frequencies other than 7 Mc., on which band pirate stations have been heard using their call sign.

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.)
To be appointed

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. G. JEAPES (G2XV), 89, Perne 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), 81, Studland Road, Hanwell, W.7.

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. W. A. CLARK (G5FV), "Lynton," Hull Road, Keyingham, E. Yorks.

DISTRICT 19 (Northern).
(Northumberland, Durham, and North Yorks.)
To be appointed

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)

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

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

Town Representatives :

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

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

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

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

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

Liverpool : J. Davies (G2OA), 13, Exeter Road, Wallasey, Cheshire.

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

Nelson : R. Hardy (G2RB), 10, Westcliffe Walk.

Preston : H. B. Sumner (G5AX), 35, Moss Lane, Leyland.

Rochdale : T. A. Whiteley (G6QA), 82, Molyneux Street.

Warrington : F. A. Vost (G2DF), 26, Pinewood Avenue.

FOR the benefit of those members who were unable to attend the P.D.M. recently held at Southport and who are therefore not aware of the policy now in force regarding these notes, the District Scribe would like to point out once again that the purpose of this section of the BULLETIN is first and foremost to record the activities of groups of members in various centres so far as they relate to what might be called official R.S.G.B. business ; for example, organised meetings, field days, visits to places of technical interest and functions of a similar nature arranged for the benefit of members in furtherance of the objects and purposes of the Society, and, secondly, to publish individual reports of outstanding interest to members generally. There is no value whatever

in a report that such and such a station is rebuilding or testing microphones and items of special interest regarding DX worked should be forwarded to G6WY for publication in the appropriate section. The reports in future will therefore be confined to a record of group activities, a list of the call signs of stations active on the air and of new licences issued, particulars of organised tests of a special nature and schedules arranged in connection therewith and other items of genuine interest. T.R.'s are requested, therefore, to submit their reports with this in mind in order to lighten the task of preparing the notes for publication.

Burnley.—Applications for membership have been received from G3IY and 3KT. The T.R., 5ZN, visited the N.F.D. station of St. Anne's and derived much pleasure from his visit. G8TD is operating on 28 Mc.

FORTHCOMING EVENTS

July 20.—District 15 (West London Section), 7.30 p.m., at 2CMG, 70, Wormholt Road, Shepherds Bush, W.3.

,, 20.—District 1 (Liverpool Section), 8 p.m., at 56, Whitechapel, Liverpool.

,, 20.—District 14 (East Essex Section), 8 p.m., at G8RT, "St. Ives," Leicester Road, Laindon.

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

,, 24.—District 16 Conventionette, at Adelphi Hotel, Warrior Square, Hastings. Assemble 12 noon.

,, 26.—District 14 (East London Section), 7.30 p.m., at BRS3270, 62, Southern Drive, Loughton.

Aug. 3.—S.L.D.R.T.S., 8 p.m., at Brotherhood Hall, West Norwood.

,, 4.—District 14 (Colchester Section), 7.30 p.m., at G8PZ, 19-21, Artillery Street, Colchester.

,, 5.—District Meeting in Bedford Area.

,, 18.—District 10, 8 p.m., at Globe Hotel, Duke Street, Cardiff.

Manchester.—An attendance of 23 was recorded at the last meeting at which N.F.D. formed the main topic of discussion.

It was proposed by G6OM that a subscription of 6d. per month should be paid by each member towards the cost of building a permanent N.F.D. transmitter. The proposal was carried and the first collection amounted to 11s. 6d. Any member who would like to help should forward his subscription to 2WQ, of 7, Stanley Road, Broughton Park, Manchester, who is acting as Hon. Treasurer. The new transmitter will belong to the group, so please help to build it by sending your subscription each month. Sales and raffles will also be held during the coming year.

It is a pleasure to report that as the result of previous sales, there is still a balance in hand from last year, all N.F.D. expenses having been cleared.

Now a word or two about N.F.D. 1938. Conditions on 14 Mc. were very poor. Heavy rain fell during the night, with thick mist, but contact was established with VQ, ZB, W1 and 2, and TF, also Europe, but only four G stations were heard and only four HB stations. There was a blank period between 2330 and about 0710 during the heavy rain. Thanks are accorded to 2DF, 2LK, 2OI, 3AH, 6KS, 2BMG and 2ARC, who operated the gear and helped to erect it, to 6OM (who gave up a lot of his valuable time) for the loan of gear, to 2ARC who built the transmitter, to 5YD for helping to transport the gear, to 2WR for the loan of a meter and crystal and to 2LK, 2BMG and 2OI for loan of other gear. Also a word of thanks to 6KS who came all the way from Liverpool and brought spare parts, to 2DF who journeyed from Warrington and to the treasurer 2WQ who came forward at the last moment and helped to find the deposit for the tent. A surprise visit was paid by 6JN who recently arrived in England after many months at sea as "Sparks."

Through a misunderstanding the reports were missed last month, but this month's should make up for the omission. The next meeting will be held on September 7.

All the usual stations report active while a few are busy rebuilding for C.C. on 56 Mc.

Liverpool.—It has been necessary to secure other accommodation for the monthly meetings and in future members will meet at 56 Whitechapel on the third Wednesday in each month. These premises are more central and even better attendances are anticipated than before. Members met there in June and in spite of the fact that the holiday period is now in being, a good attendance was recorded.

Interest is reviving in 56 Mc., and it is a sign of progress that crystal control is coming into favour. Both G6DP and 8VY are operating with crystal control and would like to hear from other stations who will co-operate on this frequency. 6DP has been reported S6 at 30 miles.

2CVG has returned to England after visiting various stations "out East," including VU2CQ and SU1SG, and he hopes to have a full call by the time these notes are in print.

Blackburn.—N.F.D. was the cause of considerable activity. A report and photographs appeared in the local press and much interest was shown by the general public. Thanks are accorded to all who worked so hard in support of the affair, particularly to G2HW, 6BH, 8FI, 8JA, 3DKL, 2DJD, BRS3172 and BRS3248. The inner man was looked after by Mrs. 2QN and Mrs. 2CRM, to whom all concerned were very much indebted for their efforts.

Now that N.F.D. is over there is much rebuilding in progress and plans are in hand for more activity at week-ends with portable gear.

Stations active include G8JA, who is WBE on 14 Mc. with 8.56 watts input, and 8FI, who appends a formidable list of DX worked.

Preston.—Local meetings have been discontinued during the summer.

G5UG has been experimenting with long aerials, and the following are also active: G3JR, 5AX and 5UG. 2CSM has applied for full licence.

DISTRICT 2 (North-Eastern)

District Representative.—L. W. Parry (G6PY), 13, Huddersfield Road, Barnsley.
District Scribe.—C. A. Sharp (G6KU), 316, Poplar Grove, Gt. Horton, Bradford.
Town Representatives :—
Barnsley.—T. Malkin (G5IV), 5, White Hill Terrace, Dodsworth Road.
Bradford.—G6KU, 316, Poplar Grove, Gt. Horton.
Halifax.—J. S. Kilpatrick (G6QS), Lynn Cottage, Lightcliffe.
Huddersfield.—J. Dale (G5VD), 12, Langley Terrace, Crosland Road, Oakes.
Ilkley.—J. W. Hemingway (G8ID), 17, Thwaites Avenue, Leeds Road.
Leeds.—W. F. Wilson (BRS2317), 4, Stratford Street, Leeds, 11.
Sheffield.—A. Pemberton (G2JY), 57, Tillotson Road.
Wakefield.—W. L. V. Parker (G6WJ), Chalfonte, Thornes Road.

The T.R.s responsible for the various N.F.D. stations thank all who contributed to the success of this event, and in particular the District thanks Mr. H. Beckett (G5HK) for loaning a field for the Sheffield station.

Barnsley.—The following stations are active on 56 Mc. : G2BH, 5IV, 5UA, 6AJ, 6LZ, 8NM and 8PK.

Halifax.—Most stations are active, chiefly on 56 Mc., and an effort is being made by many members to speed up the code in order to get their AA licences changed to radiating permits.

Best wishes are sent to a new member to the District, ex-ZL1BG, who has promised to give us a talk.

Sheffield.—Details of the next meeting will appear in " Forthcoming Events," and members are asked to make a special effort to attend. The following are active : G2AS, 2JI, 2LT, 3FN, 5TO, 6LF, 8JP, 8NN and 2DJT.

Leeds.—The following are active : G2XY, 3HV, 6XT, 8OG, 8SX and BRS2317.

Huddersfield.—The N.F.D. station was a great success. Careful planning made it possible to have the station ready for operation six hours before the start and the site was cleared in twenty minutes at the finish, after a very enjoyable week-end. Those taking part were G5VD, 6RO, 8CW, 8GW, 8OF, 8TM, 8VF, 8VK, 2ALU and BRS1686. G5XK is welcomed to membership.

Bradford.—A private portable station was operated in N.F.D. under the call G6XLP.

DISTRICT 3 (West Midlands).

District Representative : V. M. Desmond (G5VM), 199, Russell Road, Moseley, Birmingham, 13.
District Scribe : G. M. Whitehouse (G2YV), Trumwyn House, Cannock, Staffs.
Town Representatives :
Birmingham : G. Brown (G5BJ), 94, Sunnymead Road, Yardley.
Coventry : L. W. Gardner (G5GR), 40, Medina Road.
Shrewsbury : E. R. Westlake (G6KR), " Ardlui," Wenlock Road.
Rugby : H. S. Norris (G8FJ), 19, Charter Road.
Stoke : A. W. Wilson (G2WN), 8, Stanley Street, Hanley.

Rugby.—G8FJ has taken up the position of T.R. A 25-watt permit has been issued to 8RL, who is now operating a new CO 59, BA 46, PA T20, rig with 12 watts input. He took part in the SP contest, but did not gain many points.

Shrewsbury.—Congratulations to 2CJO, who now awaits his morse test for full licence. Active stations are G5YP, 6KR, 2BMN, 2DAQ, 2CJO.

Staffordshire.—6SW, who is touring the Continent, needs South America for W.A.C. 2YV rebuilt transmitter in 6' rack. Experiments on 56 Mc. have been carried out with one or two local amateurs and 14 Mc. CW has been heard in North China. Other active stations include 2FAH and 2FAP.

Stoke.—The T.R. reports strong activity. G2VG kindly lent his laboratory for meetings of the local society, which is composed of about twelve members. His phone is consistently heard in most parts of the world on 7, 14 and 28 Mc. Contacts up to 50 miles have been obtained on 56 Mc. 2WN is working mainly on 7, 14 and 56 Mc. G8DV active on 7 and 14 Mc. G5VA has worked all W districts on CW, using less than 10 watts to an 82' W3EDP.

Will members calling on the D.R. please telephone beforehand to avoid fruitless journeys ? 'Phone is South 2232.

DISTRICT 5 (Western)

National Field Day went off without a hitch at the four District Stations, and if the scores were not so high as they might have been, those who took part thoroughly enjoyed themselves.

The 7 Mc. station was honoured by a visit from the Duke of Beaufort, on whose property it was situated. The services of all those who assisted are acknowledged with thanks. The support accorded by many of the newer members was very good, whilst the publicity resulting from the Press notices brought forth a number of enquiries regarding the Society's activities.

Bath members are obtaining good results with W8JK beam aerials on 14 Mc. Many of the Bristol members availed themselves of the opportunity to visit Bristol Airport on June 19, and were very interested in the transmitter and D.F. apparatus. Mr. Johnson, the Engineer-in-Charge, ably explained the superiority of the particular D.F. system in use, error due to night effect being eliminated by the use of vertical aerials and screened feeders. Thanks are due to G2IK for arranging the visit.

At the June Bristol meeting G5JU demonstrated a new transmitter subsequently used at the 3.5 Mc. N.F.D. station.

A discussion regarding a 1.7 Mc. D.F. Field Day took place and a fresh treasurer was appointed in the person of 2FBW (late BRS1657) who has just obtained his AA licence, as also has 2DWI (late BRS3143). 2AYP of Gloucester is congratulated on obtaining his full call, G3MA, also 2AKR of Cheltenham, who is G3LZ. The other Cheltenham stations are active in various directions, mainly on the 14 and 56 Mc. bands ; 8DA is steadily pursuing his QRP and magnetic effects studies.

R. B. Stewart, ex EI5M and late of Cheltenham, is getting married soon and mentions that invitations to the ceremony will be issued through G5BM.

DISTRICT 6 (South Western).

District Representative.—W. B. Sydenham (G5SY), Sherrington, Cleveland Road, Torquay.

Town Representatives :—

Torquay.—L. G. Mays (BRS2785), 185, Windsor Road.

Exeter.—H. A. Bartlett (G5QA), Lendorie, Birchy Barton Hill, Heavitree.

Plymouth.—D. E. Herbert (G6RF), 3, Hill Lane, Hartley.

Taunton.—Dr. D. A. Iles (G5LM), Shuttern House.

N. Devon.—D. H. Jones (G3BD), Westover, Windmill Lane, Northam.

If numbers attending at the various N.F.D. stations were any guide, then surely District No. 6 should rank fairly high when the results appear. Everyone enjoyed the week-end, the weather was kind, and even if the number of contacts made prove to be somewhat less than those obtained in other areas, we have the satisfaction of knowing that it was not for the lack of concerted effort, nor for the lack of efficient apparatus. All the gear worked well, and we thank all those who provided any part, however small. We in the South-West feel that we are working under a handicap when competing with the more favourably placed Districts. The question has been asked, if N. Ireland, etc., can be allowed extra points, why not us ?

We should also like to make a comment about the 7 Mc. 'phone QRM on the Sunday morning. This did not give the impression that the nuisance was abating ; in fact we actually heard one of the many G 'phone operators waxing wrathful on account of the C.W. QRM caused by N.F.D. !

Torquay.—Most stations are active, but there is nothing of special mention except that G2CI and G3HW are co-operating in some aerial experiments on 56 Mc. Meetings will probably start again in October, but in the meantime it is hoped to arrange for one or more local 56 Mc. field days. Those known to be interested will be notified. Any others who have not previously taken part in these events and would now like to do so should write in for information. This will be forwarded when available.

Exeter.—Meetings are now held on the first Monday in each month. G3MU, owned by F. Saunders, Roidal, Pennsylvania, Exeter, is a new call. All stations report active and some excellent quality 'phone is being put out by G2FP, 3BI, 5QI, and 8QL. At the next meeting each member is to give a ten minute talk on the aerial he uses and his reason for so doing. It is thought this discussion will help non-transmitting members to select the best aerial to use.

N. Devon.—Apart from N.F.D. there is little to report this month. This is the first time that the N. Devon group has operated the 14 Mc. N.F.D. station. Conditions could have been better ; nevertheless, everyone enjoyed the experience. Thanks to those responsible for the gear, the station remained in continuous operation throughout the event without technical trouble of any kind.

The T.R. takes this opportunity of thanking G6GM and Mrs. Merriman for their kind hospitality, and all those who provided transport and the loan of gear. We are pleased to report G8US active again after his illness.

DISTRICT 7 (Southern).

District Representative : E. A. Dedman (G2NH). 75, Woodlands Avenue, New Malden, Surrey.

Town Representatives :

Bournemouth : R. P. Heatley (G5OH), 26, The Triangle, Bournemouth.

Croydon : E. W. V. Butcher (G5AN), 16, Manor Gardens, Purley, Surrey.

Guildford : W. E. Russell (G5WP), " Milestones," Westfield Road, Mayford, Woking, Surrey.

Oxford : H. J. Long (G5LO), Stanton Harcourt, Oxford.

Portsmouth : L. E. Newnham (G6NZ), 145, Victoria Road North, Southsea, Hants.

Reading : A. Lambourne (G5AO), 26, Zinzan Street.

Reigate : L. G. Knight (G5LK), " Radiohme," Madeira Walk.

Southampton : L. G. Stoodley (G8DM), 31, Ripstone Gardens, Highfield.

A record number of members took part in N.F.D. work and all had an enjoyable time under ideal conditions from the weather, if not radio, point of view.

Due to a business appointment at Alexandra Palace, 2BNS has been forced to resign his appointment as T.R. for New Malden and Kingston, and we take this opportunity of thanking him for his past services. Will members in the area send nominations for a new T.R. direct to H.Q. ?

The visit to the Daventry Station of the B.B.C. on June 26 was attended by 26 members from No. 7 District and S.L.D.R.T.S. We are extremely lucky in having two District 7 members on the B.B.C. staff, and they were able to explain the mysteries. As a result of the visit we anticipate an influx of stacked dipoles and feeder correction stubs in the District.

Bournemouth.—G2TR, 2NS, 3BM, 5PB, and 5OH are active. 2DTR and 2DNF have almost completed their rigs and are now making frequency meters. Recent gales brought down masts at 3BM and 2DNF. 3BM has erected two 70-ft. lattice masts for support of his W8JK beam system. 8KX and 8BW are carrying out alterations to gear.

Guildford.—G8IX, 8UG, 6YZ, and 5WP are active, but little of outstanding interest has taken place apart from N.F.D.

New Malden.—2AJN is now G3MF. 2DOP is busy with 56 Mc. receiver research. G2NH and G5MA have portable c.c. 56 Mc. transmitters with field power supplies. G5MA uses a generator driven from his car engine and 2NH a vibrator unit operating from a car battery. Several tests from " portable " sites have been made with very satisfactory results. G6VR, 8TX and 3DZ are known to be active.

DISTRICT 8 (Home Counties)

A pleasing attendance of 19 members was recorded at the district meeting held at Cambridge on June 3, when a short agenda of matters previously discussed by the sub-committee was soon dispensed with. The remaining part of the evening was given to general informal discussion on various matters which seemed to be well enjoyed by all.

Reports this month are very few, although most stations seem to be active. G2XV has added a reflector on the east side of his semi-vertical Windom and reports a definite increase of at least one to two

" S " points all over U.S.A. and Australia—tests are soon to be made with the addition of a director.

At Peterborough, G2NJ continues with his aerial experiments and hopes soon to have some useful information for the BULLETIN. 2UQ and 3DY built the transmitter for the 7 Mc. N.F.D. station and made a truly portable job of it. It certainly did its job very well, as also did the receiver constructed by 3BK.

Bedford can boast another full ticket and our congratulations go out to Mr. Jeakings, the T.R., whose call is now G5FO (ex-2AWH), and is to be heard already putting out a nice signal on 7 Mc. 'phone.

It is interesting to report here that the 1.7 Mc. N.F.D. station in this district actually logged W8QLX on C.W. and were reading this station RST 579 on the speaker ! !—time, 03.25 G.M.T.

DISTRICT 9 (East Anglia).

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

District Scribe.—F. L. C. Firmin (G5QO), 2, Hall Park Villas, Oulton Road, Lowestoft, Suffolk.

Town Representatives :—

Ipswich.—S. G. Keeble (G2AN), 139, Sidegate Lane.

Lowestoft.—R. Tunney (G8OD), " Kelley Bray," Colville Road, Oulton Broad, nr. Lowestoft.

Norwich.—A. G. Parker (6QZ), 84, Cecil Road.

It appears that the last paragraph of the June notes was taken rather too seriously, for only one written report has been received.

Ipswich.—Stations active include G8MU, 8IS, 6TI, 2JD, 8KB, 8AG, 8CU, 2DT, 8AN and 2AN.

Norwich.—Stations active, G2MN, 2UT, 8VW and 6QZ. The latter is testing most evenings on 56 Mc. between 22.00 and 22.30 B.S.T. A horizontal transmitting aerial is used.

Lowestoft.—G5QO is testing on 56 Mc. most Friday and Saturday evenings between 22.00 and 22.30 B.S.T.

Mr. W. F. Wilson (BRS2317), who will be staying at Gorleston-on-Sea until September 17, can be reached c/o J. H. Squire Celeste Orchestra, Beach Gardens. He will be pleased to make the acquaintance of members who would like to pay him a visit.

DISTRICT 10 (South Wales and Monmouthshire)

District Representative :

Austin Forsyth (G6FO), 29, Stow Park Avenue, Newport, Mon. (Tel. 4498.)

Town Representatives :

Newport.—R. V. Allbright (G2JL), 2, Palmyra Place.

Cardiff.—H. Phillips (2BQB), 132, Clare Road, Grangetown.

Blackwood.—W. F. Mudford, 3, Albany Road.

Pembroke.—Capt. G. Courtenay Price (GW2OP), The Mount, Pembroke Dock.

What matters most this month is N.F.D. news, and here it is :—

Newport.—G2JLP on 1.7 Mc., with 3AJ to assist and 2CDM, 2DBO and 2DHM as helpers, put on 91 points for 39 QSOs. Two foreigners were worked in OZ2PX and F8RJ, and the transmitter was a battery-operated CO-PA, using a single twin-triode RK-34 and a straight receiver. A most creditable performance, the only mishap being to 2JL's face ; in true pioneer fashion, he shaved with a rusty razor. Then a frog electrocuted itself on the H.T. batteries.

Swansea.—GW5KJP on 3.5 Mc., with 2UL, 3AX, 5FI, 5ZL, 6GJ, 6JW and 8HI, made 130 points for 53 contacts, which fully justified the selection of the 3.5 Mc. site. Best DX was the HB portables, using a CO-PA run from a machine, with 5KJ's AGSX receiver. The weather was not too good for them, and the general feeling may be summed up as " Hard work for every point." And well done.

Blackwood.—The Blackwood Group, operating GW8CTP on 7 Mc., with 2NG, 6BK and 8PU, assisted by 2BG, 2BAQ and others, once more covered themselves with glory by filling the score sheets. 74 contacts knocked out 172 points, though no actual DX was worked. The transmitter which so successfully overcame the QRM was a 6L6-T20, with 20 watts from generators, and a straight receiver. A potent remark in 8CT's report runs as follows : " General disgust at G warblers into mikes ; clear 7 Mc. of 'phone or leave it out of the Contest in future years." What say, somebody, please. Ercha. And we all agree. What about 1.7 Mc. in 1939, Blackwood ! !

Cardiff.—GW5BIP on 14 Mc., with 2XZ, 8AM, 8NP, 8UH and 8WU, together with 2BQB, 2CPA and other AA helpers, gave us 154 points for 53 QSOs, best DX being a W5, while SU1A contributed a nice-looking " 10 " to the score. This was a fine effort on Cardiff's first 14 Mc. outing, especially in view of the fact that they made a somewhat slow start ; conditions were for them very bad from 03.00 to 07.00. The transmitter used was a 6L6-T.20, run from a converter, and a 1-V-1 receiver. We cannot forbear to mention that the location chosen was in the next field to a popular camping ground, but the inevitable QRM did not appear to affect the result ! Or was that why things were flat from 03.00-07.00 ?

The District total for N.F.D., 1938, therefore stands at the highly respectable figure of 547 points, and the D.R. would like to thank, on behalf of the District, the charge-operators, assistant operators and those many unnamed helpers who put in a lot of hard and thankless work to make our participation the success it was.

DISTRICT 12 (London North and Hertford)

District Representative : S. Buckingham (G5QF), 41, Brunswick Park Road, N.11.

District Scribe : A. W. Hartley (G3MS), 35, Essex Park, N.3.

Area Representatives :

Area 1.—L. Gregory (G2AI), 71, Uphill Grove, Mill Hill, N.W.7 ; Church End, Finchley (N.3), North Finchley (N.12), Whetstone (N.20), Hendon (N.W.4), Mill Hill (N.W.7), The Hyde (N.W.9), Golders Green (N.W.11).

Area 3.—N. Haskins (G8JR), Dancers End, Fitzroy Park, N.6 ; Islington (N.1), Finsbury Park (N.4), Highbury (N.5), Highgate (N.6), Holloway (N.7), Stoke Newington (N.16), Upper Holloway (N.19), Camden Town (N.W.1), Kentish Town (N.W.5).

Area 4.—A. J. Mathews (G6QM), 74, Hawthorn Road, Hornsey, N.8; East Finchley (N.2), Hornsey (N.8), Muswell Hill (N.10), S. Tottenham (N.15), Tottenham (N.17), Wood Green (N.22).

Area 5.—P. Solder (G5FA), 35, Torrington Gardens, New Southgate, N.11.; Lower Edmonton (N.9), New Southgate (N.11), Palmers Green (N.13), Southgate (N.14), Upper Edmonton (N.18), Winchmore Hill (N.21).

Town Representatives :

Potters Bar : R. Pidsley (G6PI), 118, Mimms Hall Road, Potters Bar.

Welwyn : J. Hum (G5UM), "Byeways," The Drive, Welwyn.

Watford : H. Gibson (2BUP), 50, Oundle Avenue, Bushey.

Thirty-one members attended the last of the season's meetings held at the Orpheum Cinema on Friday, June 17. The programme took the form of a chat by the four chief operators of the N.F.D. stations on their experiences during the previous week-end. It may be of interest to those who could not attend the meeting to know that the District was able this year to meet all expenses in connection with N.F.D. out of funds in hand.

DISTRICT 16 CONVENTIONETTE

SUNDAY, JULY 24, 1938

at

ADELPHI HOTEL, WARRIOR SQUARE, HASTINGS

Assemble	12 noon.
Lunch	1 p.m.
Short business Meeting ...	2.30 p.m.
Tea	4.30 p.m.

Charge 5s. inclusive. Reservations to Mr. W. H. Allen (G2UJ), not later than July 19. Car parking facilities near Warrior Square Station.

The proposed picnic has been cancelled, as it has been found impossible to fit in a suitable date during July, owing to other society activities.

News from individual members is scarce, and this can perhaps be put down to the approach of the holiday season. The District Scribe has relinquished the call of 2BTZ for G3MS, and will shortly be heard on the air on 7,055 and 14,110 kc.

Meetings will be resumed in September, notice of which will appear in the BULLETIN.

DISTRICT 13 (London South)

An Area meeting was held on June 23 at West Norwood, and the D.R. regrets that he was unable to attend. A few remarks on the subject of N.F.D. would now seem to be appropriate. It is very unfortunate that the District was not able to secure a higher position in the contest, but this was mainly due to the low scoring of the D.R.'s own station, G2WVP. It is, however, satisfactory to feel that the trouble lay, not with any member of the District, but to the very unfortunate way in which we were failed at the last minute by the suppliers of the H.T. accumulators, although arrangements had been made months previously. Indeed, had it not been for the extreme perseverance of G2JK, we should have faced the major catastrophe of not beng on the air at all. We would like to thank 2JK most heartily and also his father, Mr. Ilott, who made a double journey all the way to Westerham and back, with 300 volts of accumulators, around midnight. District 13 stands very much in his debt and we offer him our sincere thanks. The other three stations did remarkably well and all credit is due to those who were responsible—namely G2CX, 2GZ and 2UX. G2RC again did splendid work at G2CXP.

Tooting and Balham Area.—The same members took part in N.F.D. at the Dulwich Station as last year, with the exception of 2GZ, who was at Eltham. G3CU and 3DF also assisted at Eltham. Thanks are due to 2JB, 5PY, 6AN and 6HM for supplying and erecting masts, gear, tents, etc. 3CI and 8LQ also were of great assistance. 2UX was unlucky to be on the sick list up to the Friday, but in spite of this was present and did excellent work during the event. Thanks, OM. All the usual members of this area are active and 2UX mentions that he will be operating, chiefly on 7 Mc., near Norwich, from July 21 to August 21. He has had a portable station operating for two week-ends on 7 Mc. telephony and C.W. at Westerham Hill, Kent, and has been comparing the radiating properties of various aerials which he finds it impossible to erect at home.

Blackheath Area.—Thanks are due to G2GZ for his successful handling of the 3.5 Mc. N.F.D. station at Eltham also to 8WO and his wife for their very kind efforts and hospitality. We fear that 8WO must be very much out of pocket, but we trust that we shall be able to put the matter straight in the near future. We were sorry not to have the pleasure of seeing G2ZQ at N.F.D. this year; this was due to his hurried departure to Scotland on business.

G2YG and 3GU are preparing for experiments on the 56 Mc. band.

DISTRICT 14 (Eastern).

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

Town Representatives :

Brentwood : M. B. Edwards (G3MV), "Upwey," West Park Hill.

Chelmsford : L. J. Fuller (G6LB), 85, High Street. Tel. : Chelmsford 2079.

East Essex : C. J. Greenaway (G2LC), 24, Percy Road, Leigh-on-Sea.

East Essex.—There was an attendance of 19 at the June meeting held at G2UK, Eastwood, including G2WG, 2CIH and 2CRJ from the Brentwood area. G2SO who, with a score of 558, won the local QRP test, was presented with a voucher for radio goods. Next in order of merit were G2LC, 5XI, 6IF, 8RT, 2KH, and 5VQ. During the week G2SO worked 62 stations from 9 countries on 7 Mc., with an input of 3 watts. It is hoped to

arrange a similar test towards the end of the year. The morse recorder which has been constructed by G2UK was the object of much interest at the meeting and a demonstration was given in the recording of signals from HAS and JNJ. The attendance at the N.F.D. station, G5UKP, was 43 —including visitors. Thanks are due to all those who put in such efforts to make it a success. We are pleased to welcome 2ALH of Laindon as a new member.

East London.—There was only a moderate attendance at the June meeting held at 2DJI, Chingford. G8RT from Laindon attended. During N.F.D. G8AB was assisted by 2DHD, 2ANB, BRS3114 and 3270, visitors included G6CT, 5XI, 6SG, 2DJI, 2CID, 2BRR and the official photographers. At station G6UTP assistance was rendered by G2SO, G6AH, 3AI,8JM, 2DHA, 2CD, 2CID and 2XP. Amongst the many visitors were G2SA, 2XG, 5DA, 5XI, 6CT, 6TX, 6SG, 2DBC, 2ANB. Thanks are due to Mr. Rowe and the Misses Rowe for the site and for the catering arrangements respectively.

Brentwood.—The T.R., 2ALX, has received his full permit and is now working as G3MV. The Brentwood Amateur Radio Society are holding a "Hamfest" on Sunday, July 24, at 5.30 p.m., at the "Home Kitchen," Crown Street, Brentwood.

Chelmsford.—G5RV, 3BS and 2KG are active on 14 Mc. The former is erecting a rotating aerial on a 30-ft. tower, G6LB has completed his new tramsnitter and will be on the air again after four years' silence; a pirate has, however, kept his call sign warm and is now requested to choose another! The N.F.D. station was abandoned owing to lack of assistance—apparently local members were not interested in the 1.7 Mc. band!

DISTRICT 15 (London West, Middlesex and Buckinghamshire).

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

Town Representatives:

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

North Middlesex: J. Hearn (G8MA), 47, Eversley Crescent, Ruislip.

South Middlesex: F. C. Crocker (G2NN), "Deepside," 17, Cross Deep, Twickenham.

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

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

The June meeting was attended by 30 members. Thanks are due to all who helped and to Mrs. Bradley, who carried out the refreshment arrangements. This was the last meeting of the season and the QRA for the next (September) will be announced later.

N.F.D. was a great success all round, and we are now hoping the District's score will put us well in the running for the trophy.

This month we lose one of our oldest members in Mr. G. Exeter (G6YK), who has gone to Portsmouth. In a letter to G6WN, he wishes the District success in the future and admits that he will miss his connection with future N.F.D. events. He left a really nice memento to the District—the generator used at N.F.D.—a gesture much appreciated. We wish him every success for the future.

West London.—G8WR building 56 Mc. gear, also getting ready for 28 Mc. G3GY and 8KZ active on 14. Later also on 56 Mc. G6CO erected a 1½ wave 14 Mc. aerial fed doublet fashion in 1st ½ wave and this is working fairly well. BRS3227 wishes to know of member studying moon effects, and will welcome any auroral or sunspot notes. (Try R.E.S.—Ed.)

South Middlesex.—G3JG active on 14 Mc., using ½ wave doublet; G2KI active on 56 Mc.

North Middlesex.—G6LJ, using 33 ft. dipole with improved results. Asks who phone station D9A is, heard working TT6SN. G2IM, who sends his first report, has rebuilt for accessibility after getting into "difficulties" making adjustments.

DISTRICT 16 (South-Eastern).

District Representative W. H. Allen (G2UJ), 32, Earls Road, Tunbridge Wells, Kent.

Town Representatives:

Eastbourne: F. E. Wingfield (G3CX), 14, Gore Park Road.

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

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

Medway Towns: J. E. Bryden (2BOL), 24, City Way, Rochester.

Whitstable: W. Crossland (G5CI), 13, Queen's Road.

The above is a list of those who have been *officially* elected and registered with the Society as T.R.'s for 1938. As pointed out in these notes in January, T.R.'s have to be nominated or re-nominated each year, and we regret to say that certain town groups have still not sent in their nomination forms, with the result that although they have a member doing the work of a T.R., he cannot be recognised as such by the Society and consequently does not receive the monthly T.R. Circular. Will all these "border-line" T.R.'s *please* see to it at once that they are correctly registered?

May we remind members that the list of those who propose visiting Hastings on July 24 for the Conventionette is still open? The D.R. will be pleased to hear by the 19th from all who intend being present.

The following are the scores made by the District during N.F.D. These are, of course, subject to confirmation. 1.7 Mc., 78; 3.5 Mc., 113; 7Mc., 148; 14 Mc., 202. All concerned are heartily thanked for their co-operation.

Eastbourne.—The following stations are active :—G2AO, 3CX, 5BW, 5IH, 8CP, 2AVQ, 2BPB and 2CNO. We have pleasure in welcoming BRS3293 to the District.

Gravesend.—G6BQ gave a talk on "Valve Keying Circuits" at the meeting on June 20. 3GP—the Club portable 56 Mc. station—was entered for the 56 Mc. Field Day, and activity on the band is represented by 2IZ, 2TN, 5IL, 6GP and 6VC. Other stations active are :—2KL, 3HU, 5SU, 6BQ, 8HK, and 2BDL.

Heathfield.—Activity :—5JZ, 2BRI, 1173 (56 Mc.). 5PN, 5PR and 2CJZ. VK5RN recently visited the Group.

Medway Towns.—The D.R. visited the Chatham meeting on May 31. and gave a short talk on his 56 Mc. receiver. 2BOL's signal generator was also inspected. This instrument is one of the finest pieces of amateur constructional work so far seen, and it is hoped to exhibit it on the Society's stand at Olympia.

Whitstable.—Activity, apart from 3BD, 5CI and 2BBT, is low, but it is satisfactory to hear that an outbreak of unlicensed transmission which was noticed around Whitstable recently has now subsided owing to action on the part of the Post Office.

Chichester.—On June 15, 2BGH demonstrated his home-constructed television receiver to the Club. The quality of picture was excellent, and the subsequent lecture was voted the best so far delivered to the " West Sussex." Active :—2PF, 2ZV, 5PF and 2DDD.

Brighton and Hove.—The Group are going ahead with 56 Mc work, and have purchased a 28 Mc. crystal for the Club transmitter, G8OQ. This station works portable on 56 Mc. from time to time, and reports will be appreciated. Activity :—3JF, 6CY, 6RM, 8OQ, 2CIA, 2CTO, 2DGR, 2DYC. Congratulations to 2AKS on getting his full call, G3KJ.

Tunbridge Wells.—Active :—G2UJ, 5KV, 6OB, 2AKQ.

DISTRICT 17 (Mid-East).

The D.R. regrets that owing to indisposition the District Notes for last month were not sent forward in time for publication. He also wishes to thank all members for the co-operation and hard work put into N.F.D. It was hoped to hold a District meeting in the early part of July at Skegness, but arrangements could not be made in time. The first date available was the 10th, which, unfortunately, clashed with the P.D.M. at Cambridge. In view of this, it is proposed to hold a meeting later. T.R.s will be informed of final arrangements in due course. The D.R. and all members in the District join in expressing their sympathy with G5CY in the loss of his mother.

Lincoln.—G5XL has renewed his licence, which had been in abeyance owing to the difficulty of operating at his new QRA. He hopes to be active soon. 2CFT also reports.

Horncastle.—Members will be pleased to hear that 2AAS is now well on the road to recovery after his illness and has turned his attentions to amateur radio once again.

Grimsby and District.—The following stations all report active : G2QA, 2VY, 5GS, 6AK, 8PV, 8CI, 2AZH and 2BXG.

Northern Ireland

District Representative.—J. A. Sang (GI6TB), 22, Stranmillis Gardens, Belfast.

District Scribe and Town Representative :—

Belfast.—S. N. Johnson (GI5SJ), 10, Cyprus Avenue, Belfast.

For the first time, and with some considerable trouble, GI ran four stations during N.F.D. this year. GI5HVP on 1.7 Mc. was located within earshot of the Belfast Zoo, but its night noises were the nearest we got to B.E.R.U. conditions ! Best DX worked was Paris.

GI5SJP, on high ground south of Belfast, made its mark on 3.5 Mc. ; though W's were heard they could not be raised.

GI5URP, situated on the famous Craigantlet hill-climb slopes, had about as beautiful a site as one could imagine, with Belfast lying in the valley below and the first two stations almost within sight. GI5QXP was situated at Portaferry, where an old windmill stump supported one end of the aerial. During the night the wind almost wrecked the tent and an embroidered verbal S O S was sent to all not on duty. This station was WAC in the first two hours. Conditions, while not really good, were very much better than last year, though only one W station was contacted.

N.F.D. opened in a downpour of rain which continued with varying degrees of intensity until Sunday morning, when the weather changed to " Sunny." Past experiences proved helpful, and the uncomfortable weather did not reduce efficiency. The crews of all stations thoroughly enjoyed the event and nothing very outstanding occurred, good or bad. More lessons were learned, however, and next year should see an even better representation from GI.

One of the first stations contacted on 1.7 Mc. gave an S7 report and added " but here QRP hi ! " Any innuendo intended by this remark was equally deprecated and ignored, and it is mentioned only that such things may be avoided in future.

GI5UR is active on 14 Mc., but nothing startling to report. 8LF awaits confirmation from VK for WAC on 10 watts. He was recently QSO using 8 watts, with LU4DQ using 5 watts. VQ2 and VQ3 were new countries for 6YW, who is now using a two-section co-linear aerial ; new States are coming in slowly now. GI3FH, Methodist College, Belfast (operator, GI8PA), is doing well with 6L6 into 6L6 on 220 volts D.C.

A well-attended District meeting was held at Thompson's Restaurant, Belfast, on June 24, and the feeling was expressed that such meetings should be held four times a year. Notice of the next will be given in the appropriate " Forthcoming Events " in the BULLETIN.

Scotland

Hon. Scottish Records Officer :
James Hunter (GM6ZV), 51, Camphill Avenue, Langside, Glasgow, S.1.

" A " District, comprising Glasgow and the Counties of Renfrew, Lanark, Dumbarton and Argyll :
D.O. D. M. J. Tyre (GM5TY), 71, Waverley Street, Glasgow, S.1.

" B " District, comprising North of Scotland, Aberdeen, etc. :
D.O. D. W. Milne, junr. (GM6BM), 37, Harcourt Road, Aberdeen.

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

" D " District, comprising Edinburgh and Midlothian, etc. :
D.O. S. W. Rowden (GM6SR), " Rosebank," Pilrig Street, Edinburgh.

" E " District, comprising counties of Ayr, Dumfries, Wigton and Kirkcudbright :
D.O. Hugh McConnell, junr. (2ACQ), " Ashgrove," 23, Carrick Road, Ayr.

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

" G " District, comprising Borders :
D.O. D. S. Bruce (2CXZ), 39, High Street, Galashiels.
" H " District, comprising Fifeshire, etc. :
D.O. A. W. Lawson (2ANL), " Makora," Kinghorn, Fife.

As this is being written considerably earlier than usual owing to holidays, news is somewhat scarce, this also applies to news regarding N.F.D., which event was just over at time of writing.

" A " District.—The many friends of G6ZX, one-time D.O. of the District, will be interested to hear that he has received an appointment in Singapore. Weather during N.F.D. was considerably better, compared to last year, although several hours of rain were experienced. Conditions were poor, 14 Mc. in particular being disappointing, no DX of note being worked.

" B " District.—In spite of adverse weather conditions, N.F.D. proved as enjoyable as ever, and thanks are due to all who helped. The portable transmitters were on view at a recent meeting, at which also 56 Mc. apparatus was demonstrated by GM2OX.

The following stations are active : GM6ZP, 5LF, 8SV, 6BM, 5YN. The latter has accomplished some fine QRP work. 2AJB now awaits his Morse test.

Congratulations are due to GM6IZ on his appointment as chief radio engineer to the Aberdeen Police.

SCOTTISH CONVENTION, 1938

SUNDAY, SEPTEMBER 18

AT

GRAND HOTEL, CHARING CROSS, GLASGOW

Assemble	12 noon.
Lunch	1 p.m.
Business Meeting	2.30 p.m.
High Tea	5 p.m.

All reservations to Mr. J. Hunter (GM6ZV).
Tickets, 7s. 6d., are now ready.

" C " District.—The District have the distinction of making by far the highest score of any 14 Mc. GM station, and also the highest individual score on any band. DX, while not plentiful, included W2, 3 and 8, K5, ZB1, LU2 and ZC6.

" D " District.—The district found conditions on 14 Mc. poor, U9ML representing DX. 7 Mc. was found fair. The last meeting for the season took place in the Peacock Hotel. All stations active, including GM2SP, 2ZN, 3BA, 3BZ and 5HL. GM6SR has received notice of change-over to A.C.

" E " District.—Reorganisation of the district is proceeding satisfactorily, and the D.O. has received welcome offers of help from several members.

2BIK, BRS1295 and BRS3198 all report active.

A circular letter is being issued to the members of the district within a few days, and the D.O. will welcome comments on the proposals contained therein.

" F " District.—7 Mc. was used exclusively by the District's N.F.D. station.

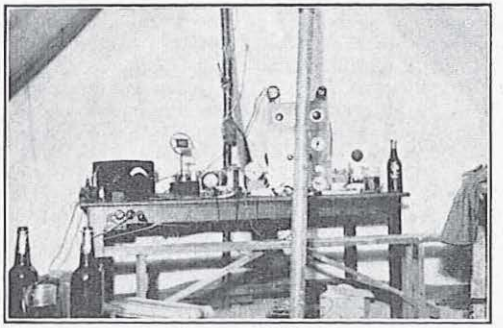
" G " District.—Three stations were active during N.F.D., no DX, apart from the two SU portables, was worked.

" H " District.—A considerably improved score over last year was made.

Egyptian Notes

Most of the members have either left or are on the point of leaving the country for the summer period, so few details of activity are to hand.

The outstanding event of the past month was, of course, N.F.D., when the Alexandria and Heliopolis groups were active. Conditions were fair.



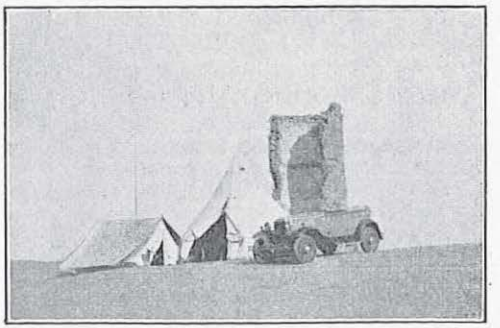
Gear—and Beer.
A flashlight photograph of SU1H taken during N.F.D.

SU2TW will now be QRT on 28 Mc. until such time as a detector valve is obtained which will oscillate smoothly on this band. The original met with an accident during the Field Day, and so far not one of forty valves tested has been found suitable as a replacement.

Heavy QRN has drowned all but the loudest signals on 14 Mc., although eastern DX has been coming in well. No details of conditions on 28 Mc. are available.

SU1HB is spending a short time in ZC6 before proceeding to England. We wish him the best of luck in his new QRA. It is also hoped that our members on vacation in Europe will enjoy themselves and have many personal contacts with other friends of the ether.

SU2TW.



Napoleon's Watchtower, Suez Road, Egypt.
The site of SU1H operated by the Heliopolis Group during N.F.D.

BRITISH EMPIRE NEWS AND NOTES

British West Indies (Eastern Group)

By VP2AT

Amateurs in Antigua are greatly perturbed over the fact that in future the current supplied for working radio receivers and transmitters will be metered. In the past we have had a reasonable flat rate. Objection is naturally raised as power is charged at the rate of 1s. 3d. per kW. hour.

A Morse practice schedule on 7 Mc. has been arranged by VP2AB and 6TR on Sunday afternoons for the benefit of stations in this Group. Each station participating takes it in turn each Sunday to do the sending.

Again this year VP2AD has arranged schedules with CLX for the exchange of weather reports during the forthcoming hurricane season.

Canada (Fifth Division)

By VE5GI.

Conditions on 14 Mc. have been poor for Europe. VK, ZL and Asian stations have been coming through well and a few African stations have been heard. VE5VO is very active on 14 Mc. 'phone and is anxiously awaiting a QSL from G to complete his WBE. 5GI is rebuilding his station and hopes to be on 'phone shortly. 5BF, 5EF are working DX on 14 Mc. 'phone. VE5EO, 5KC, 5GQ, 5UI, 5RT and 5QA are all active on 14 Mc.

News of activities would be appreciated by the writer in order to make these reports a regular feature.

Personnel at SU1H.
SU2TW, extreme left; SU1SW, third from left; SU1GT, extreme right.

Eire

By EI9D.

At the Annual General Meeting of I.R.T.S. held in Dublin, on June 8, the undernoted officers were elected unanimously for the Session 1938-39 :—

President : Mr. W. McIlwaine (EI9F).
Vice-President : Mr. R. Sadlier (ex-EI4D).
Hon. Treasurer : Mr. T. Green (EI9N).
Hon. Secretary : Mr. P. Murtagh (EI5N).
Executive Committee : Messrs. W. H. Coombs (EI6J), H. Hodges (EI5F), R. Martin (EI9L), F. O'Brien (EI6N), A. Woods (EI3L).

The recent alterations in regard to B.E.R.U. rendered necessary a motion to seek affiliation under the new scheme. This was duly carried.

EI put up a good show during N.F.D. and although we have not yet won the trophy, results and reports show that there was good co-operation and plenty of enthusiasm. For the first time we had competing portables located other than in Leinster. EI8MP in Co. Cork and EI9DP in Co. Sligo represented Munster and Connaught respectively, thus covering effectively the whole of Eire. All stations were in operation continuously over the full 24 hours and, when it is remembered that EI8MP had but three operators and EI9DP only two, it will be seen that some hard work had to be done. We are very pleased indeed that Cork found it possible to run a station. They put up a very good show and we hope to have their able assistance again next year.

To all our friends in Dublin, Cork and Sligo who, in one way or another, helped us in connection with N.F.D., we record our very best thanks.

Congratulations to BERS406, Mr. W. Watts, Barrow Cottage, Athy, Co. Kildare, who is now EI3P.

Malta

By ZB1E.

Summer conditions have set in rather rapidly this year, with consequent static and deep fading, which commences late in the afternoon and continues for some time after sunset, gradually clearing up when, at about midnight, conditions become quite good and DX can be worked. The 28 Mc. band is practically dead.

At the June General Meeting it was decided that, as in the past, the monthly meetings are to be suspended during July, August and September. The first General Meeting after the recess is to be held on Wednesday, October 5. All members will be notified in due course.

ZB1J is leaving for England on leave, and we are sorry to be losing ZB1T, who is leaving for good. We wish him the best of luck.

ZB1W has been issued to BERS438, and ZB1X to Mr. L. A. Dedman. As it is believed that in the past the call ZB1X has occasionally been used by unauthorised persons in or around the island, it will not be out of place to point out that this is now an official call, and that it is to be treated as such.

New Zealand

By ZL3AZ.

Winter in this part of the world has brought with it the usual poor conditions for high frequency work. One way of looking at it is that it allows us to put in the cold winter evenings making any necessary alterations to the transmitter, and, in general, "hotting it up" for the forthcoming DX season. ZL1GX seems to be leading out here as regards countries, with 106 to his credit.

The President of N.Z.A.R.T., Mr. L. G. Petrie, ZL2OV, has just returned from a trip to Australia, where he attended the World Radio Convention

at the invitation of the W.I.A. According to reports, the trip was well worth while, and several important points have emerged as a result of his trip. Thanks are due to the Australian amateurs for the magnificent manner in which they entertained our representative.

28 Mc. has definitely gone out for the season, until the return of our summer. More general interest is apparent in the higher frequencies, although no outstanding work has yet been carried out. This phase of activity has been sadly neglected over here, and it is pleasing to see interest being taken at last.

Northern India

By VU2AN *via* G5OV.

Summer conditions are now the order of the day, and evening DX is practically nil, the bulk of contacts being with Europe. N.F.D. was disappointing in India and few contacts were made, although most stations were on the lookout for the portables.

AC4YN is using a 35T crystal oscillator, and contemplates the erection of a W8JK beam for G when the rains finish. VU2EO is getting over well to Europe. He heard four G portables during N.F.D., also VQ3HJP (557) and SU1A (569), but no contacts were made. He has received details of the newly formed Royal Air Force A.R.T.S., and will supply same to any R.A.F. member interested. He reports Russian commercial QRM at the H.F. end of 14 Mc.

VU2AN erected a W8JK beam for work with G, but later had to search the countryside for the bits owing to the efforts of an outsize in monsoon storms! He has at last contacted LU and CE for WAC, and would appreciate schedules with VE stations early morning Canadian time. He contacted two N.F.D. portable during an all-night session, with BERS371 as second op.

Most VU stations are active, but only one report. What about a postcard, OM?

South Africa

Division Six.—We are now experiencing our winter season, and consequently much of the local amateur activity has fallen into abeyance, especially in the DX field. Even those who in desperation put up the power to 50 or 100 watts, do not appear to have been very much more successful than low-power stations.

ZS6BL has taken advantage of the off-period season, and has confined himself to building a three-stage transmitter, which he will operate on the advent of better radio conditions. 6EN is engaged in collecting QSL cards from ZS amateurs, and states that DX, for the present, does not bother him! 6DM's phone is audible on 14 Mc., and he makes regular contacts with VQ2PL.

ZS6T has been experimenting with a Johnson Q on 28 Mc. Reports received show that it is an efficient aerial, as compared with those of more conventional design. 6DZ has contacted a number of ZE1 and CR7 amateurs, many being old acquaintances.

Members are reminded that reports must reach Box 4020, Johannesburg, not later than the 20th of each month.

ZS6DZ, ex-ZU6V.

Sudan

By ST2CM *via* G6ZO.

Air Ministry sanction having been obtained, ST2CM and ST6KR are now active again.

As only one station is authorised, they are running co-jointly.

DX worked since the middle of June includes HS1BJ, ZD2H, and J2JJ, and large numbers of W's.

ST2LR is now in Cairo, having been commissioned as Signals Officer.

News from Trinidad

We are informed that Douglas Gordon Bagg (ex G6BD), is now licensed as VP4TO. He is operating on 7165 and 14,330 kc. and hopes to renew friendships with many British Isles stations.

During the early part of June he logged c.w. signals from G2DK, 2ON, 3GH, 5BJ, 5JO, 5ND, 6BV, 8IP, and 8WC. We hope to publish a full description of his station in an early issue. Mr. Bagg informs us that VP4TM has also recently been licensed. He is at present working on 7 Mc., but expects to be on 14 Mc. at an early date.

Book Review

PRINCIPLES OF RADIO. Third Edition. By Keith Henney. 495 pages and 311 illustrations. (Published by Chapman & Hall, London. Price 17s. 6d. net.)

Eight years ago the writer first reviewed this book, and since then many printings have been made. One may say that it is already well known, but the rapid advances of radio technique have made necessary a large degree of rewriting and the addition of much new material.

The present edition is well up to date, as the inclusion of such subjects as television, grid-controlled rectifiers, automatic frequency control, noise-suppressor systems, "beam" valves, etc., will show.

The book may be considered as an introduction to radio engineering, and as this subject is largely high-frequency A.C. work it is necessary that the radio engineer, amateur or professional, should understand thoroughly such circuits and phenomena. The first eight chapters lay a very sound foundation of electrical theory. Many calculations are set out in detail, and the illustrations are profuse and commendably helpful. At the end of many of the chapters a number of problems are given, but, as in many American texts, the usefulness of these is reduced by the absence of solutions with which the reader may compare his own.

The book covers the many and varied branches of radio in a very sound way; the author leaves out all consideration of confusing detail and phenomena, and deals with the broad principles in a very simple but solidly engineering way. The calculations are at no time more complicated than "workshop arithmetic," and the examples and illustrations deal in most cases with practical problems and well-known valve types.

The previous editions of this book were easy to read, interesting, and practical. The present edition will enhance the book's good reputation.

T. P. A.

INDEX TO DISPLAYED ADVERTISEMENTS

QRA Section

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

When sending in new, or changes of QRA, 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

G2AU.—A. A. DEVEY, The Crest, Oxbarn Avenue, Wolverhampton, Staffs.
G2KQ.—R. CAVE, 9, Cannonsfield Road, Welwyn, Herts.
G2KT.—J. E. NICKLESS, "Khan Yunis," Daws Heath Road, Rayleigh, Essex.
G2QL.—H. J. K. CLEMENTS, 16, Lynton Road, Chingford, London, E.4.
G2VQ.—(G2VR) H. B. OLD, "Avonholme," Papplewick, Nottingham.
G2YT.—F. J. RUMARY, "Rylstone," Grange Road, Bishopsworth, Bristol.
G2ZN.—D. P. Joseph, c/o Bank of New Zealand, 1, Queen Victoria Street, London, E.C.
G3DW.—R. M. BANGAY, R.A.F. Station, Driffield, Yorks.
GM3HX.—E. W. STEWART, 4, Craiglochart Place, Edinburgh, Scotland.
G3IT.—R. C. S. REID, Imperial Airways, Hythe, Southampton, Hants.
G3IY.—J. POLLARD, "Southfield," Manchester Road, Burnley, Lancs.
GM3JL.—JOHN STEPHEN, 168, Kenmure Street, Glasgow, S.1, Scotland.
GI3JP.—WM. J. WILSON GUY, "Firgrove," Fintona, Co. Tyrone, N.I.
G3JW.—E. G. BRIGHT, 44, Weald Road, Brentwood, Essex.
G3JY.—K. ABBOTT, 79, Marsden Road, S.S. Blackpool, Lancs.
G3KJ.—K. D. JACKSON, "Selbourne," Hangleton Road, Hove, 4, Sussex.
G3KL.—C. LANCASTER, 12, Stanley Road, Lytham, Lanc .
G3KP.—W. R. SMITH, 15a, Winton Drive, Croxley Green, Rickmansworth, Herts.
G3KR.—J. W. CLENNETT, 20, Trafalgar Terrace, Darlington, Co. Durham.
G3KT.—E. A. THOMAS, 231, Manchester Road, Burnley, Lancs.
GI3KV.—W. C. F. TAYLOR, 2, York Crescent, Shore Road, Belfast, N.I.
G3KW.—S. E. NEWBY, 17, St. Andrew's Chambers, Wells Street, London, W.1.
GW3KY.—I. JONES, Brixton Mount, Holyhead, N. Wales.
G3LA.—G. L. TURNER, 65, Warley Hill, Brentwood, Essex.
G3LB.—A. R. YATES, 22, Brook Lawn Drive, Withington, Manchester, 20.
G3LF.—D. J. ROBINSON, c/o Mrs Thomas, 28, Thirlmere Avenue, Stretford, Manchester.
G3LJ.—MRS. GLADYS M. SALTER, Firbi, Dry Sandford, Abingdon, Berks.
G3LK.—H. G. P. WILLIAMS, 28a, Brunswick Square, Hove 2, Sussex.
G3LM.—L. MUNDEY, "Fernleigh," Fetherston Road, Stanford-le-Hope, Essex.
GM3LO.—PETER GOURLAY, 75, Woodside Avenue, Rosyth, Scotland.
G3LP.—N. F. O'BRIEN, 31, Brunswick Street, Cheltenham, Glos.
G3LR.—H. CLARKE, 126, Atlas Street, Clayton-le-Moors, Accrington, Lancs.
G3LX.—H. P. ARMFIELD, 7, Hurst Lea Road, New Mills, near Stockport, Cheshire.
G3MD.—R. H. DREW, 22, Benton Road, Ilford, Essex.
G3NF.—D. G. FARQUHARSON, Invercauld, Coombe Rise, Coombe Lane, Kingston-on-Thames, Surrey.
G3MG.—L. MCGLADE, 20, Poolsbrook Road, Duckmanton, Chesterfield, Derbyshire.
G3MO.—S. J. GEARY, Barnlea, Trent Gardens, Southgate, London, N.14.
G5AO.—A. E. LAMBOURNE, 26, Zinzan Street, Reading, Berks.
GM5CL.—M. SHAW, 12, Knollpark Drive, Clarkston, Renfrewshire, Scotland.
G5CW.—E. S. WILSON, 20, Singleton Scarp, Finchley, London, N.12.
G5FK.—FREDK. W. CABLE, 19, Palm Avenue, Footscray, Kent.
G5FO.—H. R. JEAKINGS, "Cliftonville," 2, Cutcliffe Gardens, Bedford.
G5GN.—C. BOWTELL, 49, Beaumont Avenue, Hinckley, Leics.
G5GZ.—G. L. GRISDALE, Flat 4, Baddow House, Great Baddow, Chelmsford, Essex.
G5IS.—PHIL JOHNSON, 42, Kent House Lane, Beckenham, Kent.
G5IX.—W. A. DIX, "Upgate," Swannington, Norwich, Norfolk.
G5NP.—H. E. DAFT, Gloucester Place, Monument Street, Peterborough, Northants.
G5MG.—B. MORRIS, 344, Finchley Road, London, N.W.3.
GM5RH.—DENIS Q. ALDRIDGE, "Oakburn," Lochgoilhead, Argyllshire, Scotland.
G5XB.—S. A. G. COOK, 2, Queen's Avenue, Snodland, Kent.
G6AC.—A. N. LE CHEMINANT, 66, Selborne Gardens, Greenford, Middlesex.
G6FK.—F. T. S. SMITH, 13, Swan Bank, Penn, Wolverhampton, Staffs.
G6GD.—H. EDGE, 2, Green Mount, Stamford Road, Bowdon, Ches.
G6HD.—T. C. HERDMAN, 89, Copers Cope Road, Beckenham, Kent.
GM6XI.—J. WILSON, 52, Macdowall Road, Newington, Edinburgh, 9.
G8AV.—F. G. GOODMAN, "Westbrook," Jail Lane, Biggin Hill, Kent.
G8CV.—H. ATTHILL, Ardvarney, College Road, Heath End, Farnham, Surrey.
GI8DB.—J. T. PINKERTON, High Street, Ballymoney, Co. Antrim, N.I.
G8FJ.—H. S. NORRIS, 17, Charter Road, Rugby, Warwickshire.
GW8JY.—J. M. FLEET, St. David's, Colwyn Avenue, Rhos-on-Sea, Colwyn Bay, North Wales.
G8KD.—G. W. BAGSHAW, "Newfield," Newfield Lane, Dore Moor, Sheffield.
G8KT.—T. D. H. BABER, "Ty-Bryn," St. Ladoc Road, Keynsham, near Bristol.
G8KY.—DR. DENIS G. KENNEDY, Rushmere, Weedon Road, Northampton.
G8SW.—R. S. HENNIG, 7, Francis Road, Eastcote, Middlesex.
G8UJ.—T. C. WHIMSTER, Strathmore, Carleton Road, Carleton, Pontefract, Yorks.
G8UY.—W. HARTLEY, 4, Greenfield Avenue, Starbeck, Harrogate, Yorks.
G8WC.—JAS. S. K. STEPHENS, 65, Ebery Grove, Copnor, Portsmouth, Hants.
2ABD.—D. W. WELLS, Dane Cottage, Knoll Road, Bexley, Kent.
2AGK.—A .G. DUNN, 79, Hayton Grove, Hull, Yorks.
2AIJ.—J. OSWALD DYKES, 5, Sunnyside, Sandown Park, Liverpool, 15.
2AKS.—JOHN SPURGIN, Bartle Frere, Haileybury College, Hertford, Herts.
2ASL.—E. LINE, Green Meadow House, 68, Middle Park Road, Selly Oak, Birmingham, 29.
2AZM.—B. R. EDWARDS, 3a, Elm Parade, Main Road, Sidcup, Kent.
2AZR.—L. S. FRATER, c/o Knowles, 7, Milnar Street, Newark, Notts.
2BNZ.—W. C. FLINTOFF, 27, Eden Street, Saltburn-by-the-Sea, Yorks.
2CMN.—N. WHYVEL, c/o 6, Wellington Street, Lincoln, Lincs.
2DBA.—P. M. S. HEDGELAND, "Hill View," 8, Hayle Road, Maidstone, Kent.
2DBW.—D. SCOTT-JOB, 13, Mayfields Close, Wembley Park, Middlesex.
2DIB.—GEORGE OXTON, 47, Quarry Road East, Lower Bebington, Cheshire.
2DMV.—H. L. OVERTON, 3, Park View, Wotton Lane, Lympstone, Exmouth, Devon.
2DNY.—S. C. ISAACS, 5, Stanway Gardens, Acton, London, W.3.
2DRW.—S. PAYTON, 8, Chard Road, Exeter, Devon.
2DSF.—N. BOOTH, 20, Gordon Avenue, Levenshulme, Manchester, 19.
2DSP.—R. ALLEN, Farndell, Upper Bognor Road, Bognor Regis, Sussex.
2DTS.—A. D. MONKHOUSE, Delgarth, Harpenden, Herts.
2DUN.—G. PETCH, 31, Kenneth Road, Brislington, Bristol, 4.
2DUT.—J. W. GOODLAD, The Doreys, Medstead, near Alton, Hants.
2DUX.—L. BLAGBROUGH, 15, Crowtrees Crescent, Rastrick, Brighouse, Yorkshire.
2DVG.—R. D. WALMSLEY, Gedding House, Bury St. Edmunds, Suffolk.
2DVH.—JOHN STEWART, 27, Bridge Street, Lisburn.
2DVN.—H. L. WILLIAMS, High Beech, Whyteleafe Road, Upper Caterham, Surrey.
2DVR.—W. SINCLAIR, 2, Mount Pleasant Street, Greenock.
2DYH.—D. BROWN, 172, Wellingborough Road, Northampton.
2DYL.—L. CAPLIN, 248, Folkestone Road, Dover, Kent.
2DYU.—W. E. OSTLE, 2, Outgang, Aspatria, Carlisle, Cumberland.
2DYV.—J. OSTLE, 2 Outgang, Aspatria, Carlisle, Cumberland.
2DZL.—E. L. POSTANS, "Swyres," Kingston Crescent, Chelmsford, Essex.
2DZZ.—P. J. LUCAS, "Breaklands," Fivehead, Taunton, Som.
2FAG.—C. R. GREENLAND, 37, Bratton Road, Westbury, Wilts.
2FAH.—K. GREENAWAY, 223, Wolverhampton Road, Cannock, Staffs.
2FAO.—D. E. POSTLE, 53, St. Nicholas Road, Great Yarmouth, Norfolk.
2FAP.—C. R. PERKS, Cross Keys Hotel, Hednesford, Staffs.
2FAS.—A. S. CHAMBERS, 41, Wellington Road, Lancaster, Lancs.
2FBC.—J. G. ROOKE, East Horsley Garage, Epsom Road, East Horsley, Surrey.
2BMV is now BRS373.

R.E.S.—(*Continued from page* 27.)

considerably. It is realised, however, that a certain number are interested in problems independent of frequency—band-switching and variable frequency control to give two examples. A special group will be formed at a later date to which members interested in such problems will be transferred. Will those who would prefer to be attached to this special group please advise the G.M. or G.C. ?

SUNSPOTS—(*Continued from page* 29.)

experienced without any obvious source being visible on the sun.

The sun's period of rotation is about 25 days at the equator and 29 days at latitude 45°. The same spot may therefore face the earth at dates separated by approximately 27 days. Storms will therefore tend to recur at similar intervals, but it must be remembered that few spots last for many rotations of the sun, e.g., all the spots that were visible during the disturbed period at the beginning of October, 1937, had disappeared before the end of December.

Dellinger Fade-out

A brief note on the Dellinger fade-out of April 15 may be of interest. This occurred at approximately 08.45 G.M.T. and was preceded by the "hissing" phenomenon. The generally accepted explanation of these short-period fades is that a penetrating type of radiation from the sun causes intense ionisation of a layer lower than the E layer, thus causing absorption of radio signals due to the relatively great molecular density in the region of the ionisation. This fade-out appears to be associated with bursts of ultra-violet light on the sun. The hiss has not been so closely associated with this type of fade before, but that may be due to the two effects having their "peak" on widely different frequencies. The fade is most noticeable on the longer short waves, while the hiss is most prominent around 30 Mc. It has been suggested that the hiss is due to charged particles arriving on the aerial, but the fact that it is not equally strong on all frequencies suggests to the writer that it is an electro-magnetic radiation possibly caused by the rapid ionisation causing the electrons to vibrate. This particular fade preceded the magnetic storm of April 16 by about 21 hours. Whether the two had any connection is not known, but it will be interesting to notice whether the same events happen together on any future occasions.

In conclusion, any member who has evidence in his log which confirms or disproves any of the theories advanced above is urged to let the R.E.S. Propagation Groups have full particulars.

MONTH ON THE AIR—(*Continued from page* 43)

RFP30 valves and 70 watts suppressor grid modulation for telephony.

2AOU, of Jersey, has now heard 148 countries per the R.S.G.B. list; recent additions were ZD2H, J8CD 14,320, EL2A 14,320 (who has sent a confirmation letter to G6WY). Rarer stations heard include VP4TI 14,260, VP4TK 14,140, VP5BR 14,160, VR6AY (on C.W.), VP7NR 14,130, K6PPR 14,280 and nine VE5's. He mentions that G3GS in Jersey is active on 7,050 'phone—for those who need a new country on telephony. The following Bahamas stations are active and seeking G QSO's: VP7NA, NC, NR, NS and NT. Eric Trebilcock, BERS195, has received a card from ST1AB proving that he was in Dessie, Ethiopia, so that clears up an old mystery. During May, Eric concentrated on British Isles stations and heard over 300, including 1,000 log entries; as he says, "what I don't know about G stations, isn't worth knowing!" He has now reached the "163 heard with 121 QSLs" mark in the country logging business. His best reception included: 7 Mc., VP6TR, CP2PC (QRA ?), K6BAZ-6, HA, SP, YR and D., and on 14 Mc., AC4YN, F7JDY (QRA given as Noumea), OA4U, YU7LX, UK8IA, YM4AD, AS, and TF3C. He has heard the following countries being called, but has not yet been successful in hearing them:—FY8AA, VO6D, EQ4AC, FL8AB, OX2QY, FG8AF, and ZC4AC.

W9KA, the W9 QSL manager, informs us that cards from CE7AA and TF5C arrive infrequently in large batches and nearly every QSO confirmed by them is for over a year past. He wants details of CR6PG, who claims to be in Angola; we can only say he has not been reported by any British station. W9KA would appreciate schedules with stations in I.O.M., Channel Is., Malta and VQ2, 3 and 4. Here is a chance for some kind-hearted person to do a good turn.

We must close owing to space limitation, but thanks are due to the following who have also sent in reports: G5ND, G2NJ, G8FL, G8HA, G6YL, G2DH, G8IL, G8PJ, G6VK, BRS2317, 2601, 3101, 3003 and 3319.

Call.		Dominion Radio Districts.	Colonies.	Total.
G5SR	...	23	15	38
G8IL	...	—	—	37
G8HA	...	22	8	30

The above are the calls and present scores of B.E.R.T.A. aspirants. Please send us the number of *confirmed* contacts with the Dominions and Colonies, for listing. Only scores of 30 or more will be listed.

EXCHANGE AND MART

(*Continued from Back Cover*)