

THE T&R

# BULLETIN

A JOURNAL FOR  
**RADIO EXPERIMENTERS**

Vol. 15 No. 8

FEBRUARY 1940 (Copyright)

Price 1/6

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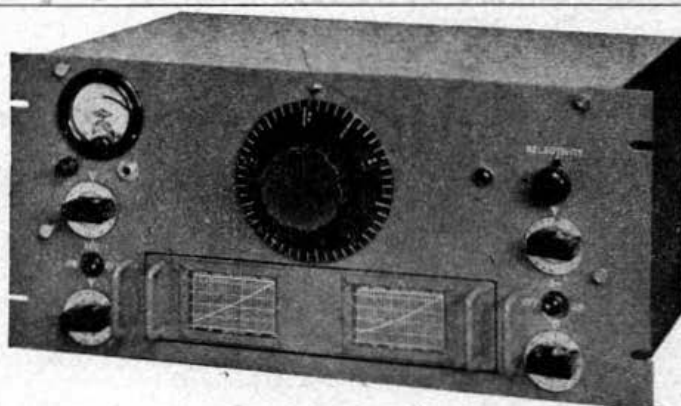
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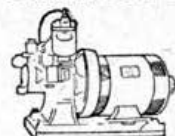
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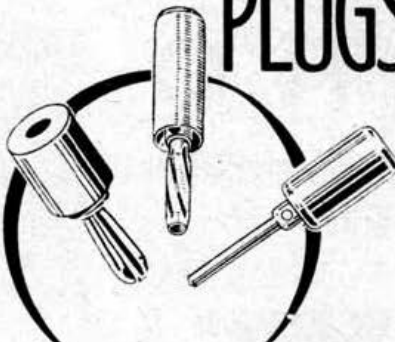


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# THE T. & R. BULLETIN

OFFICIAL JOURNAL  
OF THE  
RADIO SOCIETY  
OF GREAT BRITAIN



DEVOTED TO THE  
SCIENCE  
AND ADVANCEMENT  
OF AMATEUR RADIO

Hon. Editor: ARTHUR O. MILNE

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Vol. XV. No. 8.

## CONTENTS

FEBRUARY, 1940

	Page		Page		Page
The Design and Operation of Radio-Frequency Amplifiers ...	326	Letters to the Editor ...	337	The Month "Off" the Air ...	345
A New Design of Frequency Meter, Monitor and 10 kc. Signal Generator ...	330	Khaki and Blue ...	339	The 28 Mc. Band ...	346
Receiver Stability ...	331	Radio in the Outposts ...	341	The Ultra-High Frequencies ...	347
Convention Time in VO ...	336	Book Review ...	342, 344	British Isles Notes and News ...	348
		Experimental Section ...	343	On Active Service ...	353
		Cosmic Notes ...	344	Headquarters Calling ...	354

## MANY PREFER KHAKI

THE tasks which the modern army signaller is called upon to undertake are of a nature which demands much more than a fleeting knowledge of the Morse Code and Ohms Law. This contention was well emphasised recently by one of the Signal Training Centres, who chose as an insert for their Christmas card, two photographs, one entitled "The Raw Material," the other "The Finished Product." To the left appeared a group of new recruits being introduced by their instructor into the mysteries of the cathode ray tube, and to the right a mobile signal unit operating a radio pack set in the wilds of India.

The fact that a very large number of our members are to-day playing an important part in the work of the Royal Corps of Signals is a tribute to their pre-war training as radio experimenters. It is perhaps unfortunate that many of them were given no opportunity in peace-time of joining an Army Signals Reserve, operated on similar lines to the R.N.V.(W.)R. and R.A.F.C.W.R., but from all accounts their lack of army knowledge and technique is more than compensated for by their enthusiasm and keen desire to "learn the ropes." Correspondence received by the Society from Signals Officers, responsible for training, repeatedly confirms the view that these men form the backbone of every instructional class. Their ready adaptability to new conditions, their faculty for acquiring knowledge easily, their prompt response to army discipline are all attributes which have received favourable comment.

This is good news, for the Royal Corps of Signals is required to provide and maintain a highly intricate communications system which demands the best personnel to operate it. The complex nature of such a vast organisation cannot be visualised except by those in supreme control, nevertheless we know that even in peace-time certain of our members were helping to create this modern marvel of military efficacy. It is to them in particular we pin our hope that some of the major communication developments of this war may ultimately stand to the credit of the amateur fraternity. This thought does not however preclude the possibility that even the youngest "Ham" signaller may carve a niche for himself in history, for we remember that many of the pioneers of short-wave development were young in years if old in experience.

The Society is proud to know that in the Signals Corps as well as in many other Branches of the fighting and civil defence services, radio amateurs are contributing to the common cause, by placing their knowledge at the disposal of King and Empire.

*Certa Cito.*

J. C.



# THE DESIGN AND OPERATION OF RADIO-FREQUENCY AMPLIFIERS

By H. L. GIBSON (2BUP)

*The present time seems appropriate to give added consideration to the theory and design of Radio-Frequency Amplifiers. The contribution here published will prove of value to those who are not content to take too much for granted.*

## Summary

A SIMPLE method is described for ascertaining the performance of transmitting valves under various standard classes of operation in which current flows for less than a full cycle. The design of circuits to give the calculated performance is discussed and the method is illustrated by design calculations for a well-known transmitting valve.

## List of Symbols

- $E_{g1}$  = D.C. negative grid voltage.
- $E_x$  = A.C. exciting voltage (peak value).
- $e_{g1}$  = Instantaneous grid voltage.
- $E_{g2}$  = D.C. positive screen voltage.
- $E_{g3}$  = D.C. positive suppressor voltage.
- $E_a$  = D.C. positive anode voltage.
- $E_o$  = A.C. output voltage (peak value).
- $e_a$  = Instantaneous anode voltage.
- $I_{g1}$  = D.C. grid current.
- $i_{g1}$  = Instantaneous grid current.
- $I_a$  = D.C. anode current.
- $I_o$  = A.C. output current (crest value).
- $i_a$  = Instantaneous anode current.
- $\mu_2$  = Amplification factor of the grid with respect to the screen.
- $\mu_3$  = Amplification factor of the grid with respect to the suppressor.
- $\mu_a$  = Amplification factor of the grid with respect to the anode.
- $2\theta$  = Angle of anode current flow.
- $2\alpha$  = Angle of grid current flow.

## Introduction

Radio-frequency amplifiers operate with a negative control grid bias the value of which varies between wide limits depending on the class of operation desired. Class C amplifiers and frequency multipliers require a grid bias considerably greater than the anode current cut-off value while Class B amplifiers usually give best result when the bias is slightly less than the cut-off value. Thus the anode current is practically zero until grid excitation is applied, and since the exciting voltage is positive for only half of each cycle, the anode current flows for less than  $180^\circ$  and has an almost rectangular wave-form with a high crest value. Although the anode current has a badly distorted wave-form, the output tuned circuit is resonant to one frequency only to which it offers a high impedance which is of a purely resistive nature. The impedance offered to all other frequencies is very much less so that the voltage developed across the output circuit is almost sinusoidal. Thus the control grid and the anode may be considered as having applied to them a combined D.C. voltage and sine wave voltage, and it is

necessary to know how these voltages affect the nature of the current pulse in the valve, the principal features of which are:—

- (1) The shape of the current pulse;
- (2) The peak instantaneous current;
- (3) The D.C. component;
- (4) The fundamental A.C. component;
- (5) The harmonic A.C. components.

## Phase Relations

Referring to Fig. 1 the positive D.C. anode voltage is shown by  $E_a$  while the negative grid bias voltage is shown by  $E_{g1}$ . Superimposed on  $E_{g1}$  is the alternating excitation voltage  $E_x$  which at its peak value swings the grid positive; it will be noted that the peak excitation voltage is always greater than the D.C. bias. The A.C. component of the anode voltage  $E_o$  is superimposed on the D.C. anode voltage and is  $180^\circ$  out of phase with the alternating grid voltage. The anode current  $i_a$  is in phase with the grid voltage and flows during  $60^\circ$  to  $180^\circ$  of a cycle depending on the extent to which the grid is biased back. The grid current is also in phase with the grid voltage and flows for a rather shorter period than the anode current since grid current cannot flow until the grid

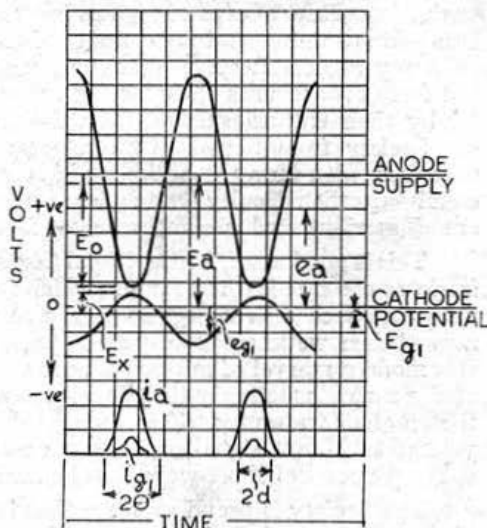


Fig. 1.  
Diagram of phase relations existing in a radio frequency amplifier.



is actually positive. If excessive grid current is to be avoided, the minimum anode voltage should not be allowed to fall below the value of maximum grid voltage. In design it is often convenient to assume that the minimum anode voltage and the maximum grid voltage are equal. The power loss in the valve will equal the product of  $E_0$  and  $i_a$  averaged over a complete cycle. It is obvious that this loss can be kept small by limiting the period during which the anode current flows.

### Analysis of the Current Pulse

The A.C. voltages applied to the anode and grid are developed across parallel resonant circuits in series with the anode and grid supplies and thus the grid and anode may be considered as having applied to them a sine wave voltage superimposed on a D.C. voltage. The grid and anode currents flowing at any instant are due to the combined action of the instantaneous grid and anode voltages  $e_{g1}$  and  $e_a$ . For a given valve, the total space current from the cathode ( $I_s$ ) may be written:—

$$I_s = K \left( e_{g1} + \frac{E_{g2}}{\mu_2} + \frac{E_{x3}}{\mu_3} + \frac{e_a}{\mu_a} \right)^{3/2}$$

where  $K$  is a constant.

This equation assumes that all electrodes are sufficiently positive to form no virtual cathode between G1 and anode and thus does not apply when the suppressor grid is negative as in the case of suppressor-modulated telephony. In a pentode  $\mu_2$  and  $\mu_a$  are usually large enough for the effect of the suppressor and anode positive voltages to be neglected and in a triode case, the expressions:—

$$\frac{E_{g2}}{\mu_2} \text{ and } \frac{E_{x3}}{\mu_3} \text{ do not occur.}$$

Since the anode current is less than  $I_s$  by the current drawn by the grids and also because it is slightly influenced by space charges in front of the anode and by secondary electrons from the other grids, the current reaching the anode may be written:—

$$i_a = K \left( e_{g1} + \frac{E_{g2}}{\mu_2} \right)^x \text{ for a pentode}$$

$$\text{or, } i_a = K \left( e_{g1} + \frac{e_a}{\mu_a} \right)^x \text{ for a triode.}$$

Practical results indicate that no serious errors will occur if the value of  $x$  is taken as unity although authorities such as Terman<sup>1</sup> and Wagener<sup>2</sup> differ somewhat on this point.

It has already been shown that the voltages  $e_{g1}$  and  $e_a$  can be broken up into their component voltages thus:—

$$e_{g1} = E_{g1} + E_x \cos \omega t$$

$$\text{and } e_a = E_a - E_0 \cos \omega t$$

the negative sign indicating a voltage out of phase with the A.C. grid voltage. Thus for a triode:—

$$i_a = K \left[ E_{g1} + E_x \cos \omega t + \frac{E_a - E_0 \cos \omega t}{\mu_a} \right]$$

It will be noted that the pentode case is somewhat

simpler since the term  $\frac{E_{g2}}{\mu_2}$  has no A.C. component,

the screen being an earthy electrode in normal amplifier practice.

The above equation may be re-arranged, thus:—

$$i_a = K \left[ E_{g1} + \frac{E_a}{\mu_a} + \left( E_x - \frac{E_0}{\mu_a} \right) \cos \omega t \right]$$

Now it will be seen that the first two terms in the square bracket represent a D.C. voltage and the remaining terms an A.C. voltage; no current can flow until the A.C. voltage becomes sufficiently positive to overcome the D.C. voltage. This occurs when the angle  $\omega t$  passes through the anode current cut-off angle  $\theta$ .

Thus we may write:—

$$\left( E_x - \frac{E_0}{\mu_a} \right) \cos \theta = - \left( E_{g1} + \frac{E_a}{\mu_a} \right)$$

$$\text{whence } \cos \theta = - \frac{\left( E_{g1} + \frac{E_a}{\mu_a} \right)}{\left( E_x - \frac{E_0}{\mu_a} \right)}$$

Similarly in the grid circuit, the grid current cut-off angle  $\alpha$  is found from the equation:—

$$\cos \alpha = - \frac{E_{g1}}{E_x}$$

The grid current rises very rapidly as the anode voltage swings down into the region of positive grid voltage so that the grid current pulse has a peaked wave-form which approximates reasonably closely to a squared sine wave. By means of a Fourier analysis of the wave pulses, it is possible to calculate the values of the ratios of peak current to direct current and of fundamental alternating current to direct current components. Fig. 2 shows curves of these ratios for various values of  $\theta$  for sine waves and for squared sine waves.

### Choice of Operating Conditions

The power developed in the output resonant circuit of a power amplifier is dependant on the alternating current flowing through the impedance of this circuit and on the A.C. voltage developed across this impedance. These factors are limited in a given valve by the maximum safe anode voltage that can be applied, the peak current that can be drawn from the filament and the maximum power that can be dissipated in the anode. The peak value of the anode current pulse occurs when the anode voltage is at a minimum and the grid voltage is at a maximum positive value. The upper limit of operation is placed on the static valve curves at the point of peak anode current and minimum anode voltage. It is usually convenient to let the minimum anode voltage equal the maximum grid voltage so that the upper limit of operation is placed on the curve  $E_{g1} = E_a$ . It should be noted, however, that the exact location of this point will depend on the permissible grid and screen currents. In practical cases the anode input in terms of the anode voltage and anode current will be known, and knowing the class of operation, an approximation can be made for the value of  $\theta$ . From Fig. 2 the ratio of peak current to D.C. current for the chosen value of  $\theta$  may be found. Multiplying the D.C. anode current  $I_a$  by this factor determines the maximum instantaneous current  $i_{a \text{ max}}$ . This value is located on the static curves and its position determines the maximum value of instantaneous grid voltage and the minimum value of instantaneous anode voltage. The required grid bias can now be calculated.

$$\cos \theta = \frac{-(E_{g1} + \frac{E_a}{\mu_a})}{(E_x - \frac{E_o}{\mu_a})}$$

But  $E_x = e_{g1 \max} + (-E_{g1})$

Hence

$$E_{g1} = \left[ \left( -e_{g1 \max} + \frac{E_o}{\mu_a} \right) \cos \theta - \frac{E_a}{\mu_a} \right] \cdot \frac{1}{1 - \cos \theta}$$

The excitation voltage  $E_x$  is given by the sum of the absolute values of  $e_{g1 \max}$  and the negative grid bias. From Fig. 2 the ratio of A.C. fundamental current to D.C. component can be found. Multiplying the anode current  $I_a$  by this ratio gives the peak value of the A.C. component of the anode current  $I_o$ .

the corresponding ratio of peak to D.C. for a squared sine wave can be obtained from Fig. 2; hence the D.C. grid current is known. The driving power approximates to  $E_x \cdot I_{g1}$  but H.P. Thomas<sup>3</sup> has shown that a closer approximation is given by  $0.9 E_x \cdot I_{g1}$ . The load impedance into which the valve has to work

is given by  $\frac{E_o}{I_o}$  and if a value is assumed for the

loaded  $Q$  of the anode tuned circuit, the correct values of capacitance and inductance for any frequency may be calculated.

### Typical Calculation for Class C Telegraphy

As an example of the method a design will be worked out for the R.C.A. 809 which is quite well-known in amateur circles. The rated maximum

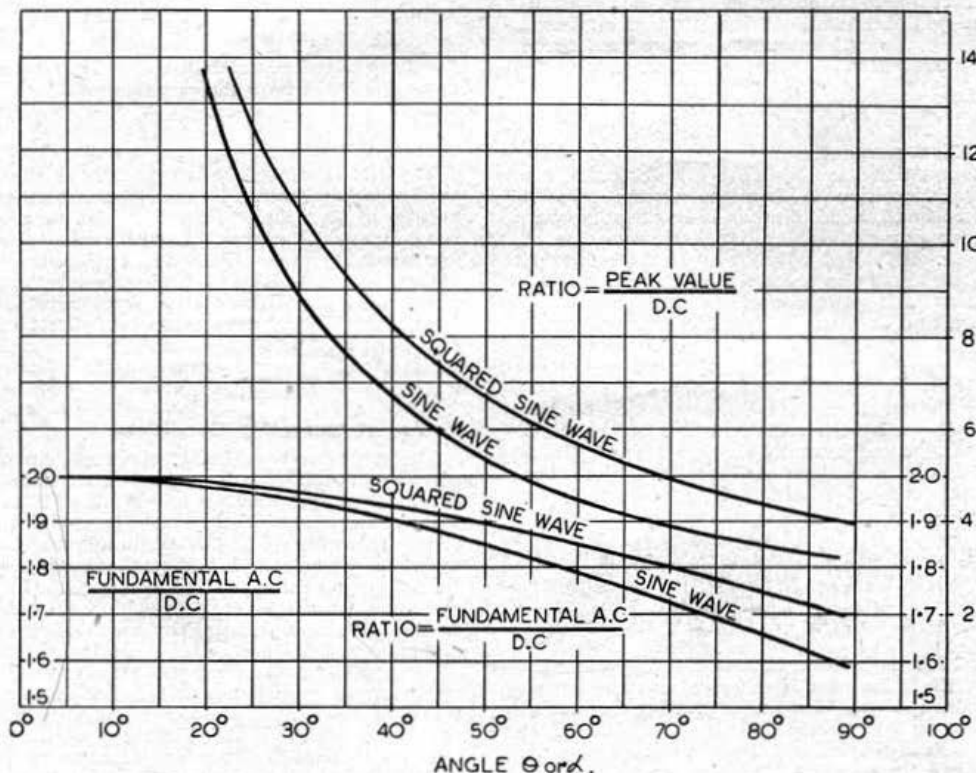


Fig. 2.

Curves of the current ratios used in the calculations.

$$\text{Then Power output} = \frac{I_o}{\sqrt{2}} \cdot \frac{E_o}{\sqrt{2}} = 0.5 \cdot I_o \cdot E_o$$

$$\text{Power input} = I_a \cdot E_a$$

$$\text{Anode efficiency} = \frac{0.5 \cdot I_o \cdot E_o}{I_a \cdot E_a}$$

Turning to the grid circuit, the total alternating grid swing is known and the peak value of grid current at the maximum positive grid voltage can be read off the static valve curves. The angle  $2\alpha$  during which grid current flows can be calculated and

conditions for this type of valve under Class C Telegraph conditions are:  $-E_a = 750\text{v.}$ ;  $I_a = 100\text{mA.}$ ; anode dissipation 25w. Amplification factor ( $\mu_a$ ) = 50.

Let us assume that the anode current flows for  $150^\circ$ , i.e.,  $\theta = 75^\circ$ , which is a reasonable compromise between efficiency, power gain and peak emission limitations. From Fig. 2 the ratio

$$\frac{i_{a \max}}{I_a} = 3.7$$

when  $\theta = 75^\circ$  for a sine wave.

Hence  $i_{a \max} = I_a \times \frac{i_{a \max}}{I_a} = 100 \times 3.7 = 370 \text{ mA}$ .

From the published characteristic curves shown in Fig. 3, it is seen that this current is obtained when anode and grid voltages are each +80 volts.

$$\text{i.e., } e_{g1 \max} = e_{a \min} = +80 \text{ v.}$$

Now  $E_o = E_a - e_{a \min} = 750 - 80 = 670 \text{ v.}$   
and

$$E_{g1} = \frac{1}{1 - \cos \theta} \left[ \left( -e_{g1 \max} + \frac{E_o}{\mu_a} \right) \cos \theta - \frac{E_a}{\mu_a} \right]$$

$$= \frac{1}{1 - 0.26} \left[ \left( -80 + \frac{670}{50} \right) 0.26 - \frac{750}{50} \right]$$

$$= -44 \text{ v.}$$

Total grid swing  $E_x = 80 + 44 = 124 \text{ v.}$

From Fig. 2,

ratio  $\frac{I_o}{I_a} = 1.7$  so that  $I_o = 1.7 \times 100 = 170 \text{ mA}$ .

Power output  $= \frac{1}{2} \times 170 \times 670 = 57 \text{ w.}$

Power input  $= 100 \times 750 = 75 \text{ w.}$

Anode efficiency  $= \frac{57}{75} = 76\%$ .

In the grid circuit

$$\cos \alpha = \frac{E_{g1}}{E_x} = \frac{44}{124} = 0.355$$

whence  $\alpha = 69^\circ$ .

From the squared sine wave curve of Fig. 2

$$\frac{i_{g1 \max}}{I_{g1}} = 5.1$$

and from the published grid current curves the maximum grid current when  $e_{g1 \max} = e_{a \min} = 80 \text{ v.}$  is 110 mA.

$$\text{Therefore } I_{g1} = \frac{110}{5.1} = 21.5 \text{ mA.}$$

Driving power  $= 0.9 \times 21.5 \times 124 \times 10^{-3} = 2.4 \text{ watts.}$

$$\text{Optimum load impedance } Z_o = \frac{670}{170} = 4,000 \Omega.$$

If the effective loaded  $Q$  of the anode tuned circuit is taken as 12 which is a usual figure, we have  $\omega L Q = Z_o$ .

$$\omega L = \frac{4000}{12} = 333 \text{ ohms.}$$

The corresponding inductance and capacitance can now be calculated for any frequency. Thus for

$$f = 15 \text{ Mc., } L = \frac{333}{2\pi \cdot 15 \times 10^6} \text{ H} = 3.54 \mu\text{H and}$$

$C = 32 \mu\text{F effective value.}$

We now have the valve operating conditions and the design data for the anode tuned circuit and if the valve is set up under these conditions the results

*Continued on page 356.*

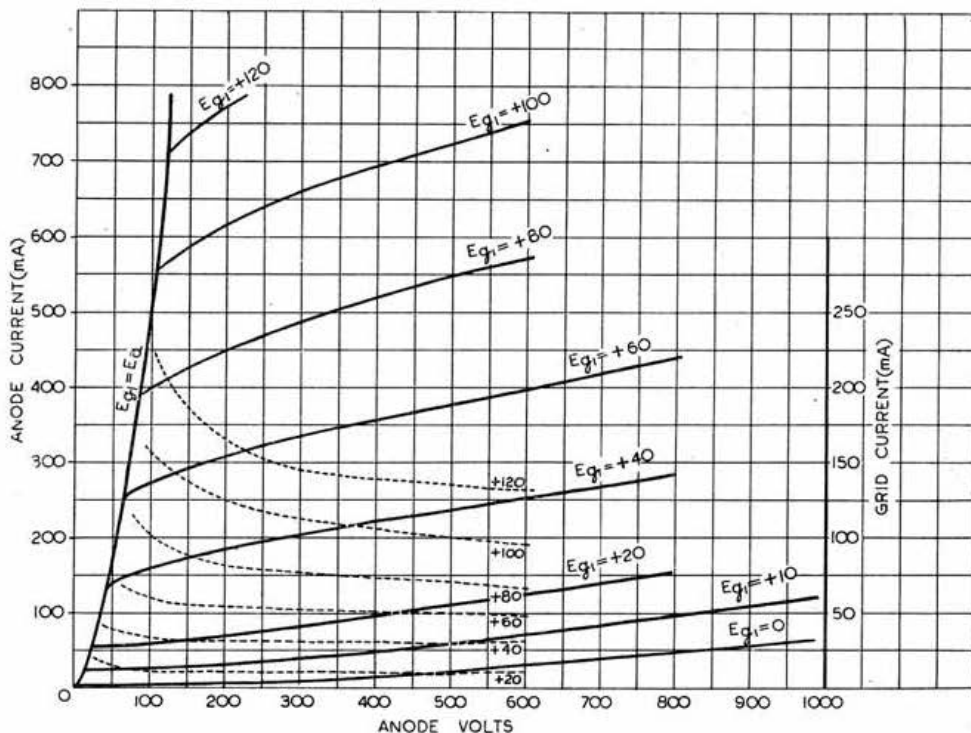


Fig. 3.

Characteristics of the Type RCA809 valve used as a typical example of radio frequency amplifier design.

# A NEW DESIGN OF FREQUENCY METER, MONITOR and 10 kc. SIGNAL GENERATOR

By T. B. WIMBUSH (G6HP)

## PART II.

### Operation

THE frequency meter described in the last issue, should first be tested with the aid of a receiver, and the detector tested for C.W. and telephony monitoring. When the output coil is coupled to the input of the receiver, sufficient coupling also exists between the receiver and frequency meter and between the receiver and the 100 kc. oscillator. If the receiver is overloaded, the output volume control may be used, the output circuit detuned or preferably the coupling loosened. The coupling condenser from the anode of the harmonic amplifier to the detector grid should next be adjusted so that a weak signal is audible on all bands from the multi-vibrator and 100 kc. oscillator in the detector stage. The 100 kc. oscillator stage should next be tested; bringing the output circuit into tune increases the strength of harmonics. Next switch on the multi-vibrator stage with the frequency control resistance approximately in its mid-way position. A whole series of signals should be heard across the band on the receiver, or on the frequency meter and detector, but 100 kc. points should be considerably stronger than the other notes. Count the number of points between any two adjacent 100 kc. points, if nine are heard the multi-vibrator is locking on its tenth harmonic and the points will be 10 kc. apart. If seven are heard the multi-vibrator is locking on its eighth harmonic, and the points will be 12.5 kc. apart and so on.

With the frequency control resistance fully in circuit the multi-vibrator should lock on its eighth harmonic and when all out on its twelfth. Midway

10 kc. points will be available, which are probably the most useful because of the simplicity of using this round figure. As the resistance is varied the signals should jump from one frequency to another, which is evidence that the multi-vibrator stage is under control. There should not be a gradual change from one frequency to another. In each case the resistance may be varied a reasonable amount before the control order changes. This range of variation is useful since it will be found that certain settings will bring all intermediate signals up to the same strength, whilst other settings will accentuate certain frequencies. The correct adjustment is the one which maintains all the intermediate points between the loud 100 kc. points at the same strength.

Adjusting the preset coupling condenser (C25) will alter the range of frequencies available. For example with one setting of this condenser it will be found possible to lock the multi-vibrator on the second to the sixth harmonic, or on any other series.

The frequency meter can now be checked to ensure that each band is spread across the whole dial, and the remainder of the coils wound and tested, with the aid of the signal generator.

### Frequency Measuring

The uses of the complete instrument will be quite obvious. Band edges can be located accurately, whilst the stability of the frequency meter itself is constantly under check by means of the 10 kc. signal generator, therefore, it is unnecessary to draw graphs for its calibration. To find the frequency of a station tuned in on the receiver, first locate the signal on the frequency meter, between two known 100 kc points, then switch on the multi-vibrator stage and locate it between two 10 kc. points. On 14 Mc. it will appear between two points on the dial of the frequency meter 2.5 degrees (or 25-1/10 degree divisions) apart, each 1/10 degree representing 400 cycles. Count the number of 1/10 divisions from the nearest 10 kc. point in tuning to zero-beat with the signal and a little mental arithmetic will give the frequency. Similarly a transmitting frequency can be set very accurately and easily, using the monitoring function.

It is an advantage to dispense with graphs since they are liable to introduce errors and in any case it is quite as easy to read a frequency direct from the dial using the above method, providing a good type of S.L.F. variable condenser is employed. It is not necessary to alter the receiver setting when tuned to a station whose frequency it is desired to measure. By using the same method, but listening on the frequency meter and detector, the same result is achieved.

The accuracy to which frequency measurement can be made depends primarily on the accuracy of the 100 kc. crystal. The maximum amount that the crystal harmonic frequency could deviate on say 14 Mc. due to temperature variations is 1.120 kc. This added to the certified accuracy of the crystal,

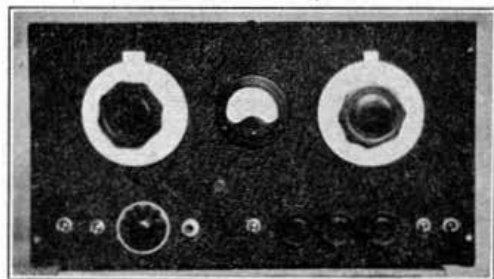


Fig. 4.

A front view of the completed instrument. Controls are as follows:—Left-hand dial, frequency meter vernier, right-hand dial, harmonic amplifier output circuit. Controls along the bottom from left to right are S2, frequency meter screen switch; S3, frequency meter on-off switch; S, band switch; J, headphones jack; S4, 100 kc. oscillator on-off switch; R7, voltage control to frequency meter stage; R19, multi-vibrator selector resistance; R14, output volume control; S5, multi-vibrator on-off switch; and S6, mains on-off switch.



which is  $140 \times 25$  cycles, which gives a total deviation of 4.62 kc. on that band. Actually such a crystal would be regarded as being a very bad one and allowance could be made to correct the measurements. In actual practice, it is safe to assume that readings are accurate to within 0.5 kc. on 14 Mc. (which is an accuracy of 0.0036 per cent.), provided allowance is made for crystal variation. A temperature controlled oven would be an advantage for maintaining the crystal at the correct operating temperature, and the percentage accuracy would in this case be increased.

The possibility of using this 10 kc. signal generator as a drive unit for a transmitter, by coupling the output to amplifying stages, has not been overlooked and if successful will form the subject of a further article when licences are reissued.

The writer wishes to record his thanks to Mr. A. E. Brookes, G6VK, for demonstrating the signal generator in operation.

The writer will appreciate hearing from members who construct this apparatus with a view to offering assistance or answering questions.

## Bibliography

- A New Type of Frequency Checking Device.* George Grammer. QST, June, 1938.  
*A Stable Triode Frequency Meter.* A. D. Gay. THE T. & R. BULLETIN, December, 1932.  
*A 50 kc Frequency Standard.* A. D. Gay. THE T. & R. BULLETIN, January, 1933.  
*Frequency Meter Design and Operation.* H. C. Page. THE T. & R. BULLETIN, February, 1933.  
*The H.F. Pentode as a Frequency Divider.* A. D. Gay. THE T. & R. BULLETIN, April, 1934.  
*A 100 kc Frequency Sub-standard.* A. D. Gay. THE T. & R. BULLETIN, March, 1935.  
*A Frequency Meter Monitor for the Amateur Station.* G. McLean Wilford. THE T. & R. BULLETIN, December, 1935.  
*The Harmonic Checker.* H. C. Page. THE T. & R. BULLETIN, July, 1936.  
*Frequency Measurement.* THE AMATEUR RADIO HANDBOOK.

# RECEIVER STABILITY

By J. N. WALKER (G5JU)

## PART I.

**C**ONTROLLABLE oscillation is a desirable feature in many types of receiver but it frequently happens that undesirable oscillations occur, sometimes obviously but often without the knowledge of the user. As such oscillations mar the performance of a receiver in a number of ways it is essential that all traces of them be removed.

In general, unwanted oscillations take two definite forms. The first type occurs at or near the same frequency to which one or other of the tuned circuits in the receiver is resonant; the other is of a parasitic nature, usually of an exceedingly high frequency. It is quite possible for both forms of oscillation to take place simultaneously but since the cures of each differ, they will be dealt with separately, considering the former first.

The hints which follow, whilst mainly intended as a guide for curing trouble in existing apparatus, should also be borne in mind when constructing a new receiver.

### R.F. Stages

The reader will be aware that for oscillation to occur at all, some form of feedback must be present between the input and output circuits of a valve. The screen-grid valve is specially designed to prevent such feedback taking place, by virtue of the inter-electrode capacity existing between its grid and anode, and in general, the internal screening between these two electrodes is sufficiently complete to prevent it occurring, providing the external by-passing arrangements are efficient.

However, it must be remembered that wires and metal parts (e.g., the fixed vanes of variable condensers) connected to the grid, will possess capacity to similar wires connected to the anode unless effective screening is provided to prevent this effect, and the total capacity may be large enough to

provoke self-oscillation. Particularly is this liable to occur when a valve of high gain is employed.

The design and losses of the complementary circuits will naturally modify the effect of any feedback existing. At low and medium frequencies, circuit losses will be, or should be, low, whilst the grid/cathode path will impose but light damping on its associated circuit. On the other hand, the action of by-pass condensers will be effective, but oscillation will still tend to occur unless complete screening is provided.

As the frequency is increased, various modifications are brought about. The impedance of the grid/anode capacity is lowered and the feedback voltage increased. The inductance inherent in by-pass condensers, and in the wires attached thereto, takes more effect, and increases the impedance of the by-pass circuit. Both these factors increase the tendency to self-oscillation but, on the other hand, the losses of the tuned circuits become higher, as also does the damping imposed by the valve so that the stage gain is reduced. The cumulative effect is that the tendency to oscillate decreases above a certain frequency, which is itself dependent on the circuit losses and type of valve in use.

Self-oscillation is particularly liable to occur when a faulty valve is replaced by one of a more modern type and giving a higher gain.

An amount of regeneration which falls short of actual oscillation is beneficial and is often purposely introduced. By such means the circuit losses are in effect, lessened and the selectivity curve is made steeper.

### Symptoms

Self-oscillation of an R.F. stage usually occurs when the grid tuning condenser is rotated through resonance with the following circuit. One result is

to make it impossible to tune correctly for maximum results and a gap often occurs in the tuning range.

In a straight receiver self-oscillation of the R.F. stage is self-evident—"plops" will be heard at points on the dial of the R.F. tuning condenser, the grid circuit will be "alive" and in this condition radiation will take place from the aerial. Tightening the aerial coupling may effect a cure of sorts but will be detrimental in other directions. The aim should be to achieve complete stability even with no aerial connection. The trouble is more likely to occur when a regenerative detector valve follows, since this

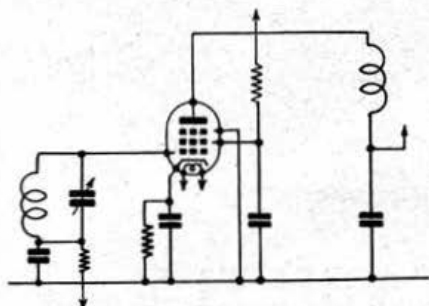


Fig. 1a.

Illustrating the wrong method of connecting by-pass condensers in a typical R.F. stage.

tends to "trigger off" the R.F. stage at resonance.

In the case of a superhet. the effect is recognisable by the existence of innumerable beat notes. The following stages will be over-loaded by the comparatively high oscillating voltage passed on to them and it will be obvious that there is something wrong with the performance as a whole.

Where more than one R.F. stage is employed, it is sometimes difficult to prevent oscillation owing to the high overall gain causing instability. In such cases, if the trouble persists after all other means have failed, it may be necessary to reduce somewhat the amplification of each valve. This may be done by increasing the grid bias to a value in excess of that normally required, or by reducing the screen voltage. The former method is preferable since it increases the signal handling capabilities of the valve whereas the latter method may lead to the introduction of distortion on strong signals.

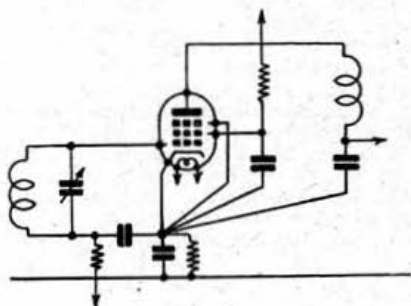


Fig. 1b.

The correct method of connecting by-pass condensers in an R.F. stage.

## Cures

To effect a complete cure it will be evident that the screening between the input and output circuits of the valve concerned must be rendered so complete that the only feed-back effective is that which occurs within the valve itself. The latter must be reduced to a minimum by paying careful attention to the by-passing arrangements, on which it is partly dependent.

If at all possible, the valve should be mounted (horizontally, if necessary) so that the anode terminal is not in the screened compartment containing the tuned grid circuit. This, incidentally, will usually enable the wiring carrying R.F. to be made shorter. Many modern valves are constructed with a top cap grid connection so that the design and construction are simplified by virtue of the fact that the anode pin is screened off by the metal on which the valve-holder is mounted. In the latest "footless" valves, provision is made for the insertion of a metal plate which projects into the body of the valve. The external electrode connections are arranged with the grid and anode tags on opposite sides of this metal plate, thus giving very effective screening.

It will probably be necessary to screen the lead to an anode top-cap in cases other than those outlined above. Since such screening will inevitably reduce the gain, due to the by-pass action, special care should be given to this point. The lead should be made as short as possible and only the very minimum of solid dielectric material introduced.

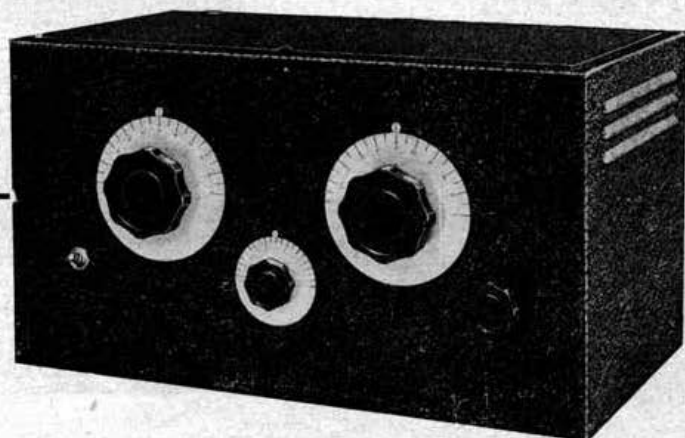
It is not always realised that the metal coating on some of the older type valves acts as a coupling impedance at high frequencies, rather than a screen, and it is usually better to employ a metal screening can of the recognised type. This is not necessary when modern valves are used since the metallic coating is of a much closer texture and therefore of lower resistance.

The same applies to the screen placed between stages. If this is of thin high resistance metal, it will often fail to act in its proper capacity. Stout brass or copper is the best metal to employ for the purpose and in all cases the screening will be made considerably more effective if a double screen is employed. The two sheets of metal may then be quite thin and may be separated by any convenient distance between  $\frac{1}{4}$  in. and 1 in.

## By-pass Condensers

So far little has been said about by-pass condensers and the positioning thereof but actually of course these factors are very important ones. As its name implies, the function of a by-pass condenser is to pass to "earth" the R.F. currents existing at the particular point of connection. Sometimes, the condenser is essential for the action of the circuit as a whole whilst on other occasions it is inserted to prevent R.F. currents flowing into parts of the circuit where their presence would cause undesirable effects. In both cases, the condenser is used to maintain at earth or zero potential (as regards R.F.) a point in the circuit which cannot be earthed directly because of its different d.c. potential. A typical example is the screen grid of a valve, which would otherwise develop considerable R.F. potentials and the proper functioning of the valve would be completely altered.

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FEBRUARY ISSUE

# ELECTRONICS AND TELEVISION AND SHORT-WAVE WORLD

NOW ON SALE  
 1/6 MONTHLY

CHANSITOR HOUSE,  
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The insertion of a resistance or choke on the far side of the condenser will increase the effectiveness of the by-pass action, since the R.F. currents will automatically be persuaded to take the line of least resistance through the condenser itself, but such an expedient will not affect the holding down to earth properties of the condenser.

To be completely effective, a by-pass condenser should present a very low impedance to the whole range of frequencies being handled. If the inductance inherent in the condenser and in its connecting leads did not exist it would be true that the larger the capacity of the condenser the more perfect would be the by-pass effect. Actually, however, the presence of the inevitable inductance plays a large part in determining the effective impedance, particularly on the very high frequencies. The inherent inductance increases with the size of the condenser and, for this reason there exists, for a given type of condenser, a certain optimum capacity for every radio frequency.

Paper dielectric condensers (even the so-called non-inductive variety) possess both comparatively high inductance and high losses, and their use should be avoided in radio frequency circuits, with the possible exception of intermediate frequency stages in which the frequency is comparatively low.

The tag end mica dielectric types (T.C.C. "M" and Dobilier 690W) are excellent for the purpose in mind whilst still better are those in which the metal plates consist of silver electrolytically deposited on the mica. These are offered by a number of firms, including *Erie* and *Bulgin*, both of which makes have been tested and found very satisfactory.

Best of all are the ceramic condensers, the construction of which takes the form of a plate of ceramic material, of varying shapes, on each side of which is a deposit of silver. The losses and inductance are not only initially very low but are maintained low with increasing age, which is often not the case with mica condensers. Further, the small physical size of the ceramic condenser enables it to be placed very close to the valve-holder (or other component involved), thus cutting out long leads. One result is that a 100  $\mu$ F ceramic condenser is as effective a by-pass as one of much higher capacity of the other types mentioned, the cost being approximately equal. Sizes larger than 100  $\mu$ F are of course obtainable.

### Position of By-pass Condensers

When considering by-pass condensers, it is with their relationship to a valve that we are nearly always concerned, and it is well to remember that the important electrode is the cathode, except when this is itself at an R.F. potential above zero, as for instance, in the case of an electron-coupled oscillator. It is to the cathode that all by-pass condensers associated with any one valve should be returned, rather than to a metal chassis or earth terminal. By this means oscillating currents, probably of different magnitudes and phases, are prevented from circulating in a common path, which state of affairs would be conducive to instability. This is made clear in Fig. 1, which illustrates a typical R.F. stage. The connections in both (a) and (b) are electrically identical but in (a) the "earthy" sides of the four by-pass condensers are assumed to be connected to the nearest point on a metal chassis whereas in (b) they are all taken to a common point which, in practice, should be the cathode tag on the valve-holder in the case of mains valves, and to the negative filament leg

in the case of battery valves. As shown, the suppressor grid is brought out to a separate pin but in many cases, of course, it will already be internally connected to the cathode.

In Fig. 1, the coupling to the following stage is inductive, but capacity coupling is often employed, as illustrated in Fig. 2. The latter diagram brings out a further interesting point. The resonant circuit LC is actually two circuits in one—the anode circuit of V1 and the grid circuit of V2. The lower end of this circuit is shown connected direct to the cathode of V2 and no by-pass condenser becomes necessary. Since, however, the circuit LC forms the load (at least in part) across the output of V1, a return path must be provided to the cathode of the first valve and this path usually is provided by the connections indicated in heavy lines. A considerable length of wire and metal is involved and in addition the

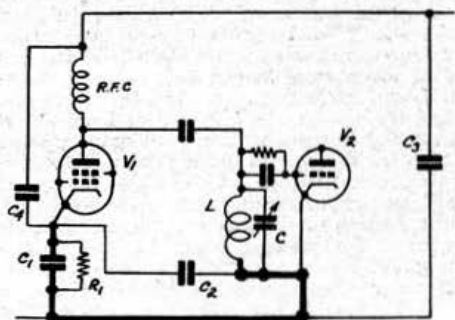


Fig. 2.

Adding refinements in the shape of C2 and C4 will invariably improve a T.R.F. receiver.

impedance of the combination R1/C1 is in series with the path. To obviate this, an alternative path should be provided through the by-pass condenser C2 and, by suitably designing the layout, it should be possible to reduce to small dimensions the lengths of its connecting leads.

The R.F. choke in the anode circuit also forms part of the load presented to V1 and it is necessary to maintain at true zero R.F. potential the earthy end of this choke. Admittedly, a path to earth is provided through the H.T. connections but again long lengths of wire may be involved whilst the R.F. by-passing properties of the condenser C3, which is assumed to be a paper or electrolytic type, will be poor. Another mica condenser C4 should therefore be added as shown, again making the connecting leads very short.

The foregoing points may seem to have little to do with self-oscillation but it should be remembered that, whilst they are relatively unimportant on broadcast frequencies, they are of material assistance in maintaining good stability at high frequencies and in any case the addition of the refinements mentioned will improve the performance of any receiver.

(To be continued.)

### Tape Recording

Mr. N. P. Spooner, G2NS, 2a Rowena Road, Southbourne, Bournemouth, will be pleased to hear from any member who has had experience with modern tape or syphon recording.

## CONVENTION TIME IN VO.

By A. N. LE CHEMINENT (G6AC)

**F**OLLOWING after six months in the heart of Newfoundland and two months of no amateur activity due to the war, the chance of a few days in St. Johns, the capital of the island, was looked forward to with the greatest of pleasure. That those particular days would encompass a visit to an Amateur Radio Convention was something not even thought of at the time of departure.

The trip started at midnight on November 8, the journey of 213 miles taking 9½ hours, which time fortunately was spent in bed. Rail travel in this country lacks both the speed and the comfort of that at home; being snugly tucked into a bunk is by far the most comfortable way of travelling. Having arrived at St. Johns and pleasantly settled at the Newfoundland Hotel, my first thought, once business was over, was to contact a few of the VO1 amateurs, some of whom were known by call, whilst others knew I was in the country. Frank Wood, VO1X (one of the operators of VONF and VONG, the broadcasting stations of Newfoundland, the studios of which are situated on the top floor of the hotel), was the nearest within call. He was delighted to hear of my visit, but at that time (early evening) was about to commence tuition to a class of 40 budding "sparks." We made a date for the following evening and I went into dinner. This repast was hardly over when the call boy informed me that Eric Holden, VO1H, had arrived and was waiting in the lobby. Introductions were lost in my query as to how he knew I was in St. Johns, only to be told that 1X had informed him, and that I was to be looked after! Eric, as prime mover and staple upholder of the Newfoundland Amateur Radio Society, was as glad to see me as I am ever glad to meet a "ham" anywhere, and when he told me that on the Saturday evening there was to be held the Society's annual meeting and convention, wild horses could not have kept me away!

### A Partridge Supper

Visitors to convention are rare, for a trip to St. Johns usually means at least three or four days away from even the airport, which is situated roughly halfway between the two terminal points. I was called for by VO1E on the Saturday evening to join a party of five, which included Major Haig-Smith, the newly appointed secretary of Posts and Telegraphs, Mr. A. J. Crocker, chief inspector of radio for the Dept. of Posts and Telegraphs, and Mr. Al Vardy, news commentator of the Newfoundland Broadcasting Stations. I indeed felt "small fry" in such distinguished company, but radio talk soon had us all chatting merrily for the nine-or-ten-miles drive to the meeting place, a small outlying hotel. I learnt during the run that the repast was to be a partridge supper, which is just what the name implies. A partridge supper is one of those things that just happen in Newfoundland. Another and more ceremonious occasion is a seal flipper supper. (I have yet to be initiated!)

The business meeting had just broken up when we arrived, which provided a fitting opportunity for respite and ragchew for those who had been hard at work planning the forthcoming year. N.A.R.S. run things in a very businesslike way, the whole

meeting and supper being presided over by Mr. Stirling, a representative from a well-known firm of solicitors, who I discovered to my great surprise was not an amateur at all. His senior partner volunteered his services to look after the Society's legal affairs, and when unable to attend his junior fills the breach. Mr. Stirling carried out his duties exceedingly well and left no doubt as to the Society's safety in legal matters.

### Rag-Chewing

The round of ragchew was terminated by the call to the festive board, and here I must pay a tribute to the gathering. Newfoundland is a comparatively small country, especially in respect to population, and amateur radio has perhaps more chance to play a practical and useful role than at home, but when the secretary of Posts and Telegraphs and his chief inspector are guests at the annual Convention I think it bodes well for the hobby. The speeches which followed the disappearance of the "bird of honour" gave every cause to amplify that feeling, and it is my one regret that I had no portable recording outfit in my pocket and that my shorthand is *non est*. I have attended similar meetings in many parts of the world, but Mr. Vardy's speech on amateur radio was a gem, worthy of posterity. A few of his main points dealt with the democratic spirit of our hobby, the need for keeping that spirit alive in this time of trial, and the possibility of our share in moulding a new and future world state. The fact that even in the dictator countries amateur radio associations are or were still run on democratic lines added weight to his argument. Here again to me, the bewildering fact that Mr. Vardy is not a



"ham" in the accepted sense of the word. Mr Crocker dealt comfortably and leniently, yet not without wise counsel in his capacity of representing "officialdom," on the way things should be, and the usual difficulties that beset licensing authorities. He then paid great tribute to the excellent work VOI amateurs are doing in monitoring the "ham" bands. As soon as war was declared, and religiously ever since, they have divided themselves into evening watches, and every day someone is alert for any unusual signal. A toast was drunk to the member on duty that night. Although nothing spectacular had been achieved it was appreciated and comforting to the authorities that this service was being carried out. Mr. Crocker also made reference to the help rendered by the VOI's on the occasion when an aeroplane failed to report on a trip to Labrador, following which he made a request that amateur stations, although unable to transmit, should not be dismantled, but kept in order in case of emergency. The reason for this is that Newfoundland has many parts where cables and telephones cannot reach and, even where available in normal times, they are

subject to weather that may put them out of communication for many days. Radio then may be a necessity, and a chain of amateur stations is a valuable asset to the country.

Other speeches were made by Major Haig-Smith (who was making his first public appearance in Newfoundland at this Convention), Mr. E. S. Holden ("Pop" of VOI), Mr. Skiffington (vice-president), and Mr. Bob Munro, VOID, the hard-worked secretary. When the writer was asked to say a few words he almost gave up in a mist of confusion, trying to remember what everyone else had said!

Midnight came almost without noticing it, and when the party broke up for another year with the usual farewells, I took my leave of one of the most memorable evenings of my life, carrying with me the feeling that here in Newfoundland exists the real essence of all that is good in our hobby.

My stay is not yet over, and I hope to get to know even better this fine bunch of fellow amateurs before I return. In the interim those at home may take heart that in this part of the Empire you have their wholehearted support and sympathies.

## Letters to the Editor

### "A QUIET B.F.O CIRCUIT"

DEAR SIR,—With reference to Mr. E. L. Gardiner's description of "A Quiet Beat Frequency Oscillator Circuit" in the December BULLETIN; I feel that the comparison test with a well-known commercial receiver is very misleading for the following reasons.

The two receivers were first adjusted on a telephony station and the pre-detector controls adjusted until the modulation signal just disappeared in the 'speakers. From this it was deduced that the signals on the input circuits of the two detectors were of comparable strength.

In my opinion this deduction is not correct, since the commercial receiver (being a single valve detector circuit) will produce output in its anode circuit from an incoming signal even if the B.F.O. is not working, e.g., ordinary telephony reception. The two-valve circuit, however, *whether the individual valves are adjusted as amplifiers or detectors*, should give no output of the modulation in the differential output circuit shown *if the two valves are properly balanced*; though such output could be obtained from a transformer connected in the common H.T. + lead when the valves are operating individually as detectors. It follows then that when the modulation frequency output became just inaudible, being only a component due to out-of-balance of the circuit, it represented a very considerably greater signal on the grids of the valves than in the case of the single valve detector circuit.

When the B.F.O.'s are applied to the two circuits, the single valve circuit will give a "beat" signal, of strength proportional to the product of the signal on the grid and the B.F.O., in its anode circuit. The two-valve circuit on the other hand will not give a beat frequency output in a transformer in the common H.T. + lead, but will give one proportional to the product of the signal on the grid and the B.F.O. in the differential output circuit used by Mr. Gardiner.

It would appear, therefore, that the striking

increase in the two-valve circuit was, in fact, due to the method of comparing the signals on the grids of the two detector circuits which led to a considerably greater signal being applied to the two-valve circuit.

This criticism does not detract from the very considerable advantages mentioned in the description, with which I am in full agreement and which in my opinion would entirely justify the additional circuit complication involved.

Yours truly,  
NORMAN C. STAMFORD (2ALY).

DEAR SIR,—I have been interested to read the letter from 2ALY, in which he disagrees with the comparative test described in my notes regarding a "Quiet B.F.O. Circuit." On a purely scientific basis I think Mr. Stamford is fully justified in the points which he raises. However, he has interpreted my remarks rather more strictly than I had intended, for it will be seen that I stated the input to the two detector systems to be of comparable strength, "allowing for possible differences in detector efficiency and design." Surely these words cover just the objection which he has raised, having been originally written for that purpose. It is a difference in detector efficiency which Mr. Stamford is pointing out!

It will be noted that I carefully refrained from claiming that the input to the two systems was identical, although Mr. Stamford seems to have rather inferred that I meant that. In my view the term "comparable strength" might cover a divergence of several fold. However, I entirely agree that a test in which the voltage at each grid were measured, and made exactly equal, is much to be preferred. My intention was to devise a simple comparison between the detectors under working conditions of weak-signal reception. In such a case the grid input is too small to measure by simple methods, such as a diode voltmeter of the type which most amateurs might possess, and it would be



necessary to resort to a very high class of amplifying voltmeter. I have not a suitable meter myself at the present time, and in writing notes for THE BULLETIN I have always felt it best to avoid suggesting the use of equipment not to be found in a typical amateur station.

In spite of Mr. Stamford's argument, I still feel that the test is not misleading, for it gives a comparison under typical working conditions, namely those of similar noise level in the two receivers. The adjustment of gain to a comparable level of telephony modulation implies that noise, both modulated on to the carrier or picked up otherwise (and which is very much in the nature of modulation) will be of the same order. If then a sturdy heterodyne beat is produced in the push-pull detector system, which considerably exceeds that produced by the simple detector, above a similar level of background noise, then the push-pull system is just that much superior in C.W. reception. It matters little practically whether the superiority is mainly due to efficient heterodyning, or in a large measure to differences in detector efficiency, but I agree that the test could be made more technically strict, and that I might perhaps have explained it more adequately.

Since Mr. Stamford has made a friendly criticism of my test, I may perhaps criticise his underlined sentence in return. I feel that it is by no means immaterial whether the two valves are adjusted as amplifiers or detectors. As amplifiers there should, of course, be no output from the circuit shown, but as detectors this condition could only be attained if a number of special conditions are fulfilled. Important amongst these is the necessity for a symmetrically modulated transmission, in which the positive and negative sides of the envelope are equal. It will be found that unless this condition be met, even balanced detectors can give an output, the magnitude of which is not independent of the type of detector used. In the case of carrier noise which resembles a very lightly modulated telephony signal, a fair symmetry may be retained, and a reasonably good balance made possible. This is particularly so in the case of the B.F.O., which is not subjected to any distortion in its short path to the detector grids, but it is surprising how few actual transmissions show the degree of symmetry necessary to permit of a complete balance. Moreover, it is an unfortunate fact that an originally symmetrical modulation envelope generally becomes appreciably distorted in passing through the earlier stages of a superheterodyne receiver, due to such effects as curvature of the valve characteristics, and mistuning from the exact centre of the resonance curve. In practice, therefore, quite a large output will usually be obtained from a balanced push-pull detector system.

My own detector forms part of a receiver of many stages, and which contains crystal band-pass filters. It is nearly always used in the single sideband condition, and I fear that the modulation envelope is often extremely unsymmetrical by the time the detector stage is reached. I find that the push-pull detectors often give a satisfactory output from telephony, and I think the correct explanation of this is that appreciable rectification has taken place in the earlier stages of the receiver. This practical observation does not detract from the correctness of Mr. Stamford's conclusion, and I should expect, for example, that in a straight receiver the push-pull arrangement would be little use on telephony.

To overcome this defect in practice I advise any amateurs who may be constructing the Quiet B.F.O. Circuit to provide a switch which will open the cathode, filament or anode circuit of one detector when the B.F.O. is not in use. Only one of the detectors will then be operating, and will give normal rectification of modulated signals. This switch can be "ganged" with the B.F.O. switch, a S.P.D.T. toggle switch being suitable. In the simplest circuit arrangement the cathodes of the B.F.O. and one of the two detector valves might be joined together, and taken to the earth-line through a single Q.M.B. switch. On opening this, both stages would be interrupted simultaneously.

Yours truly,

E. L. GARDINER (G6GR).

### "ACCUMULATOR CHARGING FROM D.C. MAINS"

DEAR SIR,—I read with much interest the article "Charging Accumulators from D. C. Mains" by R. M. Hall (XZ2EM) in the January issue of THE T. & R. BULLETIN, and, since this is a method I have employed myself, the following comments may not be out of place.

The writer states, in the fourth paragraph, that it is immaterial which mains lead is utilised, but I would suggest that it should always be the "earth" side for considerations of safety although it is granted that as far as the efficacy of the system is concerned this is of no importance.

Two further improvements of the arrangement might be suggested, namely:—

- (i) Use of 3-pin instead of 2-pin plugs thus obviating the possibility of a reversal of connections at the socket.
- (ii) In the event of the house system being on the "Flat Rate," the suggested position would often give a greater current than desired, but if supplementary sockets are provided *after* the Distribution Box in the individual circuits, these may be utilised for small capacity cells leaving the main socket for car batteries, etc.

Trusting that these remarks may be of use to those persons who are in a position to use this little-known but very handy method of charging.

Yours faithfully,

D. R. PENFOLD (BRS3648).



A BREATH OF SUMMER

John Powell (VQ3HJP) of Aeradio Station, Dar-es-salaam, sends this snap of himself and station taken just prior to "the end of the world!" Up to that time contacts with 78 countries had been confirmed out of over 100 worked.



# KHAKI AND BLUE

*A topical feature in which we publish information concerning our members serving in H.M. Forces. Items for inclusion in future issues should reach the Secretary-Editor not later than the first day of the month preceding date of publication.*

Service members who happen to be in the Stranraer area should make a special point of calling at the Harbour Station canteen, where they will find one of Scotland's best known amateur 'phone operators on duty. The call—GM2UU—the name Doug Lamb.

Cpl. P. Halligey, G8PI, now in France with the R.A.F. reports having met Paul Dumont, F3UG who holds a similar rank in the French Air Force. Paul wishes to be remembered to friends in Great Britain.

E. Lawden, G3SS and R. Wyer, G8RY (photograph overleaf), who are serving with the R.A.F. would be glad to hear from old friends previously contacted on 7 Mc. Letters may be sent c/o Mrs. Ellwood, 44 Benefield Road, Oundle, Peterborough.

L. W. Richards, G3YM, now a Signaller in the First Army Signals, will be pleased to hear from friends who may write via his home address, 92 Markham Road, Winton, Bournemouth.

Friends of Cpl. Joe Rockall, G2ZV, of Rustington, Sussex, will be interested to hear that he is now at an R.A.F. station in Northumbria, but so far he has been unable to "get in" on u.h.f. work—his pet interest in peace-time. Joe, who is joint holder with 2DDD of the Mitchell-Milling Trophy, sends greetings to all old friends especially those worked on 56 Mc.

E. R. Dolman, 2DCG, now an L.A.C. in the R.A.F. recently met F3XH whilst in France. Unfortunately due to the language difficulty their conversation had to be carried on by emitting short whistles in the Morse Code, but we understand the result was quite satisfactory! Esperantists you have competitors! Our correspondent also tells us that M. Trier (G8VH) had the misfortune to fracture his wrist on Christmas Day. 2DCG should be on leave by the time this issue appears.

R. E. C. Beardow, G3FT. Hon. Secretary of the Romford and District Amateur Radio Society who is serving as a Telegraphist in the R.N.V.(W.)R. wishes to be remembered to old friends particularly those in the Southend, Brentwood, Ilford, and Welwyn Garden City Radio Societies. G3FT will be pleased to receive letters which should be addressed Telegraphist Beardow, P.W.RX752, H.M.S. Cormorant, c/o G.P.O. London.

Cpl. Fred Ingleton, G6FI, who, as reported last month is serving in France with the R.A.F., wishes to be remembered to all old friends. He tells us that he is in "good" ham company! We can guess the rest. Fred is due home on leave shortly.

Mr. C. Symonds, G5OV, advises us that he is employed by the Air Ministry on radio work in a

civilian capacity and not, as mentioned last month, serving in the R.N.V.(W.)R. He will be pleased to meet any member located in Hunts or Cambs. His address is Station Road, Over. He tells us that Gilbert Pollock (ex VK2XU) is now a Staff Sgt. in the R. C. of S.

G6CL has been pleased to welcome recently Bert Allen, G2UJ home on 10 days' leave from the B.E.F., Ham Whyte, G6WY who continues his R.A.F. work in England and Douglas Walters, G5CV, who is on R.A.F. research work. G2UJ reported himself fit and well and brought news from several members who went to France early in the war. He wishes to thank all members who have written to him during the past five months.

## ALDERSHOT & FARNBOROUGH MEETING

*All Service members in the above area  
are cordially invited to attend a*

## Ham Gathering

on

**Sunday, 25th February,  
1940**

**Meet at Y.M.C.A., off Lynchford  
Road, North Camp, Farnborough,  
at 2 p.m. Tea 3.30 p.m.**

We understand that VE5ZM, who was recorded last month as being in England with the Canadians, has met a great many District 7 members during the past few weeks. He was a welcomed visitor at the meeting held at G2YL early in January. Bill wishes to thank those who have written to him since he came to the land where "DX grows on trees!"

Signalmen Bartholomew, G8CK, and Harris, 2ATZ, who are serving in the R.C. of S. near Hertford, would appreciate receiving "ham" literature from any member who can oblige. They would also like to meet local members. Letters should be sent to G8CK, c/o his home address, 62 King George's Avenue, Watford.

Flt./Sgt. E. A. Luckhurst, G3OB, who is serving with the R.A.F. in France, will appreciate the loan of a "bug" key for the purpose of giving private morse tuition to some of his colleagues. Headquarters will be pleased to supply the address to which the key should be sent.

Roger Hawkey, G5ZG, tells us that among his "class mates," at a special training centre he entered on joining the Navy last October, was "Jock" Henderson, G8JV, one of the keenest of Midlands 56 Mc. enthusiasts.

Roger writes: "It is impossible to tell you what a real pleasure it is to find someone in a strange town amidst strangers with whom one can discuss our favourite hobby." That sentiment must have been expressed a few hundred times since September!

G5ZG wishes to be remembered to G6LL and all other old friends of the air. His present rank is Sub-Lieut., R.N.V.R., and letters can be sent via "Little West Hatch," Chigwell, Essex.



Apropos the paragraph published last month in which we referred to the activities of Coventry members, Lt. Swinnerton informs us that G3YO and 8UX are still in England, whilst G5NO is serving at sea as a Telegraphist.

Sgt. P. M. Bartlett, G3OK, sends greetings to his ham friends and especially to G3DK and 6ZO. Peter tells us that serving with an Anti-Aircraft Regiment in "Zummerzet" has not eclipsed all interest in his pre-war hobby—which is nice to know. We reiterate his hope that we shall all be back on the air before the next sunspot maximum—provided that occurs *this* year!

Friends of J. M. R. Sutton, GW2NG, may be wondering what has become of him. In a long and newsy letter to H.Q. he tells us that he was granted a commission in the R.A.F.V.R. last September. He is at present a Flight-Lieutenant and Officer Commanding an important R.A.F. station somewhere on the east coast of England. He sends special greetings to all in District 10 and to those who co-operated with him on 56 Mc. Letters can be forwarded via his home address 15 Caradoc Street, Cwmarn, Crosskeys, Newport, Mon.

H. V. Prince, G3UF, of Halifax, who is serving as a Telegraphist in a trawler tells us he has a comfortable shack with only one thing missing—a transmitter for the ham bands! He will be glad to hear from members especially from any who are following his present occupation. Letters should be sent via H.Q. He sends special greetings to Tel. J. Holden, GM3SF.

Tel. J. H. Brazzill, R.N.V.(W.)R. would like to hear from G8KU, whom he met in barracks, and also from the amateur believed to be located temporarily at Brightlingsea. Letters may be sent via H.Q.

### Canada's Response

Mr. F. H. B. Saxon, VE3SG, President of the Canadian Amateur Radio Operator's Association, has kindly forwarded the call signs of over 90 Canadian amateurs who have enlisted for foreign service. We hope that every Canadian amateur who arrives in England will endeavour to get in touch with R.S.G.B. Headquarters.

### Ham Coincidences No.1

Whilst on the troopship taking him to his station, Mr. B. C. Leefe, G5XI, had the good fortune to meet ZLIMZ. On arrival at destination he found that a local "townie" in Victor Sims, G5VS, had also been posted there as a telegraphist. Later, after contracting malaria he discovered that two of his fellow sufferers in hospital were G2YJ and 5VS. Needless to say "ham radio" was the chief topic of conversation during their convalescence.—G2SO. [Next please, Ed.]



Frank Wyer (G8RY) and Ernest Lawden (G3SS) are serving with the R.A.F. somewhere in England.

# RADIO IN THE OUTPOSTS

By W. A. CHAMBERS (BERS482)\*

*To those who live in crowded cities and towns, it is difficult to appreciate fully the great difference broadcasting has made to the lives of people in remote parts of the British Empire. The author of this article brings home to us in a vivid descriptive word-picture, the benefits accruing to the Colonial listener.*

TO appreciate the wonders of modern radio communication and the great part it plays in our lives, one must live in the outposts of the Empire. People in civilisation with their daily newspapers, cinemas, theatres and other forms of amusement on tap so to speak, can have no idea how radio supplies these necessities out "in the blue."

This is being written in a little corner of what was once North Eastern Rhodesia, before amalgamation took place with the North Western part in 1924, and the whole became Northern Rhodesia. Before that event, this was a protectorate possessing its own Governor and having the machinery necessary to satisfactorily administer the law, and to attend to the general welfare of its inhabitants.

This same country—renamed East Luangwa Province, a district of 30,000 square miles, rich in game of all kinds (and little else)—is now governed by a Provincial Commissioner, assisted by a District Commissioner, a District Officer, a Medical Officer and two European Police Officers, with a few native police.

It has a big native population and about 80 Europeans, mostly ex-Service men with their wives and children, engaged in growing tobacco and scattered round the little township within a radius of 100 miles. It has a school for European children, a hospital for Europeans and one for natives. Native schools and dispensaries are also scattered throughout the territory. The one small township in this vast area is called Fort Jameson, after the late Dr. Jameson who was more or less responsible for the founding of the Territory.

We are always about 10 years behind the times and a visitor from London, after inspecting our motor cars, would probably say we had not reached the 20th century!

To-day, our receiving sets are mostly on a par with our cars—out of date—and the reason is not far to seek. Reception from Daventry has so much improved, and as most of us have not had the pleasure of listening to a really good up-to-date set, why worry? The only two local general stores in the township are not in a position to stock new models of various makes in view of the possibility of having them left on their hands. Therefore everything new has to be ordered, and may arrive anytime from three to five months afterwards.

We are 400 miles from railhead on the west side and 200 on the east. Salisbury, in Southern Rhodesia, is 400 miles south and has a fair quantity of our business. \* From these three points goods are brought by motor lorry—a difficult journey during the rainy season, when rivers are swollen torrents. Up to a few years ago these journeys were mostly done on foot with the aid of the ubiquitous natives as carriers.

## Power Supply Problems

As we have no electric power, our radio sets are battery-driven. Dry batteries are sometimes a problem, especially during the wet season. For obvious reasons, the stores cannot maintain large quantities. Low tension accumulators were a major problem before the arrival of the Air Cell, owing to the scarcity of charging facilities and distance between.

The writer is a tobacco planter living 20 miles from town, with his nearest neighbour 10 miles away and a river between. This means that during the "rains," from December until April, we are virtually prisoners and see nobody.

Our broadcast receiver requires three 45-volt batteries, and during the wet season they suffer from the excessive humidity; consequently their life is shortened. When one "picks in" we send our boy for a replacement. He may get back within four or five days with a note which reads "Sorry—none, expect within two or three weeks." By the time we receive the new batteries probably the Air Cell has been attacked, and the salts are oozing from the connections; then another long delay occurs. Dry batteries and Air Cells are expensive items in this country, but with the cessation of the "rains" our troubles are generally at an end and Daventry comes in strongly on 13 metres.

Being in tsetse fly country there are no cattle. The Luangwa River, which is about four days' trek north from our estate, runs through the Luangwa Valley, and owing to sleeping sickness has earned for itself the name of "The Valley of Death." On the river itself, beautiful to look at in this dry and practically riverless country, sleeping sickness has occurred in several places and hunters have struggled back to the little township to die. No one has recovered to our knowledge and the danger is still there.

The writer has travelled from one end to the other of this beautiful valley on hunting trips, and since it extends for some hundreds of miles, the journey takes some time. Game of every description abounds and during one such excursion we saw one herd of buffalo about 5,000 strong on the dambo (plain) before sunset, standing steady awaiting the signal to move off to the feeding grounds. At our approach they got on the move and in a few seconds nothing but a cloud of dust was to be seen, their hoofs beating a strange tattoo as they galloped away. Here also we had the luck to encounter a pride of eight lions at 4 o'clock in the afternoon, only 30 yards distant, and a fine sight they were, to be sure. Although the writer gave battle and shot three, the others preferred to leave the locality as quickly as possible.

Elephants are also very numerous and 250 have been counted in a two weeks' trip. In fact, the

\* Nyambuli, Fort Jameson, Northern Rhodesia

valley, with all its dangers and disadvantages, and the river, with its thousands of crocodiles and wonderful bird life, draw hunters like a magnet.

Yearly, after the tobacco season is over and the crop disposed of, we collect half a dozen boys together to carry our few wants, which comprise only blankets, tea, sugar and flour for two or three months, and disappear into the blue. And it is to the Valley we go. Sleeping sickness, you say? Kismet.

Eventually we limp home with two or three pairs of tusks, each weighing 40 to 60 lbs. With these the author has frequently paid for his shooting licence and expenses for the trip, and then finished up a few pounds in hand!

But news has been lacking! Why wasn't a portable radio taken along? Well, people in the back-blocks hardly know what a portable radio is. We have heard of them, but few of us have ever seen one. Radio, to people situated in the backwaters alone for weeks and weeks, is not a luxury. It is a real necessity and has become part of our lives. Loneliness no longer exists. London calling and London talking to us personally. When was I there last? Yes, in February, 1901. And then Big Ben booms and I mechanically put my clock right.

Daventry supplies a Music Hall programme such as it would be necessary to go 400 miles to see. It supplies the daily news, which newspapers confirm a month later. Daventry attends to our spiritual needs in giving us a Sunday service when I can listen to the hymns of my boyhood. Before I received my set, I was never in a church twice a year, owing to distance. In fact, Daventry caters for my every need. Is it strange that I marvel at the wonders of Radio?

I hope within a few weeks to pack once more my few wants and again disappear into the blue. But this time, there will be three extra boys who will have charge of my set and batteries.

Will the hippo, in the river voice his approval of the B.B.C. Orchestra, and will the monkeys in the trees listen? I only hope an elephant does not come along and stop the performance by emphatically putting his foot down (on the set). I shall camp near native villages when possible. The stars above form my roof and freshly cut grass my bed, and no tent will be taken.

What will the natives say of this—the latest of the white man's magic? Many of them "up there" on the river have only occasionally seen a hunter or tax-collector. What will they think of the talking box? I should like a programme of drums, and especially native drums. I am sure the B.B.C. would never have a more appreciative audience. The hyena may get a laugh out of Will Fyfe and the lion in the distance may grunt his disapproval of such goings-on in his domain.

Yes, Radio is very wonderful and tropical Africa is no longer lonely.

"London calling" and with Daventry's kindly "Good-night to you wherever you may be," I switch off and go to bed.

### QSL BUREAU

**M**EMBERS are asked to note that the R.S.G.B. QSL bureau is now being managed by MR. A. O. MILNE (G2MI), 29 Kechill Gardens, Hayes, Bromley, Kent.

## BOOK REVIEW

**THE RADIO AMATEUR'S HANDBOOK.** Seventeenth (1940) Edition. By the Headquarters Staff of the A.R.R.L. Published by the American Radio Relay League, Inc., West Hartford, Conn. 576 pages, including 8-page topical index and 120-page catalogue section. About 830 illustrations and 86 charts and tables. Price 7/-.

The new Handbook shows very many changes, and its 32 chapters present what is really a new book.

The first two chapters introduce the newcomer to amateur radio; then follow four chapters on principles and design, and these survey the essential features without becoming too analytical. Fourteen chapters deal with construction and adjustment, and range from workshop practice, receivers, power supplies, right through to station assembly. There is a special chapter on complete transmitters in which one is given sufficient detail to satisfy even the most precise copyist.

The aerial section is a little handbook in itself. There are five chapters, and starting with fundamental principles one passes on through the design of aerials of all sorts, and transmission lines, until reaching the most elaborate directive arrangements.

Five chapters are devoted to the ultra-high frequencies, and here are descriptions of proved apparatus for frequencies up to 224 Mc. A chapter covers the special aerial requirements of these bands, and an interesting type is the stacked coaxial arrangement.

There are chapters on emergency and portable gear, on station assembly, on measurements and related equipment, on operating, and many other phases of the subject. There is a chapter of miscellaneous information containing mainly tables of valve data, and this information is extraordinarily comprehensive.

There is no doubt that the new edition is a most worthy successor to the now long line of valuable Handbooks. The gear described is right up-to-date, and reliable, and the practice described is the best.

T. P. A.

(Orders for this publication can now be accepted by headquarters, see announcement on p. 324).

### Canadians on Service

With reference to the paragraph printed on page 340 Mr. Fred Saxon, VE3SG, President of the Canadian Operators Association, has kindly sent us a further list of Canadian amateurs who have enlisted. Unfortunately the list, which contains 58 names, does not designate the various services, but Mr. Saxon informs us that a large number of amateurs from the Prairie Provinces have joined the Navy. This seems remarkable when it is remembered that these men have come from homes at least 1,000 miles from the Pacific and 2,000 from the Atlantic. We understand, however, the R.C.N.V.R. is responsible for this satisfactory response from the VE2, 3 and 4 Districts.

Incidentally, Mr. Saxon served as a staff sergeant with the Canadians in France during the last war, and married a London lady before returning to his home in Toronto.

### Technical Articles

The Secretary-Editor will be pleased to consider for publication technical articles.



## EXPERIMENTAL SECTION

By A. M. HOUSTON FERGUS (G2ZC)

**W**HILST appreciating the kind remarks made by Council in their Annual Report, the writer feels that it is right and proper to point out that the successes standing to the credit of the Section are due to the team co-operation, no less than to the efforts of the Section and individual Group Managers. When the Section was reformed two years ago an attempt was made to introduce the "happy family" spirit and from the results we have been able to obtain this method of operation has been fully justified.

It is desirable to keep in mind that the whole "make up" of organised experimental work within the Society has undergone many changes since the days of Contact Bureau and the old R.E.S. To-day with specialised contributions appearing monthly in THE BULLETIN, the trend of collective effort can frequently be followed more closely elsewhere than is possible in these notes. This observation applies particularly to the 28 Mc. and U.H.F. contributors, many of whom are prominent E.S. members.

Those who join a specialised group of E.S. are given the opportunity of studying in detail the work which is being carried out by similar workers in a particular field, and incidentally of adding their quota, but the writer is firmly of the opinion that the majority of R.S.G.B. members prefer to have experimental facts placed before them in the shape of complete articles rather than in the form of observations leading up to, at some remote date, an article. This applies especially to long term observations where the final result may turn out to be either negative or "not proven."

Readers must by now have noticed that although we outline, as a matter of general interest, the work being done by the Groups, it is by complete articles that we really show what the Section is accomplishing. War-time conditions have changed many of our plans but in spite of limitations and the depletion of our ranks those carrying on are determined to tackle many outstanding problems. It is to be hoped that our efforts will result in the betterment of design and circuit layout (to mention but two features of our work) so that when hostilities cease we shall have contributed a moiety of advancement to many problems of interest to the radio amateur.

It has been decided not to issue coloured membership discs during the war but to keep the names of all members on our registers pending their being able to resume normal membership at a later date.

G2ZC.

### Aerial Group

In view of the fact that many members will be unable to take an active part in Group work during the war and because several others are uncertain as to the time they will have available, it has been decided not to form Group Centres at the present time. The Group as now constituted comprises the following members:—J. W. B. Evans (GW3GL), H. Flintham (BRS.163), F. W. Garnett (G6XL), E. A. Hayward (GW2UH) and H. Jones (G5ZT).

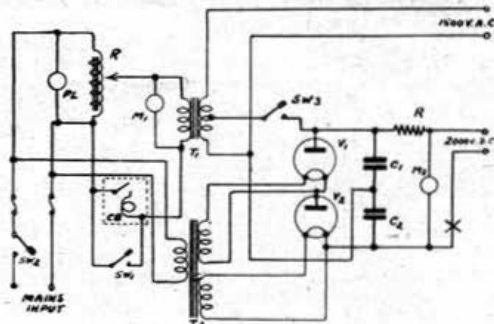
A letter budget is in circulation and it is hoped to give a summary of recent work in our next notes.

GM3OM.

### Receiver Group

In order to experiment with insulating materials, cables, condensers, etc., it is necessary to have available some form of A.C. and/or D.C. test set. A description of such a device, which is simple to construct and operate, follows:—

The A.C. portion of the circuit consists of a 500 volt transformer ( $T_1$ ) the primary voltage of which may be adjusted by means of a voltage regulator, a tapped choke or a suitable potentiometer. The voltage regulator, which is in effect a variable transformer giving continuous variation of voltage from zero to maximum, is the most satisfactory means, but where expense rules it out the tapped choke or potentiometer method may be used for low values of current and voltage. A circuit breaker (CB) is included to trip the supply when breakdown occurs; a suitable type may be obtained from Messrs. *Electradix*. The spring must be loaded according to the conditions of use, but a breaker tripping at  $\frac{1}{2}$  amp. is suggested for the circuit in question. A pilot lamp (PL) is included across the transformer primary to show when the apparatus is alive; a very desirable precaution to guard the operator from dangerous shocks. Fuses are also necessary in the input leads to protect the apparatus on short circuit in the event of the circuit breaker failing to trip. The voltage of the output is best measured by placing a 0-250 volt-meter (M1) across the primary and this is calibrated in output volts for the particular transformer in use.



An A.C.—D.C. test set.

The D.C. portion of the test set consists of a voltage doubler circuit using two GU1's (V1 and V2) as rectifiers. The filaments of the rectifiers must be fed from two independent windings of a transformer and the insulation between the windings should be capable of standing 5,000 volts peak test. The condensers  $C_1$  and  $C_2$  are  $2 \mu F$  2,000 volt working and the limiting resistance  $R$  is 3,000 ohms. The switch  $SW_3$  is included to allow the rectifiers to heat up before the H.T. is applied and to isolate the D.C. portion when making A.C. tests. This switch must be well insulated as it is connected to the centre tap of the secondary of the main transformer. The switch  $SW_1$  which may be ganged with  $SW_3$  is used to short circuit the breaker for D.C. testing; breakdown in this case being indicated when the voltage on  $M_2$  drops to zero.

Some readers may be puzzled by the fact that for A.C. testing the whole of the secondary of the main transformer is used, whereas only one half is used for D.C. work. The explanation lies in the fact that the rated A.C. output is 1,500 volts R.M.S., whereas the D.C. output is 2,000 volts rectified peak voltage. In order to use the whole secondary winding, larger rectifier valves will be necessary, giving an output of approximately 4,000 volts.

Leakage current may be measured by inserting a milliammeter at X, which should be protected from breakdown by paralleling it with a Philips 4378 "Neon Type" discharge unit.

The uses of this type of test set and some experiments with it will be dealt with next month.

G5HF.

### Transmitter Group

Although the war has affected our membership the Group continues to maintain an active interest in all matters appertaining to experimental transmission.

Every endeavour will be made to publish brief extracts of important foreign developments on the lines suggested by the Aerial G.M. last month.

It is hoped shortly to circulate a Group Letter Budget dealing with such developments, and in this connection the G.M. asks all members to please advise him if they discover any interesting information in little known publications.

GW4KQ.

## COSMIC NOTES

By E. J. WILLIAMS, B.Sc. (G2XC)

### Sunspots

DATA is available for the period November 18 to December 30. No unusually large spots were reported during this time, and during the first few days of December spots were extremely rare. On December 5 the United States Naval Observatory recorded only three spots and the greatest number recorded on any day in December was 47 on the 14th of the month.

A number of large prominences were observed at Tokio Observatory during the latter half of November. Dates on which particularly large prominences were reported were November 21, 25, 27 and November 30 to December 3.

### Magnetic Elements

Magnetic activity was generally quiet during the same period. Disturbances of a moderate character were recorded on November 25 and 26, December 6 to 8, 16, 21 to 22, and 27. On December 1 and 12 there were disturbances known as bays lasting only an hour or two.

### Radio Conditions

Measurements at Washington, U.S.A., show that the critical frequency at midday for the F2 layer has been of the order of 11,000 kc. Actual figures for Wednesdays beginning November 22 were: 11,200 kc., 11,000 kc., 11,000 kc., 11,600 kc., 10,200 kc., 11,000 kc.

These figures are about 2,000 kc., less than the figures for the corresponding period last year.

## BOOK REVIEW

THE A.R.R.L. ANTENNA BOOK. By George Grammer and Byron Goodman (of H.Q. staff of A.R.R.L.). 139 pages, 246 illustrations and many tables. Published by The American Radio Relay League, Inc., West Hartford, Conn. Price 3s.

The foreword to this book rightly points out that, until recently, amateurs have been operating "hundreds of dollars' worth of station apparatus on about a dollar's worth of antenna." Advances in transmitter technique have been such, that improvements in station performance now mainly depend upon better radiation systems.

This book compiles much of the theory and practice of aeriels suitable for amateur use, and deals with all types from the simplest Marconi to the ambitious rhombic; indeed, one would hardly be surprised to hear of a U.S.A. station using a multiple-unit steered aerial!

Perhaps in aerial design one needs to have a better grasp of the underlying principles than in any other part of the equipment, and the reader will get much help from the sound and clear treatment of these principles by the authors.

The book is divided into 18 chapters, the first four dealing with wave propagation, aerial fundamentals, ground effects, and feeder systems. After this excellent foundation is laid, the various types of aerial are considered, starting with the half-wave type and passing on to long single wires, multi-band aeriels, driven arrays, parasitic arrays, vee aeriels, rhombics and aeriels for 160 metres. After a consideration of designs for U.H.F. work, there is a chapter on special systems, which include loops, artificial aeriels, bent aeriels, three-feeder double aeriels, etc.

A useful chapter on "Finding Directions," well-illustrated by azimuthal maps, should be very helpful.

The remaining three chapters deal with supports and construction, rotating mechanisms, and receiving aeriels.

The illustrations, which are excellent, average a little under two per page, and full practical information about all types is given in charts or formulae.

The authors aimed at supplying all the modern aerial information that the amateur could use, and the writer feels that they have succeeded most commendably.

It is a very useful book, and despite the fact that it was read under blue lights while travelling under "black-out" conditions, the writer found it most enjoyable.

T. P. A.

(Orders for this publication can now be accepted by headquarters, see announcement on p. 324.)

### Those Free Handbooks

It is with grateful thanks we record that several members, and one Radio Society (Cannock), have most generously contributed to our Fund for sending copies of the Society's Handbook to members on active service. Space limitations prevent us quoting from the letters received from service members who have been recipients of free copies, but we can assure all who have contributed that their kind gesture has been very greatly appreciated.

Further donations to the Fund will be welcomed, as will requests from members serving abroad who would like to receive a copy.

# THE MONTH "OFF" THE AIR—January, 1940

By ARTHUR O. MILNE (G2MI)

**T**HE response to the appeal last month, under the heading "Will you help?" has been most gratifying. All those who replied have been written to individually.

Conditions during the first month of the new year have been very poor, especially after dark; this lines up with observations made during the same period last year, except that 28 Mc. has been practically dead. It would not be surprising if this band fails to open up at all next year.

No further countries have been closed down and the Portuguese appear to be working general contacts again. A CT was heard working ES2G recently. It is also interesting to note that the Russians are still on.

During the course of an extremely interesting letter, W6QVY, of Salt Lake City, Utah, tells of his recent visits to the Conventions at San Francisco and Denver and details some of the prizes awarded which included a Hammalund HQ-120X, a National HRO complete, a Hallicrafters Dual Diversity receiver complete, a Hallicrafters HT7 and hundreds of smaller prizes! The declaration of war was heard on his car radio whilst crossing the Nevada Desert in the early hours of the morning where, he says "you boil during the day and freeze at night." "At Denver" he relates "we were to have had a talk on breakdown of insulating materials at high voltages. The speaker was drawing two-foot arcs from a diathermy machine up front, when he put his hand inside to change the capacity and apparently received a condenser discharge and straightway flopped out. He was immediately jumped on and artificial respiration was started. Everything was done just like the first aid books say; the fire department was telephoned and told to bring their respirator, a doctor was next called, the windows were opened and the victim's clothing loosened, coats wrapped round him, etc. After ten minutes had passed and no fire siren had been heard, the man recovered and was carried out. One fellow fainted during the proceedings and you can guess we were all pretty well excited! It wasn't until the next night at the banquet we learned that the whole thing had been timed to show us what do to when someone really does catch a packet!"

W6QVY also says that the W's are having their 112 Mc. band narrowed from 112-118 Mc. to 112-116 Mc. The 1.7 Mc. band is to be moved from 1,715-2,000 kc. to 1,750-2,050 kc., an increase of 15 kc., as soon as removal of existing non-amateur stations to beyond 2,050 kc. can be facilitated.

The Australians have received written assurance from their Post Office that their calls are being reserved for them until after the war. Talking of VK, it is interesting to note that VK4JP is the one and only holder of the B.E.R.T.A. telephony award in the whole world.

G5LU has just received a letter and QSL from VK9VG confirming the first G-VK9 'phone QSO. A packet of QSL's has also just arrived from our old friend and fellow member I1IR who may still be heard with his T9 note on 14 Mc. A few lines about our ham friends in Italy would be appreciated o.m.

VU7BR, at present on leave in this country, will gladly send a further card to anyone who has not

received confirmation of a QSO with him, if they will send a card *via* the bureau at G2MI, giving details of the contact. He points out, however, that all his cards and logbooks are in Bahrein so he cannot do anything until he returns in March. He had a new batch of cards printed just before the war and will be glad to find a home for a few of them.

This example might be followed more generally; there are many of us who still await cards for much of our good DX and now that time hangs rather heavily on many amateurs' hands, it would be an excellent thing to help cheer some of the lads with that overdue card. QST had a note on this same point in their January issue which we heartily endorse. No ham who still has his ticket quite realises what the arrival of a few unexpected cards means to the fellow who has not. So what about it? Some of those outstanding cards for W.A.S., for example, or that odd one or two which will put lads like G3JR, 8IG and 8IL into the Century Club. G5XB looked in the other day and surprised us by his list of cards still outstanding—VQ2, VK2, VK5, for example! Not just one card but several in each case.

VQ3HJP bemoans the hamless life but says his gloom was lightened on Christmas morning by the arrival of a card from HBICE. He also offers to QSL again to anyone who has not yet received his card.

## D.X. PERSONALITIES—No. 8.



Wal Ryan (VK2TI) Past President and Secretary of W.I.A., one of Australia's best known DX operators.



In a recent letter, GM5IR mentions that he had worked 62 countries, 24 B.E.R.T.A. districts and 26 zones in six months with 230 volt D.C. mains, a really remarkable performance.

For the general interest, we record that cards addressed to PK1PY, ITS, IAF, IOH and 4HV have been returned "unknown."

In reply to several enquiries, it is confirmed that reports cards may be accepted at the bureau for transmission to countries whose amateurs are still active, but members are advised to forward cards for "rare" countries direct. There is no postal censorship to the American continents, but as A.R.R.L. is kindly handling all cards for the Americas for us, please keep these down to a reasonable minimum.

May we appeal for more monthly reports for this feature, either of personal observations or gleanings from personal correspondence, and, in passing, would any member be willing to loan a portable type-basher to your scribe for the duration? Full care and responsibility and maintenance guaranteed.

G6NU sends a short note acknowledging some cards and says rationing is nearly sending him "nuts." He is the manager of a large grocery store. Most of our other Medway members are at work on civilian Government service.



"Ham" Whyte (G6WY), one of England's best known DX operators, now a Flight-Lieutenant in the R.A.F.V.R.

2CNC quotes a letter from VU2FA who says he got his WAC on September 1/2, 1939! It will be remembered that VU stations were closed down a day or two after us. Certainly a close finish!

W9V DX laments the disappearance of British Empire stations as he needs only two colonial areas for B.E.R.T.A. U9AW, 9BC, 9ML, UK9AN, AC4JS, XU5WT, 8MI, 8WS, J8CG and J8CL are all good around 23.00 G.M.T. there and he also mentions that EA7AV is old EAR151 using 250 watts input. To quote his own words "Ye gods, what competition there is for DX now! Let one little blooper pop up anywhere on 7 or 14 and Wow! I'll bet the DX op must think the heaven's opened and cracked down on him!"

Several hundred cards, many of them relating to contacts in 1936, recently arrived from Hungary. This seems to be another case of poor staff work.

Some of these European societies will have to look into their QSL organisation pretty thoroughly when things return to normal!

G8IL mentions the excellent signal from VLZ on the 9 Mc. band, also VLQS on VK2ME's old frequency of 9.59 Mc. VLR on 9.58 still comes through in the early morning and KZRH the very American sounding "Voice of Manila" on 9.64 Mc. gives news in English at 13.45 G.M.T. each Sunday. G8IL uses a 9.5 Mc. doublet and remarks on the good results.

Once again, please send us your news so that this feature, your own little chatty corner, can continue to hand out the latest dope.

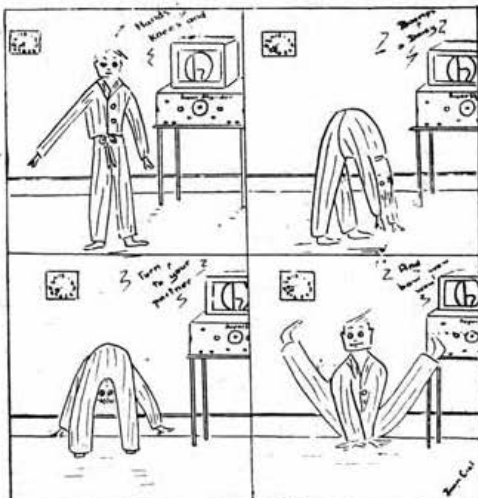
## THE 28 Mc. BAND

By NELLY CORRY (G2YL)

LAST month fewer 28 Mc. signals were heard in Great Britain than in any winter month since October, 1935, when the band first opened up for worldwide contacts. It is impossible to say how dead the band really is, but the widespread reduction in activity is undoubtedly assisting in the premature arrival of "sunspot minimum conditions." On lower frequencies a mixed collection of broadcasters, commercials, semi-commercials and "pirates" are gradually encroaching on the amateur bands, but apparently its uncertain reputation is causing 28 Mc. to be left severely alone by such stations.

From reports to hand it seems that during January no signals were audible from Oceania, Asia, Africa or Europe, and HC1JB, logged by BRS3003, 3179, and 3585 on January 20 and 21, has the distinction of being the only South American reported. From the West Indies, CO2WM was heard by BRS3003 at 16.10 G.M.T. on January 1, and BRS3179 heard K4FOW.

U.S.A. signals were only reported on 18 days during the month, but possibly a few came through on several other days at times when no one happened to be listening for them. As a rule a few East Coast stations were audible between 14.00 and 17.00 G.M.T., but the 4th, 5th and 9th districts were only rarely heard, and no West Coast stations were reported at all. Signals usually faded rather badly,



The early-morning DX ham in War-time.



and often only one or two stations could be heard on at a time.

W9BNX reports that there was a considerable amount of "summer short skip" in the U.S.A. during the second week in December, apparently due to sporadic-E layer reflections. During the last half of November "extended ground wave" signals were also reported every evening in the 9th district, after the W6's had faded out, and they were audible until the early morning. A "round-table" was held in the Chicago area on November 28, from 7 p.m. to 1.20 a.m., in which 62 stations participated (!), including a number who were over a hundred miles from Chicago.

Reports from 2BGN, BRS3003, 3179 and 3585 are acknowledged with many thanks, particularly as listening on "Ten" has lost most of its thrill these days.

## THE ULTRA-HIGH FREQUENCIES

By CONSTANCE HALL (G8LY)

### British Columbia-Japan on 56 Mc.

I recently came to the knowledge of the writer, via G2YL that Mr. W. Wadsworth, VE5ZM (now in England with the Canadians) had participated in a Trans-Pacific 56 Mc. contact. By dint of careful enquiries it has been discovered that VE5ZM was in contact on August 27, 1939, with the Japanese station J2KE. Communication was established at 01.35 G.M.T. after a prolonged series of schedules had taken place between the Canadian station and J2KE, 2KG and 2NF. These schedules, it is learned, had been kept every third day for a period of six months commencing at 01.00 G.M.T. On the day in question the usual procedure was followed and VE5ZM had the thrill of hearing J2KE come back to him with a report of 449. Signals faded out immediately afterwards.

Mr. Wadsworth received confirmation, of what must surely be a record contact, three days before he was called for military service. As a result he was able to give the news to British amateurs in person.

His portable transmitter employed 6L6GX, 6L6GX and parallel 6L6GX's final modulated with a 6F6G to give an input of 50 watts. His receiver was an RME 69 with 510X frequency expander, operated from vibrator supply. The portable was located in a car on a mountain top 5,400 feet above sea level.

The story of this achievement is but a further example of what can be done when proper schedules are arranged and kept. We offer our congratulations to both parties, and in passing express the hope that the Japanese amateurs operating on the u.h.f.'s will let us have news for publication. In the meantime we commiserate with VE5ZM on the closing down of his station just when success was attending his efforts.

### U.S.A. News

The A.R.R.L. announce a U.H.F. Marathon for 1940. All amateur frequencies above 56 Mc. may be used and points scored for contacts, depending upon distance. Three medallions are to be awarded to

those who work the most states during the year. With this event under way, U.S.A. activity should increase and although there is little likelihood of signals being heard in Great Britain, we hope it will be possible to publish transmitting schedules for the benefit of those who wish to co-operate by listening.

### British Isles News

As a result of day-to-day observations over a period of three years G6DH has been able to furnish figures showing the average highest receivable frequency for the months February and November, 1937-9. The figures reproduced below show a falling off in conditions since 1937.

	1937	1938	1939
February	43.25 Mc.	39.1 Mc.	33.5 Mc.
November	42.5 Mc.	42.5 Mc.	32 Mc.

The predicted sun spot maximum of 1939 apparently occurred earlier than was expected.

As a point of interest it was during 1936-7 that signals from G6DH and 5BY were heard in the U.S.A.

G8OS who is still a confirmed believer in straight receivers continues his rebuild using "footless" valves for work down to below 1½ metres. G3SB and 3VA are constructing portable receivers in preparation for the time when signals can again be radiated. G2BI, 5LT, 6YL and 2DDD are thanked for their letters dealing with transatlantic 56 Mc. reception. Space limitations prevent publication of details at present.

In the next issue it is hoped to publish a list of U.H.F. definitions prepared by "Radio" in an attempt to standardise our understanding of terms and phrases used in U.H.F. work.

### From our Post Bag

"Allow me to offer my heartiest congratulations to Council on their decision to carry on, and also, to everyone concerned, for the excellent way in which the good work is being carried on—in particular the 'BULL'."

"Only a 'ham' knows how great is the wrench when he loses his ticket (and his gear into the bargain), but he also knows how great is the encouragement and consolation afforded him when he opens his favourite and most cherished periodical."

"The gratitude of all members to the editorial staff and contributors can be expressed in three letters—TNX!"

"And when a 'ham' says 'tnx' he means it." G3VK.

"I am just another one of the 'gang' writing to you from 'somewhere in England' to express my appreciation for the 'Bull' which I receive from my home address. Before the 'hiatus' started I don't think I really appreciated it, but believe me there's a row now if it's late in coming!"

G4NC.

### Stray

Friends of Eric Trebilcock, BERS195, will be interested to hear that he is now employed at the Aeradio School in Sydney. His private address is 254 Glebe Road, Glebe Point, N.S.W. Eddie Hagarty, VK4WH, another well known Australian amateur is also at the school together with VK2ADM, 2AHQ, 2FD, 5GA and 5TK.

# BRITISH ISLES NOTES AND NEWS

## DISTRICT 1 (North Western)

**Blackburn.**—The bad weather last month somewhat reduced the attendances at group meetings. ZD2H is back, having obtained six months' leave, and he will, no doubt, be glad to renew acquaintance with those who knew him as G2QN. Visitors from any District are welcome at 6 Ash Street, Blackburn.

**Burnley.**—No reports have been received, but it is known that G3IY is somewhere in France with the R.A.F. What about it, local members? Please call on, or send details of your activities to, G5ZN.

**Cumberland.**—A very pleasant afternoon was spent at G6WR on December 24, when G3BW, 2AUM and 8RZ were present. G3BW was home on leave from the R.N. A visit was also paid to 2AUM where refreshments were taken. 2AUM is doing occasional spells of listening on most of the amateur bands. 6WR has rebuilt his speech amplifier into a battleship grey cabinet and has made a fine job of it. 2DWG is busy on receivers. G3HJ, 3HJ and 8RZ are also active and "active" now means cleaning up, repairing and rebuilding odds and ends! The T.R. was pleased to receive a letter from G3HS, of Carlisle, who reports that he has just had his receiver back from the G.P.O. and sends his best wishes to the Cumberland group. G8RZ reports that his address is now "Fairfield Farm," Distington, Workington, Cumberland.

**Liverpool.**—In view of the response to the note published in the November BULLETIN, it is clearly impracticable to arrange regular monthly meetings in town, but a most friendly gathering was held at G6KS in December, supported by G2JT, 3WT, 6DP and BRS Howarth. Arrangements for further meetings are under consideration and will be published later.

G6TW via G6CX.

## DISTRICT 2 (North Eastern)

The D.R. (Mr. L. Parry, G6PY, 13 Huddersfield Road, Barnsley) asks that all T.R.'s in District 2 should advise him by the 25th of each month of meetings to be held in their area. News for inclusion in these columns should also be forwarded to him direct by the above date.

Reports are to hand from Barnsley and Huddersfield. In the former town the local club continues to hold monthly meetings at members' homes. Mr. C. T. Malkin, G5IV, 5 White Hill Terrace, Dodworth Road, will be pleased to hear from any member (service or otherwise) who desires information concerning these meetings.

From Huddersfield, Mr. J. Dale, G5VD, 12 Langley Terrace, Crossland Road, Oakes, reports that a war-time "fireside chat" and tea took place in December at his home when a dozen members attended. It was decided to hold similar meetings each month on Sunday afternoons. Local members will be advised of the date and venue in advance. Whole-hearted support is to be given to the Society and the local group will be kept intact.

Good wishes are extended to G2PC, who is now on active service.

G6PY.

## DISTRICT 5 (Western)

The first meeting of the Near Year was held in Bristol on January 2 and resulted in an attendance of 14, including two visitors, G8NW and GM5LF, both of whom are welcomed to the District. A telegram of greetings was received from ex-G6AC, now resident in Newfoundland. "Chem's" good wishes for 1940 are heartily reciprocated.

G6GN finds it difficult under present conditions to find time to look after Bristol affairs and his place is therefore taken by A. A. Uppington, 2BAR. G6GN is sincerely thanked for the excellent results he has accomplished during his year of office.

At the next meeting Morse practice will be given at various speeds and all will be invited to take part. Bristol meetings now take place regularly on the first Tuesday in the month at "The Antelope," Broadmead, and visiting "hams" are particularly welcome.

\* \* \*

With these notes, Jerry Walker, who has been granted a commission in the R.A.F.V.R., gives up, for the time being, a long and happy association with the Western District. He extends his best wishes for the future to all members within the District and trusts they will give to his successor in office, Arthur Bartlett, G6RB, all the support they possibly can.

## DISTRICT 6 (South Western)

There is again little to report, although it is known that several members are doing their best to keep up interest. A post card each month would be greatly appreciated.

G3SB advises that he entertained Taunton members by displaying the Society's films. The meeting took place at G6LY and was much appreciated by all present, G3VA is experimenting with receivers.

G5SY.

## DISTRICT 7 (Southern)

The 35 who braved terrible weather conditions to attend the January District meeting held at G2YL, thoroughly enjoyed the wonderful hospitality extended to them by Mr. and Mrs. Corry and the operator herself. Several visitors from other Districts were present in addition to one "item" of real DX in the person of Gunner Bill Wadsworth, VE5ZM. Several of the locals also turned up in either khaki or blue.

After tea, as the company did not seem to display any fears of returning home in the black-out, the D.R. set a questionnaire which was won by Sgt. Ted Laker, G6LK. Presumably everyone reached home safely although the D.R. and his party had one nasty moment when the road "disappeared" from under the front wheels of the car. A reconnoitring party discovered the river to be within a few inches of their position!

Arising out of a suggestion made at the above-mentioned meeting, VE5ZM offered to arrange a ham gathering at Farnborough on February 25. It is hoped that all amateurs in the area (members and

non-members alike) will make an effort to attend. We understand all Canadian Districts and W8 will be represented! The meeting will take place at the Y.M.C.A. off Lynchford Road, North Camp. Meet at 2 p.m., tea 3.30 p.m.—Remember the date, February 25.

**Weybridge.**—A meeting will be held at Barnes Café, Church Street, Weybridge, at 2.30 p.m., March 3. All are welcome and in particular we hope to see a large number of local members. Summer time (sic) will have returned by then so there should be plenty of time to get home before the black-out. G5WP.

### Forthcoming Events

- Feb. 17 District 13, 3 p.m. at Brotherhood Hall, West Norwood.
- „ 18 Scotland "A" District, 2.45 p.m. at the Y.M.C.A. Residential Club, 100 Bothwell Street, Glasgow. Talk by GM8HJ. Subject: "Some experiences of superhet construction."
- „ 20 District 14 (Southend Section), 7.30 p.m. at G6LF (see District notes).
- „ 23 Informal London Meeting, 5 p.m. at Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2. Charge 1s.
- „ 24 District 15, 3 p.m. at The Excelsior Hotel, Ladbroke Gardens, Ladbroke Grove, W.11.
- „ 25 Ham Gathering for the Services, 2 p.m. at Y.M.C.A., off Lynchford Road, North Camp, Farnborough, Hants. Tea at 3.30 p.m.
- Mar. 3 District 7 (Surrey Section), 2.30 p.m. Barnes Café, Church Street, Weybridge.
- „ 16 District 13, High Tea, 4.30 p.m. at the Horns Hotel, Kennington, S.E. Charge 2s. 6d.

### DISTRICT 8 (Home Counties)

As one or two members have commented on the absence of notes last month, we have re-doubled our efforts to glean some tidings.

**Cambridge.**—Has G2XV's petrol ration stranded him somewhere in the wilds? No news of him for weeks. 5JO's shack has undergone a transformation. We no longer fear the power-packs, but sundry whirring machines, belts, and counter-shafts provide the danger element. 5DR serving with the A.F.S. is now as adept with darts as he was in working DX. 5DQ listens round the bands consistently. We understand that 8FF is now in the R.A.F., as is 5PU, who is "somewhere in France." 8SY, still in Cambridge, reports "all's well."

**March.**—G3WW, who called upon the D.R. a day or two ago, has recently added a junior-op to the

family, and has electrified master David's model railway! 3BK is Petroleum Officer to the Isle of Ely C.C., but is not open to bribery anyway. Thanks to 6LX for card (no address), who we believe is now in Hampshire.

**Bedford.**—G5FO is serving with the Police War Reserve, and consequently sees much less of the other members. 3KG, of Luton, has recently purchased a Tobe receiver, ready for the post-war period.

**St. Ives.**—Rather belated congratulations to G6WA upon his marriage. 5RL is a member of the Observer Corps. 4AZ is doing his utmost to improve code and technical knowledge during the "off" period. We read in last month's BULLETIN that G5OV was serving with the R.N.W.A.R., but we believe that he is still at home. [Correct—see "Khaki and Blue."—Ed.]

**Peterborough.**—G2NJ listens daily to the Press matter sent out in Morse from certain commercials and finds it excellent for maintaining one's speed. He is also constructing two fresh receivers. G5NP has been engaged on A.R.P. duties since well before the war. He has kindly provided his post with a broadcast receiver and this is much appreciated. G3DY in Whittlesey is also on A.R.P.

Any news items for inclusion next month will be welcome—phone Cambridge 54644, or call for a rag-chew. G5BQ.

### DISTRICT 10 (South Wales & Monmouthshire)

In the absence of any communication from the D.R.—Mr. Scott Farnie—Headquarters invite an offer from a District 10 member who would be willing to act as District Scribe.

**Cardiff.**—GW2UH, 5BI, 8WU and 4KQ (the T.R.) met on January 21 at the home of 8UH. The war-time activities of local members were discussed and the T.R. was instructed to convey greetings from the "home front" to all District 10 members on active service including GW4FW, 6FO, 8NP, 2HHS and 5FI—wherever the latter may be!

Cardiff members would be very glad to welcome to their meetings any serving amateur located in the area. The T.R.'s address is 132 Clare Road.

### DISTRICT 12 (London North and Hertford)

**North London.**—In spite of very bad weather conditions twelve members attended the meeting held at G6OT; it takes more than a few feet of snow to keep hams away from a ragchew! Among others present, we were pleased to welcome Sub. Lt. "Bill" Brigden (G6WU), who is our latest member to join H.M. Forces. G3DT is leaving the district this month for the Orkney Islands, and we wish him the best of luck in his new job. He is hoping that the war will be over in the not too distant future, so that he may be able to help himself to some good DX with the bait of the Orkney's before he returns south again. Congratulations to G5DJ, who is to be married in Malta shortly. His YL has recently left this country to join him, and we wish them both every happiness. G5FA is now back in London and up early doing his exercises to try and get rid of that stone in weight which he put on whilst in Berkshire! An interesting letter has been received from an old friend of the district, G6FI, who is serving in France with the R.A.F. His friends will be pleased

to hear that he will soon be home on leave. During "restful periods" he is studying the Handbook! The next meeting will be held at G8TY, 92 Arlington Road, Southgate, N.14 (telephone ENTprise 3219) on February 25, at 3 p.m. Book to Southgate tube station, from where it is ten minutes' walk.

*Watford.*—News comes this month from the T.R. G8MH, who informs us that no meetings have so far been held, although it is hoped to arrange one as soon as the better weather comes along. 2BOK has taken a position as civilian Army instructor. G8HM is building a new 12 valve communication receiver and is active in the E.S. 28 Mc. Group.

G8CK, R.C. of S., and stationed near Hertford, tells us that G3KP is building him a compact receiver which he can easily carry around. 2ATZ is also with him. Their only grouse is the lack of ham reading. If anyone has any books to pass on, the address may be obtained from G5FA. They also enquire after local activity in the Hertford and Welwyn area. Will any member in that locality who can arrange a meeting advise us, so that a notice can be inserted in THE BULLETIN. The T.R. G5UM is on active service.

G5FA.

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### DISTRICT 13 (South London)

As indicated in our last notes, arrangements have now been made to hold a High Tea at The Horns Hotel, Kennington, on Saturday, March 16. Time 4.30 p.m. for 5 p.m., inclusive charge 2s. 6d. As this is something of a venture in these times it is hoped that London members generally will make every effort to attend. South Londoners will be given the chance at their next meeting to hand in their names, others should advise the organisers, G2JB and 8TN not later than February 29. These gentlemen are warmly thanked for making the arrangements.

An excellent attendance was recorded at the January meeting held on the 20th at the Brotherhood Hall, West Norwood. At the next meeting which is arranged to take place on February 17 at the same venue, Mr. P. A. G. Voigt, who needs no introduction, will give a lecture and demonstration. Suggestions for future lectures will be welcomed by the D.R. whose address is 13, Montpelier Row, S.E.3.

We are glad to learn that several local members are keeping up their morse speed by arranging weekly practices. We would bring the desirability of this procedure to the notice of all who can spare the time, for it is vitally necessary not to let slip our proficiency in this direction.

G2WV.

### DISTRICT 14 (Eastern)

*Chelmsford.*—Meetings continue to be held alternatively at G6LB and 5RV, and the attendance, though unavoidably small, is none the less enthusiastic. 6LB is making good progress with his new superhet receiver. 5RV has his cathode ray gear working. 2SA has been doing a little listening. 8PB reports all well. 3SI attended the last meeting "by telephone" as he was unable to make the journey to Chelmsford. 3BS has moved down to Kent, but writes to say that the world would be all right if we could be on the air again. 8PL still does a little listening and hopes to attend the next meeting. BRS3650 has done some listening, but reports nothing much heard. The local group admire the way THE BULLETIN is carrying on.

*Ilford.*—The last meeting was held at G8TL, when the following were present: G2XP, 2RR, 8TL and 8SK; the latter brought his cine projector with films, including one especially devoted to ham radio. The "Wien" circuit details brought along by 2RR were discussed, and 2XP hopes to build it in time for demonstration at the next meeting. G3KZ, who is on radio research work somewhere in Great Britain, asks to be remembered to members of the district; he recently met G5KA, who has now gone "east."

*Southend.*—The first meeting since the war commenced was held at G2LC during January, but due to the very bad weather the attendance was lower than anticipated. Those present, which included G2KH, 2LC, 2SO, 4GT, 6NB and 6IF, enjoyed the opportunity to "ragchew." G3WP and 8AX were unable to attend due to R.N.V.(W.)R. duties.

The next meeting will be held at G6IF, "Polperro," Bideford Close, Devonshire Estate, Prince Avenue, Southend, on February 20. Service members in the area will be warmly welcomed.

G6UT.

### DISTRICT 15 (London West, Middlesex and Buckinghamshire)

At last the D.R. has found it possible to arrange a District meeting, and this will take place at the Excelsior Hotel, Ladbroke Gardens, W.11, on Saturday, February 24, at 3 p.m. This hotel is on the corner of Ladbroke Grove and near the station and bus routes. G5LN is the proprietor. A nominal charge will be made for tea by those taking it. Please make an effort to attend.

*West London.*—G3UQ has been in touch with OK1VU, who is now in the District. 8VM is on the high seas, 4PA is in training with the R.A.F., and 4AR with the R.A.O.C. 8KZ has had several visitors at his warden's post. (Thanks, 3UQ, for the news. We wish a few more would report.—D.R.)

G3HT was quoted as the Chairman of the Edgware Short Wave Society in last month's notes, but this was incorrect as the popular and most enthusiastic Phil Thorogood holds the position.

As only two reports came to hand this month, we again appeal for items of general interest.

G6WN.

### DISTRICT 16 (South Eastern)

In taking over temporarily the duties of D.R. for the District, I should like to say first of all how anxious I am to make contact as soon as possible with the T.R's., most of whom are, I regret to say, not yet known to me personally. However, when





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## INDEX TO DISPLAYED ADVERTISEMENTS

	Page
A.C.S. Radio ...	351
Automatic Coil Winder and Electrical Equipment Co., Ltd. ...	Cover ii
Bernard Jones Publications, Ltd. ...	334
British Mechanical Productions, Ltd. (Clix) ...	322
Brookes Measuring Tools ...	351
Candler System Co. ...	323
Electradix Radios ...	322
Excelsior Hotel ...	351
G5NI (Birmingham) Ltd. (Radiomart) ...	321
Peto-Scott Co., Ltd. ...	Cover iii
Piezo Crystals Ltd. ...	322
Premier Radio Co. ...	Cover iv
Quartz Crystal Co., Ltd. (Q.C.C.) ...	Cover ii
R.S.G.B. Sales ...	324, 351, 352
Stratton & Co., Ltd. (Eddystone) ...	333
Taylor Electrical Instruments, Ltd. ...	334
Voigt Patents Ltd. ...	Cover ii
Webb's Radio ...	Cover i, 323

better weather comes I am hoping to get round the District and in the meantime letters and news of activity (however small) will be welcomed. We should remember that the "BULL." is still a source of interest and information to our colleagues who are on active service and news of our radio activities will provide for them an additional link with home.

G3WR (Brighton) is the only T.R. to report this month. His cheery letter is full of determination to keep the radio flag flying but he would be glad to have more individual reports from the members in his area.

Visits from members in the forces are of particular interest to most of us and if the censor does not object, are worth recording. Personally, I have been delighted to welcome an old 56 Mc. colleague here recently in the person of Mr. G. C. Oxley, G8MW. Need I say that any members who are in this neighbourhood will receive a welcome at 8 Beckenham Grove, Shortlands (phone Rav. 5894).

G2WS.

### DISTRICT 17 (Mid East)

There is still very little to report owing to the absence of news from the various parts of the District, so once again we ask all who can, to let us have a post-card once a month.

Grimsby members have been pleased to welcome G2CP and 4PY to the District and hope their stay will be a happy one. Incidentally we are glad to meet any member whose duties bring him to the town.

The Local Society continues to hold regular meetings and on January 20 its fourth Annual Dinner took place at the Market Hotel. Despite war-time conditions and the absence of many old friends, the event was a great success. In a short speech, the D.R. welcomed all visitors and expressed the hope that everyone would be present at the next dinner in addition to those whose duties had prevented them attending that day. After the toasts came a popular entertainment feature by Mr. J. Crooks whose skill as a conjuror has been appreciated at previous annual dinners. During the evening, G5GS on behalf of the members of the local society made a presentation to G8JN on the occasion of his marriage. The evening proved that even without transmitters, Amateur Radio is still as strong as ever.

G5GS.

### Scotland

"A" District.—The attendance at the January meeting was the best since last October. Mr. Niven (2CHN), in the absence of his co-auditor Mr. Ferguson (GM6WD) who was busy on duties arising out of the war, presented the financial statement for the year 1939. As in other respects, the District is sound financially and good progress has been made. Mr. Niven urged members to maintain this standard and contribute to District funds for future events. The adoption of the statement of accounts was duly moved and seconded. Mr. Duncan (GM6JD) paid a high tribute to the work of Messrs. Niven and Ferguson during the year, which was endorsed by all present. The high light of the afternoon was the presentation by GM6JD, on behalf of members, of a World Globe to Jim Stove (GM5ZX) on the occasion of his marriage. Gunner Gillies (2FZT) paid a visit to the meeting.

At the meeting on February 18 a talk of a practical nature will be given by Harry Jefferies (GM8HJ) entitled "Some experiences with Super-het Construction." This meeting will take place at the usual venue and time.

"C" and "D" Districts.—The first meetings of the year should have taken place by the time this appears in print. The following members of "D" District are on active service; GM3BZ, 3GG, 3YN, 3UM, 4HB, 5YX, 2BIQ and BRS2715.

GM6ZV.

### The Nickel Bulletin

The Mond Nickel Company Ltd., Thames House, Millbank, London, S.W.1, issues a Monthly Bulletin bearing the above title. A copy is sent to Headquarters and is available to any member interested in matters relating to the production of nickel and associated metals.

### Quartz Oscillators and their Applications

Some years ago, the Department of Scientific and Industrial Research issued a book summarising the available information on the construction, properties and the many scientific and industrial applications of quartz crystals. A new and up-to-date edition of this volume has now been issued ("Quartz Oscillators and their Applications," published H.M. Stationery Office, 4s. 6d. net.) It has been largely re-written by the author, Dr. P. Vigoureux, who was until lately a member of the staff of the National Physical Laboratory.

A

## BEST SELLER



The recently introduced emblem call sign badge is one of the most popular items introduced by the Society.

Price 2/6

(DELIVERY  
7-10 DAYS)

At District and Local Meetings, the badge instantly identifies the wearer.

Order yours to-day and send one to your pal in the services.

**R.S.G.B.** 16 ASHRIDGE GARDENS  
LONDON, N.13

## ON ACTIVE SERVICE

## FIFTH LIST

WE publish below the fifth list of radio amateurs on active service. Additional details and corrections should be advised to Headquarters as early as possible. The present list contains information received up to February 2, 1940.

Rank and Name	Regiment or Branch	Pre-war Call or B.R.S.
E.R.A. R. A. Amey ...	R.N. ...	2BAY
Tel. A. E. Amiss ...	" ...	G4CB
L./Bdr. H. Barlow ...	R.A. ...	3603
Sgt. G. D. Barry ...	R.A.F. ...	3745
Tel. S. C. Baveystock ...	R.N.V.(W.)R. ...	G6YS
Ft./Lt. N. Best ...	R.A.F.V.R. ...	G5QN
L./Tel. W. Borton ...	R.N. ...	ZBIZ
Tel. J. A. T. Bousfield ...	R.N.V.(W.)R. ...	2FQQ
— C. Brent ...	R.N. ...	2BFI
Sub. Lt. (Eng.) W. E. Bridgen.	R.N.V.R. ...	G6WU
L.A.C. J. D. Cameron ...	R.A.F. ...	GM8CN
Sig. J. Cragg ...	R.C. of S. ...	BERS. 273
Sig. R. Cumberlidge ...	" ...	G3CK
L.A.C. J. W. Davies ...	R.A.F. ...	G6NH
Lt. G. S. Dee ...	R.A.C. ...	G8RG
L.A.C. D. C. Derry ...	R.A.F. ...	G8PQ
A.C.2 D. R. L. Duthie	" ...	GM6IW
C.P.O.(A.) A. V. Dyer	R.N. ...	BERS. 378
A.C.2 J. A. Easterbrook	R.A.F. ...	2FNY
P./O. L. T. Eden ...	" ...	G6DC
P./O. C. P. Edmunds	" ...	G5UC
Sgt. C. R. Emary, M.B.E.	R.C. of S. ...	G5GH
Sgt. A. Evans ...	" ...	GW4MZ
L./Tel. R. Foster ...	R.N. ...	GW4LK
A.C.2 D. W. Fraser ...	R.A.F. ...	GM2FY
— J. Fulton ...	R.N.V.(W.)R. ...	3166
Sig. R. M. Garrett ...	Middlesex Yeomanry	G3BP
A.C.2 F. le Gassick*	R.A.F. ...	2CNZ
Gnr. G. Gledhill*	R.A. ...	GW4OH
2nd Lt. A. Graham ...	R.E. ...	2CUH
Gnr. B. H. Green ...	R.A. ...	2FLZ
Tel. E. Greenwood*	R.N. ...	G4OS
Cpl. Hartley ...	R.A.F. ...	G8UY
A.C.2 R. J. Harvie ...	" ...	2DRP
Sub. Lt. G. Henderson	R.N.V.R. ...	G8JV
Tel. I. A. Hennell ...	R.N.V.(W.)R. ...	2HJP
Gnr. J. T. A. Henry ...	R.A. ...	3496
Q.M.S. J. Hicks ...	R.A.O.C. ...	BERS. 94
Tel. W. A. Hook ...	R.N. ...	BERS. 483
A.C.1 R. W. Hunter ...	R.A.F. ...	G3FL
A.C.2 C. G. Hutchinson	" ...	3743
2nd Lt. S. C. Isaacs ...	R.C. of S. ...	G6ZY
A.C.2 J. W. Jack ...	R.A.F. ...	2AJW
Cpl. E. P. Jones ...	" ...	G8QQ
Cadet S. S. D. Jones ...	R.C. of S. ...	G8KM
A.C.2 G. F. Keech ...	R.A.F. ...	2714
— F. E. Lane ...	R.C. of S. ...	2AGZ
Lt. A. W. Lister ...	R.A. ...	G5LG
A.C.2 R. A. Loveland...	R.A.F.V.R. ...	2ARU

Rank and Name	Regiment or Branch	Pre-war Call or B.R.S.
L./Cpl. W. H. G. Metcalfe	R.C. of S. ...	VU2EU
Sig. E. G. W. Miller ...	" ...	3344
Sig. H. A. Moston ...	" ...	GW2GV
Tel. R. Munn ...	R.N.V.(W.)R. ...	2FUV
Sig. S. Nicholson ...	R.C. of S. ...	G4NC
— J. C. Noble ...	R.N.V.(W.)R. ...	3488
A.C.2 N. A. Owen ...	R.A.F. ...	G4KZ
O.A./A. G. W. Peel ...	R.N. ...	2AGL
Pte. E. A. Perkins ...	R.A.O.C. ...	G3MA
Stf./Sgt. G. Pollock*	R.C. of S. ...	ex VK2XU
Capt. R. Postill ...	" ...	G8NO
— P. Reddock ...	King's Regt. ...	3355
Tel. A. Reid ...	R.N.V.(W.)R. ...	GM5YN
Sig. L. Richards ...	R.C. of S. ...	G3YM
Cpl. D. Robertson ...	R.A.F. ...	G6GQ
Tel. C. Shutt* ...	R.N.V.(W.)R. ...	2HGA
Tel. I. F. Smith ...	R.N. ...	2BQI
A.C.2 J. Spragg ...	R.A.F. ...	2777
A.C.2 R. F. Stevens ...	" ...	2BVN
Ft./Lt. J. M. R. Sutton, B.Sc.	R.A.F.V.R. ...	GW2NG
Tel. A. P. Tapping* ...	R.N.V.(W.)R. ...	2FON
Spr. J. E. Thomson* ...	R.E. ...	G3RY
A.C.2 R. G. Thornley ...	R.A.F. ...	2DAF
A.C.2 F. C. Turner ...	" ...	G3VI
Pay Lt. G. C. Turner ...	R.N.V.R. ...	G5IH
A.C.2 E. Wake ...	R.A.F. ...	G5RP
P./O. J. N. Walker ...	R.A.F.V.R. ...	G5JU
Pte. G. P. Watts ...	R.A.M.C. ...	3129
A.C.2 W. G. R. Wilby	R.A.F. ...	2BSU
Pte. J. R. Wilkinson ...	R.A.F. ...	VQ4-JRW
Pte. L. W. Wilson ...	R.A.M.C. ...	3323
A.C.2 B. W. Wynn ...	R.A.F. ...	G8TB
A.C.2 G. C. A. Zedy ...	" ...	3732

\* Denotes non-member.

## Ham Hospitality

The members listed have asked us to record their names as being willing to entertain any service or visiting amateur who may be in their locality.

It will, in general, be appreciated if previous advice can be given of an intended visit.

Name	Call	Address	Telephone
Chas Bryant ..	G3SB	Beaconwood Hotel, Minehead Som.	Minehead 32.
R. R. Waite ..	G3PZ	61 Broadway, Northampton	—
H. Caunce ..	G6KZ	24 Vanbrugh Road, Anfield, Liverpool	—
E. Mitchell ..	G5MV	40 North Marine Rd., Scarborough	—
J. Gopdard ..	G5LT	The Doreys, Medstead, Alton, Hants.	—
A. B. Willsheer ..	G3IG	14 Lytton Gardens, Wallington, Surrey	Wallington 5672.

# HEADQUARTERS CALLING

## British Licences

The new Council feels it necessary to reiterate the view expressed in last year's Annual Report, that no useful purpose would be served at the present juncture by requesting the G.P.O. to consider matters of detail in respect to British experimental licences. In their opinion such matters can only be discussed when hostilities have ceased.

Members may however rest assured that the new Council will continue to pursue the policy previously announced of pressing for the restoration of transmitting facilities without delay after the war has finished.

## Impounded Amateur Transmitting Apparatus

With reference to the paragraph published in our last issue, Council wishes to advise members that up to the time of going to press no information had been received from the G.P.O. regarding frequency meters.

## New Defence Regulations

Council gives notice that the official statement has not yet been received from the G.P.O. regarding the new Defence Regulations printed in our last issue. Members should do nothing until the statement appears in this Journal.

## London Meeting

To meet the wishes of London members, Council has decided to arrange an informal meeting at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2, on the evening of Friday, February 23. Those attending will be asked to contribute 1s. a head towards the cost of tea and the hire of rooms, an arrangement made necessary in view of the reduced London subscription rate.

If this meeting is well supported it is hoped to hold similar gatherings in March, April and May.

Arrangements have been made by Mr. H. R. Adams of Webb's Radio for a Display of Modern Communication Equipment to take place from 5 p.m. Tea will be served from 6 p.m. and the meeting will conclude at 8 p.m.

## A.R.R.L. and Radio Ltd., Publications

The Society having concluded negotiations with the *American Radio Relay League and Radio Ltd.*, orders can now be accepted for the American publications listed below. On receipt of orders, the R.S.G.B. will advise the *A.R.R.L.* and *Radio Ltd.*, who will in turn despatch the publications *direct to members*. It must be appreciated that a delay of several weeks will occur between the time an order is received by the Society, and the delivery of the goods in Great Britain.

The following are the current prices for those publications which the Society is prepared to handle:

A.R.R.L. (1940) Handbook ..	7s. 0d.
A.R.R.L. Antenna Handbook ..	3s. 0d.
Radio (1940) Handbook ..	8s. 6d.
Radio Antenna Handbook ..	4s. 6d.

## Life Membership

The attention of members is directed to Article 27, which states that "At any time after election to the Society, members may, subject to the approval of Council, commute all future annual subscriptions, by payment of ten guineas, which shall entitle such members to all privileges and rights of ordinary membership for the remainder of their lives."

Applications for Life Membership should be addressed to the Secretary-Editor.

## West of England D.R.

Consequent upon Mr. J. N. Walker's recent entry into the R.A.F., Council has been pleased to appoint Mr. Arthur Bartlett, G6RB, 31, Kings Drive, Bishopston, Bristol, as D.R. for the West of England. Mr. Bartlett has had previous experience in this direction, having been D.R. until succeeded two years ago by G5JU.

The Council takes this opportunity of recording its very grateful thanks to Mr. Walker for his past services as D.R., and they trust his R.A.F. activities will not entirely prevent him from participating in Society activities.

## Members Notepaper

To meet the wishes of members we have decided to again stock Members Notepaper. This is now available in packets of 100 sheets at 3s. per packet, post free, or two packets for 5s. 9d.

## Kilocycles-Metres Conversion Tables

In response to several requests we have obtained a fresh supply of Kilocycles-Metres Conversion Tables arranged in vest pocket booklet format.

Copies of this very useful 64-page publication are available from Headquarters, price 1s. 3d. each, post free.

## A.R.R.L. (QST) Subscriptions

Due to the alteration in sterling exchange, the annual A.R.R.L. subscription rate is now 15s. per annum. Members who have, in the past, subscribed direct to the A.R.R.L. or have purchased copies of QST from booksellers would be well advised to pass their renewal instructions through the Society in view of the present difficulty of sending money out of the country.

## "Radio" Subscriptions

Members who wish to obtain *Radio* the West Coast U.S.A. technical Journal may forward their subscription direct to Headquarters. The subscription at the present rate of exchange is 17s. 6d. for one year or 30s. for two years.



## Changes of Address

Members in H.M. Forces who anticipate changing their address at frequent intervals are urged to arrange for THE T. & R. BULLETIN and other Society correspondence to be sent to their home address. Providing re-direction is made without delay no extra stamp is required on the wrapper or envelope.

## Back Issues

It is essential during war-time that no more copies of each issue of THE T. & R. BULLETIN be ordered than are absolutely necessary. In past years members have allowed their subscription to lapse for several months and then asked to be brought up to date. This has generally been possible, but under present conditions, where paper must be conserved and storage space is valuable, we cannot load Headquarters with big stocks of back issues on chance.

Members will greatly assist us by renewing their subscription promptly thereby making sure that their copy of THE BULLETIN arrives regularly each month.

## Situations Required

It frequently happens that Headquarters are asked by representatives of Government departments and commercial concerns, for names of members seeking employment. At the present time it is more than ever desirable that those who are out of employment should advise the Secretary-Editor, so that he may be in a position to pass on their names if an opportunity should occur.

Correspondence should be marked "Personal" and brief details given of past experience and other essential information.

## Service Photographs

We shall be pleased to consider for publication photographs of members serving in H.M. Forces. Photographs should be sharply defined and the names and call signs of those depicted either written on the back or on a separate slip of paper.

## Civil Defence

Members engaged on Civil Defence work are invited to send brief details to Headquarters, for record purposes only.

The following particulars are required: Name, Branch of Civil Defence, Call Sign or B.R.S.

## Radio Direction Finding

The British Standards Institution has just issued a Glossary of Terms used in Radio Direction Finding. This is Section 12 of the main Glossary of Electrical Engineering Terms (BS205-1936) which has been in use for several years.

The terms and definitions were prepared by the Direction Finding Committee of the Radio Research Board of the Dept. of Scientific and Industrial Research. The R.S.G.B. was directly represented on the committee entrusted with the preparation of the R.D.F. Glossary which can be obtained from the B.S.I., 28 Victoria Street, London, S.W.1. Price 1s. per copy (1s. 2d. post free).

## N.Z.A.R.T.

Mr. Jack Freeman, ZL3FB, until recently General Secretary of the N.Z.A.R.T., advises us

that Headquarters are now located in Wellington. Communications should be addressed to P.O. Box 489.

On behalf of all Home members we extend warm greetings to the new Council and our thanks to the retiring executive who worked so enthusiastically for the good of New Zealand amateur radio during the time Headquarters was located in Christchurch.

## British Sound Recording Association

A notice in THE T. & R. BULLETIN some months ago concerning the activities of the British Sound Recording Association evoked a considerable response and, in view of the present interest in sound recording by amateurs, members may like to know that the association is carrying on. It is hoped to maintain contact with the B.S.R.A. membership through publications. The information bureau is still open to handle technical queries on all aspects of sound recording.

Correspondence should be sent to Mr. F. J. Chinn, (hon. general secretary), 170a, Addington Road, Selsdon, Croydon, and letters concerning technical matters should be directed to Mr. D. W. Aldous, BRS.1006 (hon. technical secretary), c/o Mr. Chinn, at the same address.

## New Members

- R. E. DODD (G3LY), 6 Mayday Gardens, Blackheath, S.E.3.
- A. E. AMES (G4CB), 15 North Howard Street, Great Yarmouth.
- R. M. OWEN (G5RB), 14 Watermead Road, Bromley Road, Catford, S.E.6.
- G. W. PEEL (2AGL), 28 Athlerley Road, Shanklin, I.O.W.
- R. F. STEVENS (2BVN), 43 Pettits Lane, Romford, Essex.
- J. E. HODSON (2BZB), 83 Fecitt Brow, Blackburn, Lancs.
- R. STAPLES (2DKD), 23 Oaks Avenue, Romford, Essex.
- G. A. LAMBOURNE (2DQI), 16 Angola Road, Worthing, Sussex.
- D. R. BRADLEY (2DVA), Beverley, Old Higher Road, Hale Bank, Near Widnes, Lancs.
- F. H. HARDINGHAM (2HNT), 54 Mashiters Walk, Romford, Essex.
- C. G. HUTCHINSON (BRS3743), Woodlands, Knowle, Braunton, North Devon.
- A. R. WEST (BRS3744), 92a New Walk, Leicester.
- Sgt. G. D. BARRY (BRS3745), R.A.F. (QRA with Headquarters).
- K. SWALE (BRS 3746), Rydal House, Somersall Lane, Chesterfield, Derby.
- W. A. CHAMBERS (BERS482), Nyambuli, Fort Jameson, Northern Rhodesia.
- W. A. HOOK (BERS483), c/o 35 Hampstead Road, Brighton 5.

## Returned Bulletins

We hope that readers will assist us in tracing the present whereabouts of the following members who have changed their address without advising Headquarters:—

J. Apap (BERS.269), 14 Sda Scozzese, Valletta, Malta.

C. D. Adamson (2FMS), 46 Marywood Square, Glasgow.

J. Barnard (G8BA), 28 Wheatley Hall Road, Doncaster.

H. Biltcliffe (G5HB), 31 Willow Crescent, Five Lane Ends, Bradford.

L. H. Herrington (G5QL), 54 New Street, Ashford, Kent.

M. F. J. Samuel (G4FX), 9 Norfolk Road, London, N.W.8.

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

## DESIGN AND OPERATION OF R.F. AMPLIFIERS— (Continued from page 329)

obtained will usually be very close to the calculated values.

Similar methods may be applied to valves operating under other conditions and in a further article the writer hopes to deal with anode-modulated amplifiers, grid modulated amplifiers, Class B amplifiers and frequency multipliers.

### References

The following references have been used in the preparation of this article and will be found useful to those anxious to pursue the subject further.

1. F. E. Terman, "Radio Engineering." (McGraw Hill.)
2. W. G. Wagener, "Simplified Methods for Computing Performance of Transmitting Tubes." (Proc. I.R.E., Jan., 1937.)
3. H. P. Thomas, "Determination of Grid Driving Power in R.F. Power Amplifiers." (Proc. I.R.E., August, 1933.)

### News from W2IXY

Dorothy Hall, W2IXY, one of the best known U.S.A. phone operators, wishes to convey greetings to her many friends in Great Britain, particularly to those who remembered her at Christmas.

During recent months she has been on 28 Mc. with an input of about 50 watts working the odd states outstanding for her W.A.S. certificate.

### A "Ham Radio" Crossword No. 2

The following is the solution of the crossword puzzle published in our last issue:—

ACROSS.		DOWN.	
1. Microphone.	20. Sure.	2. Input.	14. Licenses.
9. Top Band.	21. Fuse.	3. Reaction.	16. Aerials.
10. Creep.	22. Tin.	4. Padsaw.	18. Ranter.
11. TNT.	24. Inane.	5. Once.	19. Cut off.
12. Trap.	25. Observe.	6. Element.	20. Skip.
13. Beat.	26. Send.	7. States.	22. Three.
15. Stator.	Faster.	8. Spot.	23. Send.
17. Filter.			

## EXCHANGE AND MART.

### Advertisement Rates

MEMBERS' private advertisements 1d. per word, minimum 1s. 6d.

TRADE advertisements. One inch Semi-Display (max. 50 words), 10s., half inch (max. 25 words), 5s. TERMS: Cash with Order. All copy and payments to be sent direct to Advertisement Managers, PARRS Advertising Ltd., 121 Kingsway, London, W.C.2, by not later than the 30th of the month for the following month's issue.

KING'S Patent Agency Ltd. (B. T. King, G5TA, Mem. R.S.G.B., Reg. Pat. Agent), 146, Queen Victoria Street, London, E.C.4. Handbook and Advice on Patents and Trade Marks free. Phone: City 6161. 50 years refs.

FOR SALE Motor Board complete with 100/120-200/240v. Induction motor, moving iron pick-up, volume control, auto-stop, regulator and 12" turntable. Unused. What cash offers?—Box 130, PARRS, 121 Kingsway, London, W.C.2.

HOWARD 450A. 12 Valves 4-550 metres, Xtal "R" Meter and Loudspeaker. Unused, purchased just previous to war, owner going abroad. £25.—TURNER, "Murray Downs," Inner Promenade, Lytham-St.-Annes.

LISTEN! and send a Reception Report—1st grade Clear Type QSL's and Log Books. Samples from Oldtimer.—G6MN, Worksop.

MAINS TRANSFORMERS 100-110 volt to 200-240 volt 65 watt 4/6. 100 watt 7/6. 150 watt 10/-. 500 watt 22/6. National 1-10, All coils for one to ten metres—No offers £7. Brown's "A" Phones as new 30/-. Power Pack, Very large Transformers and Chokes 200 volts 100 m.a. £2. £10 worth first class Ultra Short-Wave receiver material and parts, 50/-.—MANSELL, Woodfield, Madresfield Road, Malvern.

NEW EDITION.—American Amateur Relay League Handbook. 500 pages of up-to-the-minute technical information. 7s. post free. 1940 JONES Handbook; approximately 700 pages dealing with every aspect of Short-wave radio. 3s. 6d. post free.—WEBB'S RADIO, 14 Soho Street, London, W.1. Phone: Gerrard 2089.

VALVES For Sale.—Hivac's SG22OSW, 5/-, D21OSW, 3/-. Tungram 6C6, 3/6. Raytheons 46, 3/-. 53, 3/6. 59, 3/6. All little used.—G5AX, 35 Moss Lane, Leyland, Lancs.

WANTED.—Hivac CR3 or CR3A Cathode Ray Tube. State use and price to—LEWIS, 117 Fairview Road, Cheltenham.

WANTED.—H.R.O. Junior Coils, 7-14.4 M.C. and 500-1,000 K.C., also good phones. State price to ex. 2FXK.—THOMPSON, Rosedene, Walsall Road, Aldridge, Staffs.

WANTED.—Modern communications receiver in good condition. All bands up to 600 Metres, without loud speaker.—FERGUS, Churt House, Churt, Surrey.

### SITUATIONS VACANT

WANTED RADIO AMATEUR over thirty as Mechanic-Salesman, able to drive—expert radio knowledge. Trade experience not essential.—SOUTHERN RADIO, 85, Fisherton Street, Salisbury, Wilts.

### SITUATIONS WANTED

ADVERTISER (age 30) with eight years experience as representative calling on Radio Manufacturers (London district). Excellent connection, desires progressive post.—Apply in first instance to Box 132, "PARRS," 121, Kingsway, London, W.C.2.

### RADIO MAP AND GLOBE

WEBB'S RADIO MAP of the World enables you to locate any station heard. Size 40" by 30". 2-colour heavy Art Paper, 4/6. Limited supply on Linen, 10/6. WEBB'S RADIO GLOBE—superb 12" full-colour model. Radio prefixes, zones, etc. Heavy oxydised mount. Post Paid, 27/6.—WEBB'S RADIO, 14 Soho Street, London, W.1. Phone: Gerrard 2089.

# TROPHY COMMUNICATION RECEIVERS



"Listening in on a TROPHY is a most exciting experience"—

DAILY SKETCH, 17-11-39



"A good all-round Receiver; very efficient on 10 metres"—

TELEVISION & SHORT-WAVE WORLD



ALL TROPHYS ARE FULLY GUARANTEED

## ORDER NOW— and take advantage of present LOW PRICES

**TROPHY 8** 8 valves. 5 Bands, 7-550 metres (43 mc. to 545 kc continuous). Continuous bandspreading. Illuminated scale engraved in kilocycles, with divisions permitting of settings of 800 deg. in 1 deg. steps. R.F. on all bands. Separate oscillator. Beat frequency oscillator with separate pitch control. Send/Receive switch. A.V.C. and B.F.O. on/off switches. Self-contained smoothing circuit. High impedance output sockets are provided for use of separate P.M. speaker and jack incorporated for alternative headphone use. Pleasing black crackle-finish steel cabinet, size 16½ in. long by 9½ in. high by 10½ in. deep. For use on A.C. 200/250 v. 40/100 cycles supplies. Despatched accurately aligned and aerial tested. Cash price £13 : 17 : 3.

**TROPHY 8 SPEAKER.** Balanced permanent magnet moving-coil speaker, housed in celotex-lined steel cabinet, finish and design to match TROPHY 8. £2 : 6 : 3 extra.

● **LATEST NEWS BULLETINS IN ENGLISH** from every corner of the World plus an amazing variety of entertainments, all additional to the usual B.B.C. broadcasts. Enjoy all these—choose and always recommend TROPHY.

**TROPHY 6** Six International octal-type valves. Four frequency ranges, providing a continuous coverage from 6.5 to 545 metres. Directly calibrated frequency scale. Independent electrical bandspread with separate illuminated dial. Automatic volume control and beat frequency oscillator on/off switches. Send/Receive switch. Pitch control. Provision for using doublet input. Headphone jack. Built-in speaker. Cabinet in steel, pleasing black crystalline finish. Overall dimensions : 17½ in. wide by 10 in. high by 9 in. deep. Despatched accurately aligned and ready for operation on A.C. 200/250 v. 40/100 cycles supplies. Cash price £10 : 19 : 6.

### New 2 - Stage PRESELECTOR

This R.F. amplifier represents unbeatable value in perhaps one of the most useful of acquisitions. For use with any kind of set. Increases signal strength, selectivity and range and reduces second channel interference to a minimum. Selector and send/receive switches and inputs for single-wire or doublet aerials. Dimensions : 12½ in. by 12½ in. by 9½ in. deep. Cash price £7 : 8 : 6.

- Employing "E" series valves.
- 5 Bands, 7 to 550 metres.
- Frequency tuning and 800° in 1° steps.
- Self-powered for A.C. 200/250 v.

IMMEDIATE DELIVERY on all POST ORDERS. Easy Terms Available. CALLERS : Note London Showrooms given below.

**PETO SCOTT Co. Ltd.**  
77 (TR) CITY ROAD, LONDON, E.C.1  
Telephone CLissold 9875  
41 HIGH HOLBORN, LONDON, W.C.1  
Telephone HOLborn 3248

### TROPHY S/W 3

Regenerative 3-valvers for A.C. and battery use (A.C. model, 2 plus rect.), with a really amazingly high degree of sensitivity. Wave-range, using self-locating coils for external insertion, 6.2 to 550 metres. Metre and band calibrated scale. Built-in speaker and phone jack. Wireless World and many users have confirmed the capabilities of the TROPHY 3, recommended with every confidence for all-world short-wave contact.

**BATTERY MODEL.** Complete with coils for 12 to 52 metres but less batteries. Cash price £6 : 6 : 6.

**A.C. MODEL.** Complete with coils for 12 to 52 metres. Cash price £6 : 18 : 9.

If extra self-locating coils required for complete coverage 6 to 550 metres, add 18/6 to TROPHY 3. Cash Prices.



Complete TROPHY technical specifications free on request. Write NOW

## PERFORMANCE AND PRICE UNEQUALLED

# PREMIER RADIO

WISH ALL FRIENDS A HAPPY NEW  
YEAR—AND GOOD LISTENING !

## PREMIER 1940 "5 v. 5" COMMUNICATIONS RECEIVER

A 5-valve Superhet, covering 12-2,000 metres in 5 wave bands.

- Beat Frequency Oscillator
- Band-Spread Control
- A.V.C. Switch
- Illuminated Band-Spread Dial
- Send-Receive Switch
- Iron-Cored IF's
- Phone Jack
- Over 4-Watts Output

Provision for single wire or Dipole Aerial. International Octal Valves for 200-250 v.mains (A.C.). Built into Black Crackle Steel Case providing complete screening, 10½ in. Moving Coil Speaker in separate steel cabinet to match. Receiver, Complete with all tubes and Speaker ... £9-9-0

## SHORT-WAVE CONDENSERS

Trolital insulation. Certified superior to ceramic. All-brass construction. Easily ganged.

15 m.mfd.	...	1/9
25 m.mfd.	...	2/-
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