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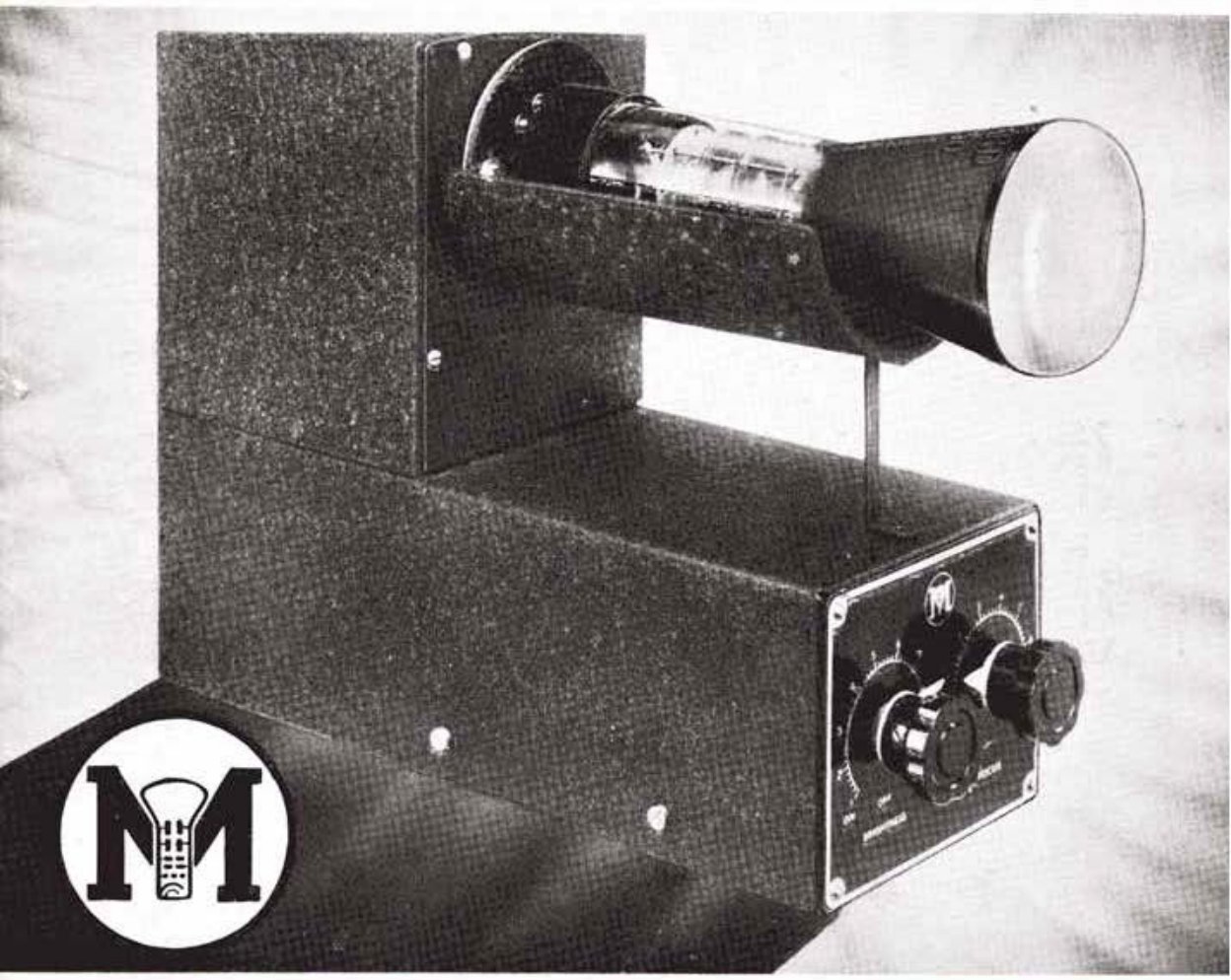
BULLETIN

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN



- COMMUNICATION ON CENTIMETRE WAVES
- PRINCIPLES OF 'SINGLE SPAN' TUNING APPLIED TO THE HIGHER FREQUENCIES
- VALVE VADE MECUM

R.S.G.B. BULLETIN

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PROBING THE UNKNOWN

TO probe into the unknown is the ambition of every radio amateur. Tell him that something cannot be done and he will prove that it *can* be done. Give him a problem and he will revel in the task of solving it.

To record the history of his past probings would be to record the history of the development of radio communication, for it was the radio amateur who invariably led the way. Driven from pillar to post as soon as commercial interests recognised the usefulness of first one medium waveband and then another, the amateur finally found himself presented with "the useless territory below 100 metres." Thanks to such pioneers as Gerald Marcuse, the late E. H. Simmonds and Cecil Goyder, the "useless territory" quickly became a happy hunting-ground for all who were desirous of probing the unknown. New records were made and as quickly broken—Empire broadcasting became a feasible proposition. Then once again commercial interests put in their claims and again the amateur had to readjust his ideas. That his thoughts should turn to the "ultra-shorts" was a foregone conclusion. Those who have been associated with the Society over a number of years need no reminding of the enthusiasm which prevailed during pre-war 5-metre field days. But in spite of the fascination which 5 metres held for many, there were some who regarded it as a long-wave band!

Although micro-wave technique was slow in developing, amateurs were helping to build up that technique when war intervened to cause a suspension of their private experiments. The knowledge they had acquired was, however, not lost, for as history will reveal radio amateurs have played no small part in war-time development of the centimetre wave-lengths.

In this issue we begin the publication of a series of articles on micro-wave technique which we have reason to believe will be read with considerable interest in radio circles. Choosing as the title for his contribution, "Communication on Centimetre Waves," the author (Mr. James Shankland, B.Sc.) has endeavoured very successfully to present a clear and concise picture of the development which had taken place up to the outbreak of war.

The fact that it is now possible to generate several hundreds watts at wave-lengths of the order of 0·1 metre will not be lost sight of by those who, in past years strove to obtain even a few watts at 5 metres. The discovery of a new method of signal generation —visualised by certain members of the Society many years ago—has made this new development an accomplished fact.

The Klystron—one of the most successful of the newer types of velocity modulated oscillators—introduces us not only to new principles, but also to a new vocabulary. When our licences are restored a discussion on the drift space between a pair of rhumbatrons will, no doubt, be as commonplace as the friendly arguments that prevailed a few years ago between the "locked and driven" school!

Readers may like to be reminded that the series of articles referred to represent the first major contribution from the recently formed Micro-wave Group of the Society's Experimental Section. The fact that this group has, through one of its members, been able to make such an outstanding contribution to our knowledge augurs well for the future of amateur radio in Great Britain.

War-time developments must of necessity remain a closed book for the time being, but it is no secret that much of the success which has come to the United Nations, has been achieved through the use of micro-waves. The contribution made by radio amateurs in this connection must not be forgotten when the time comes to hand out the bouquets. Fortunately many members of the Society now hold high executive office in the Services, Government Departments and industrial undertakings, and we can safely leave it to them to see that the work achieved by British amateurs is properly recognised.

OUR NEW HEADQUARTERS

The announcement that the Council has established new Headquarters in Central London, will be read with special interest by those members who have followed closely the growth of the Society during the past four years. The decision made in September 1939 to close down our pre-war offices and move Headquarters to a North London suburb, was a wise one, for in those hectic days none could visualise what was "around the corner." As we all now know the Society has made such progress as to warrant the decision to return to more suitable premises.

The change-over is being accomplished as rapidly as possible, but, due to reduced staff, delays in dealing with correspondence are for the moment inevitable. We are sure that members will appreciate our difficulties and will make allowances.

It is anticipated that by the end of July the routine will be back to normal, after which date a cordial welcome will await any member who calls at New Ruskin House during business hours. J. C.

COMMUNICATION ON CENTIMETRE WAVES

PART I

By J. H. SHANKLAND, B.Sc., Grad.I.E.E. (GM8FM)*

IN the past four years there has been an increasing demand for new channels, and as a result, attention has been directed to the frequency spectrum above 300 Mc/s. which had hitherto been unoccupied except for a few experimenters. Commercial installations operating in this part of the spectrum were practically non-existent, the cross-Channel micro-ray link on 17 cms. being an exception. This was due to the fact that until fairly recently there was no known method of generating adequate power at very high frequencies. At the time of installation of the cross-Channel link the most satisfactory method of producing oscillations at frequencies exceeding say 600 Mc /s. was by means of the positive-grid triode, which at best is only capable of generating a few watts of power, and with a very low over-all efficiency.

However, with the development of new types of vacuum tube devices it is now possible to generate several hundred watts at frequencies of the order of 3,000 Mc/s. with greatly increased efficiencies and thus a vast new frequency spectrum has been opened for commercial activity. This jump to such high frequencies was made possible only by the discovery of a new method of signal generation which is fundamentally different from those normally employed in radio communication.

Limitations of the Triode Oscillator

Before proceeding to discuss some of these new oscillators it may be of interest to examine the reasons for the failure of the normal negative-grid triode oscillators at very high frequencies.

With a triode oscillator operating at normal frequencies it is customary to assume that the time required for an electron to travel from the cathode to the anode is negligible when compared with the length of time taken for one radio frequency cycle. At very high frequencies however, this assumption no longer holds, and the electron transit time becomes an appreciable fraction of the time taken for one period of oscillation. Fluctuations of the grid potential no longer cause an instantaneous variation of the anode current. Suppose that the grid is biased negatively so that no grid current would flow at ordinary frequencies. Now, if the grid were suddenly made more negative, the increase in grid voltage will prevent any more electrons being drawn from the cathode, but there will be a number of electrons which have already left the cathode and are travelling across the cathode-grid space. These electrons will be prevented from reaching the anode by the increased negative voltage on the grid, and on the anode side of the grid there will be a number of electrons in the grid-anode space which have just passed through the grid, and which are now suddenly repelled by the increased negative grid potential. Thus, the electron density on the cathode side of the grid will be greater than on the anode side, and hence electro-static charges will be induced on the grid structure and a momentary grid current will flow in spite of the fact that the grid has been made more negative. If the grid is now suddenly made more positive there will be a similar but opposite state of affairs, there being now more electrons receding towards the anode than there are electrons approaching the grid from the cathode. The effect is, that if a very high frequency voltage is impressed on the grid, an alternating current will flow in the grid circuit in spite of the fact that under static conditions no grid current would flow. This means that current is still flowing in the grid circuit when the maximum positive value of applied voltage is impressed on the grid, *i.e.* the input conductance is increased.

Ferris gives the formula for the input conductance as :—

$$g = K\, G_m f^2 \tau^2$$

where G_m is the mutual conductance of the valve

f is the operating frequency

τ is the electron transit time for the cathode-grid space and K is a constant depending on the geometry of the valve and on the operating potentials.

The transit time τ is constant for a given valve and for given anode and grid voltages so it is seen that the input conductance increases as the square of the frequency. This is the main factor which determines the maximum operating frequency of the negative grid triode oscillator.

The power loss in the anode is also increased by the transit time effect due to the fact that the phase difference between the anode and grid voltages will now be less than 180°, and electrons will now be arriving at the anode when the anode potential has passed its minimum and is increasing, resulting in an increased power dissipation at the anode. This effect may be neutralised by introducing an impedance into the cathode lead of the oscillator thus adjusting the phases of the grid-cathode and anode-cathode voltages.

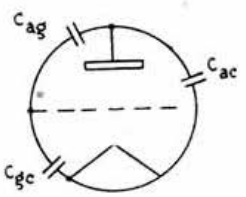


Fig. 1.

The inter-electrode capacitances of a triode.

Loading capacitance $C = C_{ag} + \dfrac{C_{ac} \times C_{gc}}{C_{gc} + C_{ac}}$

The maximum operating frequency of the triode oscillator is also limited by the fact that the valve itself contributes to the main oscillating circuit which is usually connected between the anode and grid. The physical dimensions of the external circuit are greatly reduced owing to the fact that there is a considerable amount of series inductance introduced into the oscillating circuit due to the length of electrode leads inside the valve envelope, and also, the main oscillating circuit is shunted by the internal inter-electrode capacitance of the valve. Even if the lead inductance is minimised by eliminating leads through the pinch and employing some form of concentric lead-out for the grid and anode so that the grid and anode electrodes actually form part of the external transmission line circuit, the length of the circuit is still reduced owing to the loading effect of the inter-electrode capacitances. The loading capacitance is

* 23 Richmond Road, Rugby.

not simply the anode-grid inter-electrode capacitance, but has a larger value, as it consists of the anode-grid capacitance in parallel with the anode-cathode and grid-cathode capacitances in series. (Fig. 1.)

Due to the fact that the grid input impedance of a valve with a load in the anode circuit is not the same as its impedance with zero anode load, the effective input capacitance is still further increased. This phenomena is known as the Miller Effect. A valve having a resistive anode load will have its grid-cathode capacitance C_{gk}, increased by the amount $(M + 1) C_{gp}$, where M is the voltage gain from grid to anode. Thus, neglecting other inter-electrode capacitances, the input capacitance will be :—

$$C_i = C_{gk} + (M + 1) C_{gp}$$

A tuned circuit in the anode circuit of a valve will represent a resistive load and hence the input capacitance will be increased several times. If the anode circuit is detuned from resonance there will be a reactive component in the anode load and the effect will be that the input impedance is equivalent to that of a capacitance C_i and a resistance R in parallel. R will be negative for an inductive load, and positive for a capacitive load.

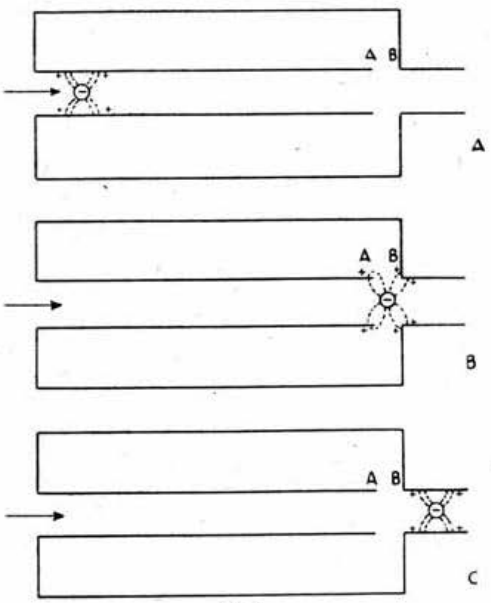


Fig. 2.
The passage of a negatively charged body through the centre of a concentric quarter-wave circuit.

It is seen therefore, that if it is desired to increase the maximum operating frequency of the negative-grid triode oscillator, the following conditions must be observed :—

(1) The transit time must be reduced either by increasing the anode voltage or by reducing the clearances between the valve electrodes. If the clearances are reduced, the physical dimensions must also be reduced in order to avoid increasing the inter-electrode capacitance. If this is done, the anode voltage cannot be increased due to the fact that the dissipation of the anode has been reduced.

(2) Some special form of electrode lead-out seal must be adopted to reduce the internal inductance of the valve. This may be done either by using a concentric lead-out or merely by using thick leads or a number of leads in parallel.

The " Acorn " is perhaps the best known example of special pinch design. These valves have a normal frequency limit around 600 Mc/s., although a small usable output may be obtained around 800 Mc/s. if special care is taken in the design and layout of the oscillating circuit. Small negative-grid triodes have been produced in the laboratory with an oscillation limit of about 1,500 Mc/s. but the electrodes are so minute that only a few milliwatts of radio frequency power are available. It seems feasible that small triodes could be produced to oscillate at frequencies of the order of 3,000 Mc/s. without reducing the clearances below the values now used in Acorns, but such valves would of course only find an application in V.H.F. receiver design, and would be quite impractical for transmitting purposes.

The Inductive Output Tube

There is, however, one type of valve developed by the R.C.A. which forms a link between the conventional type of triode oscillator and the newer types of oscillator employing velocity modulation, and it may be of interest to examine the operation of this inductive output tube before discussing the principles of velocity modulation. In this valve, electron transit time effects are minimised by using an electron beam of high velocity, the resulting dissipation problems being solved by separating the functions of radio frequency output and current collecting electrodes. This allows the current collecting electrode to be of large dimensions and thus powers of several hundred watts may handled at an operating frequency in the vicinity of 400 Mc/s.

The output circuit consists of a quarter-wave length of concentric transmission line, the inner conductor of which is hollow, and through which an electron beam passes. The outer conductor is continued as an extension of the inner, leaving a small gap between the ends of the two conductors. Consider the passage of a negatively charged body through the inside of the inner conductor (Fig. 2A). A positive charge, equal in magnitude to the negative charge, will be induced on the inner wall of the inner conductor and will move along the inner wall as the negatively charged body passes along the tube. No charge is induced on the outside of the inner conductor. When the body is passing the gap between the ends of the conductors AB, part of the induced charge will appear on the end of the outer conductor (Fig. 2B) and when the body has passed the gap all the induced charge will be transferred to the extension of the outer conductor (Fig. 2C). For this to happen, a current will have to flow from A to B over the outer surface of the inner, and the inner surface of the outer conductor.

Now suppose the tank circuit to be excited at its resonant frequency. The electric field produced will be as shown in Fig. 3 and it is seen that it is mainly radial and confined to the space between the two conductors. At the gap AB however, there is a certain

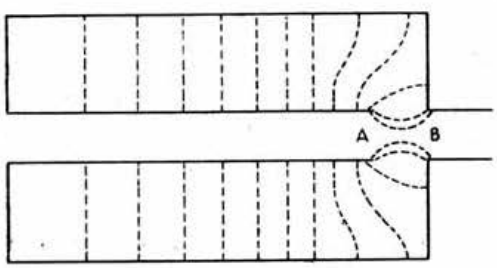


Fig. 3.
The configuration of the electric field inside an oscillating concentric quarter-wave circuit.

amount of fringing, and between the ends of the two conductors the electric field will have an axial component. The space inside the inner conductor and inside the extension of the outer are practically field-free and hence there will be no work done on a negatively charged body moving in the direction of the arrow until the charge enters the gap AB. If the charge enters the gap when the axial component of the electric field is in the direction B to A it will be retarded, part of its kinetic energy being given up to the tank circuit. If the charge should enter the gap when the field is reversed half a cycle later, it will be accelerated, the energy required to accelerate it being abstracted from the tank circuit.

It is seen therefore, that in order to excite the output circuit it is only necessary to arrange that more electrons enter the gap during one half cycle than during the following half cycle. This can be conveniently done by introducing a grid structure so that, if the grid is excited at the resonant frequency of the output circuit, the electron beam will be broken up into a series of bunches of electrons travelling through the inside of the inner conductor of the output circuit. The complete circuit of the inductive output tube is shown in Fig. 4. A conventional grid and

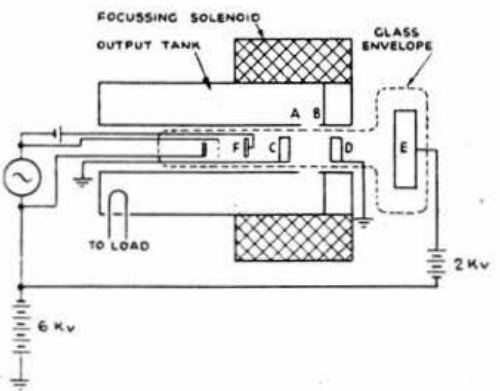


Fig. 4.
Circuit of the Inductive Output Tube.

cathode assembly is used to obtain pulses of electrons and the electron stream is concentrated at the start by means of the focussing electrode F. For further focussing, a solenoid is mounted concentrically with the tank circuit so as to produce an axial magnetic field.* Accelerating electrodes C and D are placed on either side of the gap AB, but are outside the alternating fields at the gap so that they do not constitute part of the output circuit. A current-collecting electrode E is mounted beyond the extension of the outer conductor of the output circuit in order to remove electrons which have given up part of their kinetic energy to the tank circuit during their passage across the gap AB.

When the excitation frequency of the grid is adjusted to the resonant-frequency of the output circuit there will be currents induced in the output circuit due to the passage of the bunches of electrons across the gap, and the phase of the high radio-frequency voltage which will be produced across the gap AB, will be such as to decelerate the electrons entering the gap during the half-cycle of maximum electron density, and thus energy will be transferred to the output circuit. During the next half-cycle when the electron beam entering the gap will have a minimum density, the radio frequency voltage will be such as to accelerate electrons in the beam, and thus energy will be transferred from the tank circuit to the electrons in the beam. But the electron density during this half-cycle will be very much less than during the previous half-cycle, so that the effect is that more energy is transferred to the output circuit than is abstracted from it. Energy may be drawn from the output circuit by means of a coupling loop inserted at the low impedance end.

This tube is intended mainly for use as a high-power radio frequency amplifier, but it may be used as an oscillator by providing a resonant circuit for the grid and coupling this to the output circuit.

So far, no mention has been made of the positive-grid triode, or Barkhausen oscillator nor of the magnetron oscillator, both of which make use of electron transit time to maintain oscillation. Such oscillators have been employed for many years for the production of centimetre waves, but they really belong to the new class of velocity-modulated tubes and hence will be considered after the principles of velocity modulation have been discussed.

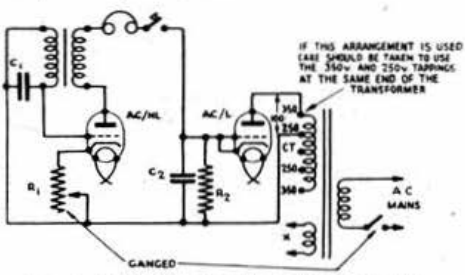
(To be continued.)

* See the *Radio Handbook Supplement*, Chapter 4, on Cathode Ray Tube Focussing.

A Mains-operated Morse Practice Oscillator

By G. P. ANDERSON (G2QY)

THIS compact mains-driven Morse practice unit can be built entirely from spare parts lying around the average shack. The oscillator portion which is quite straightforward, uses any type of cheap A.F. transformer. The oscillation frequency can be varied by means of R1 and the range set by experimenting with the value of C1—the value shown (·002 μF) suits a Telsen "Ace" transformer and a "Europa" AC/HL valve.



Circuit of Mains Operated Morse Practice Oscillator.

R1	50,000 ohms Variable.
R2	50,000 ohms.
C1	·002 μF.
C2	2 μF.

The power supply portion employs another small triode strapped as a diode half-wave rectifier, to which about 100 volts are applied. This voltage may be obtained from a transformer secondary, tapped for 350 and 250 volts full-wave output, but an old burnt-out transformer could be rewound quite simply —about 500 turns will suit most small transformers. Alternatively a higher voltage may be used and voltage dropping resistors inserted in the H.T. positive lead. The heaters may be run in parallel from a low voltage winding on the same transformer.

A value of 2 μF is quite satisfactory for the reservoir condenser C2. The 50,000 ohms shunt R2 removes any slight tendency to chirp. There is only one control on the panel—the pitch control—which is ganged to the on/off switch. The power output will prove adequate for several pairs of 'phones in parallel, or for a loudspeaker.

THE PRINCIPLES OF "SINGLE SPAN" TUNING APPLIED TO THE HIGHER FREQUENCIES

By 2FPP

WHEN reading through old technical literature, the writer discovered some interesting details of a super-heterodyne receiver which was developed several years ago and known as the "Single-Span." This was designed to cover the medium broadcast frequencies without the necessity for coil changing or switching. It used an aperiodic mixer, and the only tuned signal circuit was that of the oscillator section which was designed to cover the frequency spectrum from 150 kc/s. to 1,500 kc/s., using an I.F. of 1,600 kc/s. This coverage was obtained with a single rotation of the tuning condenser in the oscillator. The oscillator tuned circuit covered from 1,750 kc/s. to 3,100 kc/s. (under a 2 : 1 ratio) using a condenser of 100 $\mu\mu$F maximum capacity, and when beating with signal frequencies between 150 kc/s. and 1,500 kc/s. would produce the difference frequency of 1,600 kc/s. A filter incorporated between the aerial and the grid of the mixer was designed to cut off frequencies above 1,500 kc/s., the object being to prevent signal frequencies of twice the I.F. above the oscillator frequency reaching the grid and producing second channel beats. For example, assuming the oscillator was tuned to its lowest frequency, namely 1,750 kc/s., a signal with a frequency of 150 kc/s. would produce the desired I.F. and so would a signal with a frequency of 3,350 kc/s., but the filter would attenuate the latter and so prevent second channel interference. In this receiver adjacent channel selectivity was improved by the use of a regenerative buffer and normal I.F. amplifiers.

"Single Span" applied to the Higher Frequencies

These observations suggested the possible practical application of the "Single Span" idea to a receiver designed for use on the higher frequencies. Apart from the attractions of having only one tuning control, no tracking worries and only two or three coils at the most, it was thought that from the experimental angle alone the idea should prove interesting. The drawbacks were however obvious, as consideration had to be given to (*a*) lack of signal amplification before mixing, (*b*) second channel interference (as the highest frequency would be, it was hoped, in the neighbourhood of 28 Mc/s. and the type of filter described above would be impracticable), (*c*) signal-to-noise ratio.

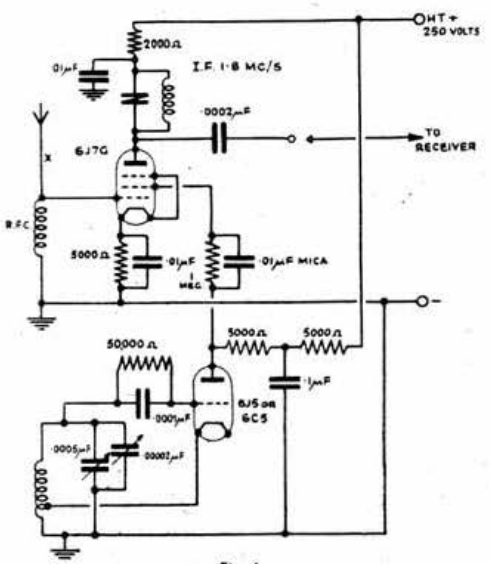


Fig. 1.
Fundamental circuit using aperiodic mixer with grid injection.

An aperiodic mixer was designed, working in conjunction with an electron coupled oscillator. The mixer was a 6J7C and the oscillator a 6J5. Screen grid injection was decided upon, as in the past several "front-ends" had used this method with success. Actually, a 6L7 was tried, but hiss level was high, so a 6J7G was substituted for convenience. Possibly the more modern 6L7, would, when correctly adjusted, give equal or better results. The circuit (Fig. 1) was roughly assembled as a convertor to be coupled to a communications receiver which would take the place of the I.F. amplifier, and also provide the advantages of the "double" superheterodyne. Incidentally, as the convertor I.F. was to be 1,600 kc/s. and as the receiver had an I.F. of 465 kc/s. an improvement in adjacent channel selectivity was to be expected. In operation this proved to be the case.

The first oscillator coil was designed to cover frequencies between 2,100 kc/s. and 8,400 kc/s. This was a high ratio, and generally undesirable, but was chosen for the sake of a high signal frequency coverage ratio. As a 500 $\mu\mu$F variable condenser was used, it was hoped that a signal frequency coverage between 500 kc/s. and 6,800 kc/s. (a 13 : 1 ratio) would be obtained. No steps were taken at this stage to cope with second channel interference. The convertor was connected to a power supply and to the receiver, and a reasonably efficient aerial attached to the grid of the mixer. The oscillator was then tuned to its lowest frequency, and search commenced at the L.F. end of the broadcast band.

Results were good and adjacent channel selectivity proved to be excellent. The positions of the various stations on the dial in use were, as was to be expected, rather cramped, so a compromise was decided upon, and a 20 $\mu\mu$F variable condenser was connected in parallel with the main tuning condenser to give a degree of bandspread. Signals were heard over the entire band, and the results showed that sensitivity was quite reasonable, but even more important was the fact that the theory was quite effective when applied to practice on the higher frequencies.

The bandspread control was extremely useful and helped considerably in fine tuning. Some experiments were carried out in an effort to find a satisfactory load impedance between grid and earth, to ensure maximum signal volts being applied to the mixer. Various potentiometers and chokes were tried, but a "four pi" short wave choke appeared to give the most satisfactory performance. The oscillator worked quite normally, and the mixer gave good results, the signal-to-noise ratio being satisfactory.

As stated previously, the object of this work was purely experimental, and the results are given as they were obtained. Doubtless further improvements could have been made to the circuit, such as pre-amplification, etc., but these improvements would have necessitated the use of more coils and tuning condensers, and their addition would have defeated the whole object of the tests. Obviously, the greater the amplitude of the signal volts applied to the grid

of the mixer, the greater will be the response at the difference frequency, with a consequent improvement of signal-to-noise ratio, etc. For this reason a good aerial is a pre-requisite, although as a point of interest, signals *were* received using approximately six feet of wire as an aerial !

A second coil was constructed to give an oscillator coverage of 8,400 kc /s. to 33,000 kc /s., with a signal frequency coverage of 6,800 kc /s. to 31,400 kc /s.

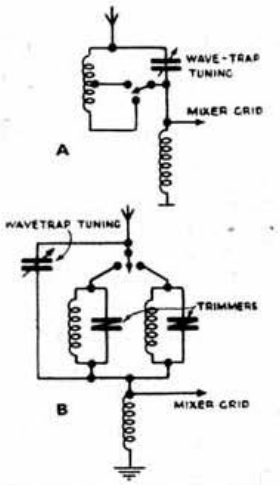


Fig. 2.

Two suggested methods of attenuating possible second channel interference. (*a*) Simple wave-trap inserted at point X in Fig. 1. (*b*) Wave-trap and oscillator circuit condensers ganged.

Results were good, although at times it was not absolutely certain whether the signals heard at the higher frequencies were fundamentals or second channel beats. Although experiments ceased at this point, several new improvements suggested themselves, in particular, the elimination of second channel interference.

Suggested methods of eliminating Second Channel Interference

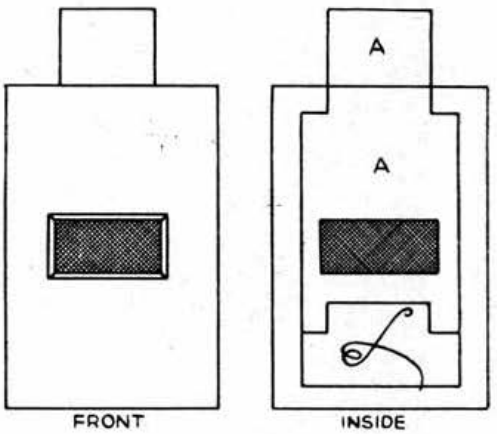
It was considered that a tunable wave-trap inserted between the aerial and the mixer grid (Fig. 2A) would assist greatly in eliminating this type of interference. As the possible interfering frequencies would be twice the I.F. away from the signal frequency, the wave-trap would have to cover a quite small frequency spectrum. For example, assuming the oscillator frequency to be 1,750 kc /s, and the desired signal at 150 kc /s, the possible second channel interfering station would be on 3,350 kc /s, so if the wave-trap be designed to cover from this frequency upwards, to twice the I.F. away from the highest signal frequency desired, second channel interference would be eliminated or greatly reduced. Applied to the frequency coverage of the first coil described above, namely that giving coverage between 2,100 kc /s. and 8,400 kc /s. (oscillator frequencies), second channel would be present if there were a station on 3,700 kc /s. at the lower frequency, and on 10,000 kc /s. at the higher frequency. The frequency coverage between 3,700 kc /s. and 10,000 kc /s. is under a 3 : 1 ratio and could easily be obtained. Probably the tuning condenser of the wave-trap could be ganged with the oscillator condenser using a shorting switch on the coil to change the frequencies attenuated when the oscillator coils are changed (Fig. 2B).

The results obtained certainly justified the trouble taken, besides providing a good deal of interest. A small receiver using the type of "front-end" discussed, with perhaps one regenerative I.F., amplifier, and a sensitive second detector, would give results at least comparable with a straight set using a similar number of valves, with the advantages of a superheterodyne and the minimum of controls.

Visual Morse Signalling

Mr. H. Ridge, G3HR, describes a little gadget which may interest readers who wish to practise visual Morse signalling.

Cardboard, plywood or metal can be used for the construction, although the former material is to be preferred as it gives silent operation. The body consists of three layers, (*a*) a front with slot, (*b*) a spacing frame and (*c*) a plain back. It is an advantage to blacken either the whole front or the part surrounding the slot.



The portion "A" slides down against the pressure of a spring and in so doing shows white behind the slot.

Dimensions are not critical, but a convenient size for the pocket is 3 in. x 2 in. In use it is held between thumb and second finger, while the first finger is used for sending.

The sketches illustrate the front and inside of this interesting little device.

Keying the Buzzer !

It is usual in code practice sets to key the buzzer but where a cheap model is employed it is much better to enclose it in a padded sound-proof box with an easily removable lid, and to allow the buzzer to run continuously. If the 'phones, or the grid of an input valve, are keyed across the coils of the buzzer, a very satisfactory note will be obtained, which will permit high speed keying not subject to the variations of the buzzer. Furthermore excessive sparking does not occur at the key contacts. Where headphones are worn for practice, slight buzzer noise will not affect the reception. G8LN

A VALVE VADE MECUM

By B. W. F. MAINPRISE, B.Sc.(Eng.), Diploma Electrical Engineering, (G5MP).*

PART I—GENERAL CONSIDERATIONS

The author of "A Field Operator's Vade Mecum" presents a new series of articles dealing with some interesting features of valve technique.

1. *A valve is a piece of apparatus which provides a controlled flow of electrons. What, briefly, are electrons?*

Any substance, be it solid, liquid, or gas is built up of atoms. Each atom consists of a central core or nucleus which is positively charged. Round this core rotate one or more small particles, each negatively charged and called *electrons*.

A flow of these negatively charged particles constitutes what we call an electric current.

2. *Are all atoms the same in construction?*

About 92 different types have been discovered. In the simplest, the core consists of one positively charged particle (called a proton), with one electron rotating round it. More complex atoms have a core built up of a number of protons, with some electrons embedded in it, the remainder of the electrons whirling round it. Normally the positive and negative charges are equal, so the atom is electrically neutral.

3. *Can you suggest a simple way of visualising an atom?*

A simple—possibly crude—analogy is to imagine a lump of meat hanging up out of doors. The meat represents the heavy core of protons. The flies, some circling round, others resting on the core, represent the electrons.

4. *Can electrons be detached from an atom?*

Yes, they can be, and the ease with which these free electrons can be detached and made to move along a substance determines whether that substance is a conductor or an insulator.

5. *What is the difference between a conductor and an insulator?*

An electric current consists of a flow of electrons. Therefore a substance whose electrons can move freely along it is a conductor. A substance in which electron flow is very difficult will be an insulator.

6. *How are electrons utilised in a valve?*

They are driven out of a suitable electrode and made to pass through a vacuum (or occasionally a gas) to another electrode. During flight their numbers, paths and speeds are controlled as required by means of intermediate electrodes, or by a magnetic field.

7. *How are electrons obtained in a valve?*

By heating a suitable material. The electrons of the atoms which build up the material gain such velocities by heating that they break away from the attraction of the positively charged proton core and leave the surface of the material all together. Once clear, arrangements are made to prevent their being drawn back, and they are accelerated towards the desired electrodes.

8. *What materials can be heated in a valve to provide electrons?*

One example is the metal tungsten. To obtain emission from a metal, a very high temperature is necessary, the emission at room temperature being negligible. Metals such as lead or tin, melt before reaching the necessary high temperature. Tungsten however has a very high melting point, and can be raised to bright heat before melting, at which temperature the electron emission is copious. Apart from the need for high temperatures some metals try to hold back their electrons more strongly than others and are therefore not so suitable as emitters.

9. *Tungsten filaments are often found in transmitting valves, but rarely in receiving valves. Why is this?*

To raise the tungsten to the necessary bright heat, a fair amount of power must be supplied from the accumulators or from the filament winding on the mains transformer. The running costs of the receiver would therefore be high, apart from the inconvenience of frequent accumulator charging. To avoid this, the filaments of receiving valves are normally of the "coated" type, with consequent saving of power.

10. *What are coated filaments?*

It has been found that certain substances, such as the oxides of barium and strontium, are excellent emitters of electrons even at barely visible red heat. In practice, a nickel wire is coated with a paste of the carbonates of these metals, and this is converted during manufacture to oxide, thus providing a coating of active material to the nickel wire. The latter acts merely as a support and a conductor for the heating current.

11. *Why are coated filaments not so suitable for transmitting valves as for those used in reception?*

In transmitting valves very large electron emission is needed, amounting to amperes rather than milliamperes. The electrons, in streaming through the high resistance oxide coating, cause local "hot spots" and the higher temperature at these spots results in still further emission, so that after a time the active material becomes destroyed and the operation of the valve is impaired. Accordingly, pure tungsten, or often tungsten with thorium added to it, is more suitable for heavy duty, high voltage valves.

12. *Why is a very high vacuum necessary inside a valve—apart from certain gas-filled types?*

For several reasons.

(*a*) Any air present would exert a certain pressure on the emissive surface and tend to press back electrons which would otherwise be able to leave the surface and play a useful part.

(*b*) Oxidation and burning out of the filament would result, as would occur in a non-evacuated electric lamp.

(*c*) The electrons hurtling against the molecules of air would ionise these to some extent. (Ions are atoms or molecules which have had an electron knocked off, thereby exhibiting an excess positive charge, or which have had an extra electron added to them, thereby acquiring an excess negative charge.) The presence of ions in a valve makes the operation somewhat erratic, and the high speed control otherwise possible is lost. Further, the bombardment of the filament by positive ions repelled from the positive anode causes considerable damage and overheating to the filament.

* 43 Brunswick Hill, Reading, Berks.

13. *How is the very high vacuum obtained in a valve ?*

During manufacture, the valve stem is connected to pumps, using mercury and special types of oil having extremely small vapour pressure. The electrodes are also heated, often by placing them in an intensely varying magnetic field, which sets up eddy currents in them and raises them to red heat. This helps to drive out any gas adhering to the surface pores of the electrodes. Finally the glass stem is melted and fused to form a gas-tight seal.

14. *What is the mirror-like surface often visible on the inside of the glass envelope ?*

This results from a further precaution to remove traces of residual gas. A small amount of a substance such as barium or magnesium is introduced into the valve during manufacture, and is " flashed " by eddy current heating. The substance, in burning, combines with any traces of gas, thereby improving the degree of vacuum, and on cooling is deposited on the glass. These substances are called " getters " and are often pasted on a small disc so placed that the deposit on cooling is kept away from the stem of the valve, where it might cause leakage.

15. *When electrons are emitted from a surface such as the filament of a valve, they form a cloud round it, which is called the " space charge." How are they drawn away ?*

By placing a suitable electrode nearby, and maintaining this at a positive potential with respect to the filament. As the electrons are negative charges they are attracted to this positive electrode, which is known as the plate, or anode. To keep the plate at a higher positive potential than the filament, a battery is used.

(*Continued on page* 16)

BULLETIN QUESTIONNAIRE

THE Council desires to record its thanks to all members who replied to THE BULLETIN Questionnaire published last month.

As a result of the opinions expressed, it has been decided to eliminate, as from this issue, the Active Service List ; the " 73 " feature will be discontinued as from the August issue. Although 60 per cent. of the votes cast were in favour of eliminating the lists of New Members, Council has decided that for the time being their publication shall be continued. Many members who voted for their retention pointed out that the information is of particular interest to D.R.'s, T.R's., and others who organise local meetings. The suggestion to circularise D.R.'s with a monthly list of new members is not practical at present.

District Notes

The Council has decided to retain District Notes, the voting was 42 per cent. in favour, 58 per cent. against. Those responsible for the preparation of the notes are, however, urged to confine them to items of general interest, and to restrict their length to a maximum of 200 words. Several members have suggested that the names of the counties which go to form each District should be published, but it will be remembered that this information was eliminated to save space when the size of THE BULLETIN was reduced in April 1941 from 40 to 16 pages. Certain members have also suggested that the names and addresses of all T.R.'s submitting reports should be published. Again, it is pointed out that this information *was* frequently published prior to the last paper cut.

Constructional Articles

The fact that over 90 per cent. of those who voted asked for more constructional articles, is a good sign, but, and here is the snag, only one member came along with an offer to prepare such an article ! The Council and Editorial staff fully appreciate the difficulties attendant upon preparing sound constructional articles at the present time, but clearly members *must* themselves assist if they wish to read more articles of a practical type.

Suggestions

Set out below is a list of suggestions for articles put forward by members who answered the questionnaire. Readers who are in a position to undertake the preparation of articles dealing with one or more of the subjects listed are invited to communicate with the General Editor. Please do *not* commence the article until your offer has been accepted. We do not want twenty articles on valve voltmeters !

Space limitations will not permit a complete analysis to be published dealing with the many useful suggestions put forward, but the members concerned may rest assured that their views have been carefully considered. Paper rationing and national security, however, make it impossible at present to put many of them into effect.

One or two members suggested that the cover pages should be used for technical articles. This suggestion, if adopted, would deprive the Society of revenue from advertising, and lose the goodwill of advertisers, besides evoking possible criticism from a large number of members. We *may* ultimately be forced to dispense with the cover but until that time arrives it is felt that most members would prefer to see the pages in question used for advertising. New members may not realise that the Society's Journal regularly carried 20 pages of displayed advertising prior the war—present issues confine displayed advertising to the four cover pages.

SUGGESTIONS FOR ARTICLES

(*a*) TECHNICAL

1. Instruments : Valve voltmeter, oscillograph, frequency modulated oscillator, audio oscillator.
2. Test gear : Valve tester, condenser checker, etc.
3. Simple receivers, including T.R.F.
4. Simplified short wave superhet receiver.
5. Advanced " straight " receivers.
6. Hints and tips on problems associated with home built receivers.
7. Practical design of I.F. transformers.
8. Preselectors.
9. Communications-type receivers.
10. Servicing and aligning receivers.
11. Design of U.H.F. crystal controlled transmitters.
12. Up-to-date treatment of aerial technique.
13. Elementary radio theory.
14. Repair of meters.
15. Recording.

(*b*) TOPICAL

1. Great events in the history of amateur radio.
2. News and reception notes of distant or unusual broadcast stations.
3. Revive " Uncle Tom."

KHAKI AND BLUE

● Tel. G. M. Twose, P/JX 363515, **BRS3849,** who is with Naval Party 850H would like to hear from any member who has time to write. Letters should be sent c/o G.P.O., London. Some months ago he visited South Africa but no amateurs were contacted. His stay of three days was, however, made very enjoyable by the residents and voluntary organisations who arranged outings and entertainments. He especially appreciated the fact that there was no blackout.

● District 10 members in particular will be interested to hear that S./Ldr. Jack Sutton, **GW2NG,** is now at R.A.F. H.Q., M.E.F., after serving for nearly two years in Malta and seven months in East Africa. He went down in May with malaria, but at the time of writing (early June), he was convalescing. Jack and Ted Laker, G6LK, seem to run into one another in all sorts of odd places. Their first meeting was in Malta where they enjoyed (!) the blitz together, then in Cairo and more recently in E.A. We gather their jobs are closely allied. 2NG sends 73 to all in District 10 who remember him.

● Continuing his wanderings over Scotland and points north, F./Lt. Jack Hum, **G5UM,** reports meeting 2FYM in a remote spot in the Faeroe Islands, and 2AVN in the next office to him at his headquarters—the latter being a W./T. N.C.O., and an ex-member of the C.W.R. GM4HB is still a corporal wireless mechanic at the same H.Q. Seeing THE BULL at a certain station in the Shetlands, 'UM made the usual inquiries and discovered that the assistant station signals officer was R.R.S. Beale of Glasgow. At another Scottish station Charlie Robertson (ZL1JZ), who was with G5UM in Iceland last year, is now a squadron signals officer, having recently been commissioned, while F./O. Don Stewart (VE4AGZ) who was in the district until recently, has disappeared overseas somewhere. It is felt that there must be many amateurs in West Fife in the Services (and even some who are not), who would care to attend local meetings if such could be organised in the Dunfermline and Rosyth districts. A line to G5UM, c/o R.S.G.B., might help to get something moving in this direction.

● One of the few Britishers to have held a Belgian amateur licence is F./Lt. A. H. Dormer, now in Signals at Coastal Command headquarters. He was at one time ON4GW of Antwerp.

● F./O. A. D. Blachford, **VE3AHX,** is now Signals Officer at new Canadian Bomber Group Headquarters, F./O. E. S. Brown, **VE3AHU** is S.O. at an R.C.A.F. fighter station and F./O. N. R. MacMillan, **VE4QH,** is S.O. at a Canadian station in Army Co-op. Command.

● A. A. Lamb, **4206,** who has recently been promoted from Sergeant to Pilot Officer, wishes to be remembered to Messrs. Davies, Morriss, Mapley and other C.W.R. members, who were at Cranwell during the autumn of 1939 and winter of 1940.

● Cpl. A. H. Hennis, **4305,** of Dagenham, reports that Arthur Yates, **G3LB,** of Ripon is serving with him at Vaagar, Faeroe Islands. The latter is now proud parent of a daughter.

● Apropos the paragraph published in this column last November, Cpl. Cairns, **G3UC,** (Royal Signals, India Command), states that he has worked R./T. over a distance of 135 miles using low power to an Army type 11 set. With reference to the BULL. he says " I have never seen so much 'goodness' packed into so small an area."

● In an airgraph letter from Signals Experimental Group, M.E.F., Cpl. W. Price, **G8OQ,** informs G6CY that a recent issue of "Parade" contained a photograph depicting "Brighton's *deserted* front." Close examination, however, revealed the presence of Capt. Dainty, G3HP—complete with beret! 8OQ seeks news of 2RU to whom he sends 73.

● Cpl. A. Allan, **5139,** Air H.Qs. R.A.F., Freetown, W.A.F., would like to hear from GM3HY.

● Friends of Alan MacFarlane, **G4CF,** of Ormskirk, will be sorry to learn that he has been discharged from the M.N. as the result of injuries received by enemy action. 4CF joined the M.N. as a radio officer before the outbreak of war.

● Mr. Robert Galea, **ZB1E,** who has been responsible for extending hospitality to dozens of British amateurs who have served in Malta, reports that all local amateurs are fit and well, although most have suffered damage through enemy action. Mr. Galea extends a cordial invitation to any member visiting G.C. Island to contact him at 20 Collegiate Street, Birkikara. He sends greetings to his friends everywhere.

● Ldg. Radio Mech. Jack Brazzill, **G3WP,** in a further letter from Iceland, reports meeting Tel. Sims, G5VS, who called upon him unexpectedly a few weeks ago. Vic was enthusiastic about the hospitality extended to him by Mr. Burgess, VS7JB, whilst he was in Ceylon. 3WP has located several other members in TF including G2NT, 2CMW, 2BUV and 6231. Incidentally, 2CMW was recorded incorrectly in the March New Members list as a B.R.S. member.

● A.C.1 Ryley, **G4NX,** in an airgraph from Ceylon gives the news that a Station Radio Club has been formed. Meetings are held in one of the N.A.A.F.I. canteens on the island, and attendances up to 12 in number have been recorded. G4NX is working with Sgt. Richardson, **G8VX,** both of whom wish to be remembered to their friends. Ryley's address is S.E.C.E., R.A.F. Ceylon.

● On the morning of May 6, F./Lt. W. Smith, **G5WZ,** received an airgraph from H.Q. advising him of the meeting to be held that day in Cairo. By good fortune he was able to keep the date. He writes: " Bill Marsh, SU1WM, deserves a clap on the back for his efforts—it was not easy in the U.K. organising these affairs, so how much more difficult for Bill out here under present conditions." Wilf sends greetings to all Tynesiders, and particularly to those in South Shields.

● Cpl. Ken Rowell **G5RL,** who is still at S.H.Q. Signals, No. 10 O.T.U., would like to hear from G4DS and 8NS who were stationed near him last year. Other members serving near his station are asked to get in touch with a view to a meeting. G5RL advises that Pat Crisp, G6DX, has recently been granted a commission in Signals and that XZ2DY is a Captain in the India Army. No news has yet been received of G8ST who was in Singapore prior to the capitulation.

● Bradford and District friends of Armt. Q.M.S. Harry Bilteliffe, **G5HB,** will be glad to hear that he is fit and well at a radio repair section attached to a H.A.A. Regiment in the M.E. He has made no amateur contacts to date but is ever hopeful of doing so. He sends 73 to all who know him.

● Sgm. A. P. B. Birt, **4147,** who is with the B.N.A.F., is another who has failed to make a personal QSO with the fraternity. He wishes to be remembered to his friends in District 1.

● Mr R. C. Cave, **G2KQ,** writing from Europa Lighthouse Bungalows, Gibraltar, reports that the Gibraltar Amateur Radio Society is now practically non-existent, due to the fact that most of the founders have left the Rock. He and GM3TD are working together.

● Cpl. T. Draycott, **5245** writing by airgraph from W./T. Station, Teheran P.A.I. Force, appeals for second-hand technical books.

● Pre-war 56 Mc/s. enthusiasts will be glad to hear that P./O. Geoff Keen, **2BIL** is fit and well at an O.T.U. in the M.E. He recalls hearing G6LI and the St. Helens Police Station on 56 Mc/s. whilst partaking in a field day on Ditchling Beacon, Sussex, during 1937.

Congrats

● To Mr. and Mrs. Harbridge, G2KH, of Southend-on-Sea, who are now proud parents of a daughter born on May 27.

● To Sgt. John Kyle, D.F.M., G6WL, who has recently been awarded the Air Force Medal. "Jock" is at an R.A.F. station in Bucks.

● To F./Lt. W. H. Simpson, **G8DI,** who has been Mentioned in Despatches. Bert was one of "The Second Earlies" and is now at an R.A.F. Bomber Station in Lincolnshire.

● To Chief Radio Officer G. A. Raeburn, **GM2KP,** who has been commended for brave conduct at sea. It is understood that Mr. Raeburn has served on three ships that have been torpedoed.

● To A.Q.M.S. R. Bullock, R.E.M.E., **2HHX,** who was married recently to Miss Joan Smith of Sutton, Surrey. He has also received promotion to W.O.II.

● To Captain Larry Richards, R. Signals, **G3YM,** whose engagement to Subaltern Rosalind Firmin, A.T.S., is announced. Larry is with the B.N.A.F.

Cranwell Meetings

There was an attendance of 40 to hear Corporal Gough, 5620, deliver the first of his new series of lectures on Aerials. The final part will be delivered on August 2 when directional effects and beam arrays will be discussed.

It is hoped that several meetings will be held in camp whilst F./O. John Clarricoats, G6CL, and other A.T.C. officers are at Cranwell during the week commencing September 4th. Members in camp are asked to watch for announcements and notices and to give the meetings their support.

Hospitality Offered

Mr. E. C. Halliday, **BRS. 6398,** 33 Hill Top Crest, Higher Street, Budeaux, Plymouth, offers hospitality to Service members located near that town.

ARE YOU AT

No. 1 R.S. OR No. 8 R.S. ?

★ If so, you are invited to attend Meetings in Hut 165 (No. 1R.S.). Details from Cpl. Chadwick (G8ON), Cpls.' Club, East Camp.

Second United Nations Amateur Radio Conventionette

By W. E. MARSH (SU1WM)

At the close of the first United Nations Amateur Radio Conventionette held last December, the majority of those present agreed to the suggestion that similar meetings should be arranged in Cairo twice a year. The second meeting was fixed to take place early in May owing to the exceedingly hot weather usually experienced here in June. Replies to the circular letter of invitation resulted in 55 acceptances for the evening meeting and it was hoped that the total attendance might touch the 70 mark.

The day before the meeting, while having afternoon tea at Groppi's, SV1RX was spotted on his way out and given a call. As a result, he was able to arrange to come along to the meeting and also be able to fix up for the dinner. (As events turned out, even professionals sometimes encounter technical hitches. In this case, a defective film pack resulted in some members on the right of the photo being "outside the band"—very sorry O.M.'s.)

The morning meeting was attended by 24—mostly members stationed outside Cairo who had got leave. A couple of hours enjoyable rag-chew was had by all present. A.A. and B.R.S. SU1WM informed the gathering that he had received two airgraphs from "Clarry" asking that his best wishes for an enjoyable evening should be passed on to all and saying that he would have very much liked to have been present. He expressed the hope that these meetings will be successful and that the victory convention will not be too long delayed.

Before moving downstairs for the photo, the hat was passed round on behalf of the R.S.G.B. P.O.W. Fund. This realised a total contribution of £6. Thanks a lot, O.M.'s. Only our less fortunate fellow hams will be able to express adequately their appreciation when they finally return.

The meeting next assembled for the photo, after which S./Ldr. M. A. Brookes, G5OI, proposed a hearty vote of thanks to SU1WM for organising the meeting. In reply, 'WM said that he hoped to have the pleasure of seeing everyone again in December but was not sure if he would be able to be present. In any case, the meetings would continue as long as there were enough amateurs left in the M.E.

The following is a complete list of those present: G2LK, 3KB, NZ, TA, GM3LG, G4AH, JY, 5BR, OI, UH, GW5VX, G5WZ, 6IX, PQ, 8DA, HW, OQ, VI, 2BXS, CIB, CIX, CLD, DOS, DTQ, DYK, FDT, FFM, FPI, FXZ, BRS3766, 4905, 6175, SV1RX, VE3AKX, VS1AJ/VU2EO, W2CMY, ZL2IO, 2TL, SU1AX, GT, SP, MW, WM.

"IN THE BAND."
Some of those who attended the second war-time Conventionette held in Cairo on May 6th, 1943.

members chiefly discussed pre-war activities and post-war hopes and plans, whilst full licence holders were mostly "concerned" about frequency allocations after the present scramble. Those present at the morning meeting were: G2LK, GM3LG, 3TA, 5UH, 6PQ, 8DA, 8KW, 2BDS, BXS, CIB, CIX, DOS, FFM, FPI, BRS4342, 6175, SV1RX, VS1AJ/VU2EO, ZL2TL, SU1AX, 1MW, 1WM.

The evening meeting was, unfortunately, not so well attended as had been expected, although there was no sudden military ban this time. It was gathered from those present that quite a number who had previously promised to attend had been kept busy and could not get away although they are stationed in Cairo or its suburbs. Writing this report a few days after the meeting, it would appear that the final stages of the Tunisian campaign probably provided the reason for the absence of those who were disappointed at the last minute. Among those present at the previous meeting, but unable for various service reasons to attend this time were: G2YK, 3AM, 4HK, 5MI, 5QY, 5VU, GW5VX, G6CW, 6GS, 6LK, 8MD, GM8RJ, 2FPY, HCW, BRS4049, 5209 and a few VEs and Ws who were in Cairo for only a short time last December. It is with deep regret that we have to report that Ft./Lt. W. H. Scotland, VE4ANE who was with us in December, is now a "Silent Key" as a result of enemy action. The following had notified their intention of being present but presumably were prevented from attending at the last minute: G2FC, 2GB, 2PA, 3GQ, 3MV, 3ZM, 4MT, 6PK, 6UG, 8FW, 8GG, 2FQZ, FRG, FUQ, BRS3835, SU1RD, VE9CNE.

During the dinner the difficulties of finding a more suitable meeting place having less QRM were discussed. The cost of such accommodation would be at least double and opinions varied as to whether this would be acceptable to a large majority of members. Certain members also suggested that a "business meeting" in the morning to discuss purely amateur matters would be very much appreciated. This will be done next time so please have your topics ready O.M.'s. How about a "Quiz" Corner?

R.S.G.B. Prisoners of War Fund

DONATIONS.—The General Secretary acknowledges with thanks, on behalf of Council, receipt of donations from:—G. A. Ginn, 4487, £1; B. Rowell, G5RL, £1 1s.; L. J. Fitzgerald, 2CKJ, £1 1s.; 2CNC and office friends, £2; F. N. Gandon, 5142, 5s.; H. G. Lapworth, 5043, 2s. 6d.; Salisbury Mtg., £3 5s. 3d.; E. H. Trowell, 2HKU, 3s.; Mrs. D. G. Tucker, 10s.; A. S. Gosling, G2VC, £1 1s.; E. W. Thompson, G8BG, 5s.; J. Bence, 4289, 6s.; T. H. Streeter, G5CM, 7s. 6d.; A. G. Archer, G8NU, 5s.; Bury Group (per 3WG), 5s.; W. G. Hopcroft, GM4AN, £1 10s.; N. W. Kent, R.A.F. A.R.S., £1 10s.; Anon, 4s. 7d.; H. G. Chandler, G6BP, 2s. 6d.; C. E. Brooks, 3811, 5s.; A. D. Blachford, VE3AHX, £1; A. A. Hammond, G6AH, 5s.; A. MacFarlane, G4CF, 5s.; M. L. R. Mahon, 5125, 5s.; R. Galea, ZB1E, 7s. 6d.; District 7 (Croydon), 16s. 6d. **Receipts to date, £841 4s. 2d. Expenditure to date, £385 10s. 3d. Balance in hand as at June 30th, £455 13. 11d.**

KIT BAGS.—Kit bags to the value of £40 19s. 11d. were purchased last month for 22 members and 5 non-members. Attache cases to a total value of £14 6s. 1d. were purchased in May for 22 members and 5 non-members with one held in stock. Bags and cases have been sent to next of kin for despatch.

BOOKS AND GAMES.—Mr. C. H. L. Edwards, G8TL, acknowledges with thanks donations of games and playing cards from several members. Information has been received that *Men Only* and *The World Wide Magazine* cannot at present be sent to prisoners of war.

THANKS.—Letters are to hand from Capt. Shackleton, W.O. G. D. Barry, L.A.C. Richardson and Chief Radio Officer F. Warner, reporting safe arrival of parcels from the R.S.G.B. Fund.

News From the Kriegies

Mrs. M. L. Healey of Bulwell informs us that her son L.A.C. R. Healey, R.A.F., **G6HY,** is a prisoner of war in Java.

Mr. A. Lawson reports that Private A. Wales, R.A.S.C., **BRS3644,** is a prisoner of war in Malaya.

BRITISH ISLES NOTES AND NEWS

District and Town Meetings

D.R.'s, T.R.'s and others are asked to arrange meetings at least seven days after BULLETIN publication date—nominally the 15th of the month. Due to distribution difficulties, coupled with the fact that a very large number of members living away from home have the BULLETIN redirected to a temporary address, some days may elapse before the current issue is received. If a meeting is fixed between the 15th and 22nd of a particular month a notice should appear in the *previous* month's issue.

Details of forthcoming meetings should be sent to reach Headquarters not later than the 27th of each month. The details should be set out on a separate slip of paper or on a post-card, and should be arranged exactly as shown in the panel published on page 12.

DISTRICT 1 (North Western)

D.R.: H. W. Stacey (G6CX), "Sandleas," Eddisbury Road, West Kirby, Cheshire. Hoylake 337.

Bolton.—At the meeting held on June 6, at 2DVQ, three visitors from the Ashton-under-Lyne group were welcomed. A visit to an Ashton Society meeting is planned. The next local meeting will be held on August 8. As the time and venue are as yet undecided, interested members are asked to contact the T.R., 2DVQ, 32 Bromwich Street, Bolton.

DISTRICT 2 (North Eastern)

D.R.: C. A. Sharp (G6KU), 316, Poplar Grove, Gt. Horton, Bradford. Bfd. 10772. *Scribe: H. Beadle (G8UO), 13, Chandos St., Keighley.*

Congrats. to Lt. J. Platt, G2VO (Army Dental Corps) and Miss W. Bailey (W.A.A.F.) on their engagement. 2FIM is building gear and 5893 swotting morse. 6441 is welcomed to membership. Will members in the Morley–Batley–Dewsbury area please get in touch with 5YV who is trying to organise something of interest. 4976 has constant visitors in 2HDY (London) and 4094 (Stoke) who are at present stationed in his town. He has obtained a number of new contacts by fastening an R.S.G.B. car plaque on his front door. He would also like to get in touch with 2AND. 4412 had a good time at the last I.E.E. meeting. 5GJ is now in GM. 3KB was present at the Cairo meeting. (Let's hear from you OM). 3HA (R.A.F.), now a Corporal, hopes to meet some amateurs among the Americans arriving in N. Africa. He would like to know what has become of 3KF. Letter budget rota now contains 32 addresses. No. 7 is on its rounds, keep it moving please. 8UO will be in York, July 24–30, and would welcome the opportunity of a meeting with anyone in or near that city. Addresses of District 2 T.R.'s can be obtained from G8UO.

G8UO.

DISTRICT 3 (West Midlands)

D.R.: V. Desmond (G5VM), The Chestnuts, Gilbert's End, Worcester. Scribe: E. J. Wilson (2FDR) 48 Westbourne Road, Olton, Birmingham.

Birmingham.—At the June meeting of the M.A.R.S. Mr. B. George gave an interesting talk on the decibel. Eighteen members and four visitors were present. The Scribe has received letters from L.A.C. D. W. Surman, BRS4045 (Rhodesia) and P. Clarke, BRS5616 (R.A.F. in the South-West). The former wishes to be remembered to all old friends. 2FDR.

DISTRICT 4 (East Midlands)

Deputy D.R.: A. E. Clipstone (G8DZ), 14 Epperstone Road, West Bridgford, Notts. 'Phone: c/o 2AOO, Nottingham 84105.

Derby.—G2OU reports visits from 8SI, 5312 and 5586. A speedy recovery to 8BN who is in hospital.

Nottingham.—Seventeen members attended the June meeting which was held in a works canteen as the College authorities decided at the last minute that they did not agree with Sunday meetings. Thanks to the Radio Editor of the *Nottingham Evening Post* the change of venue was made known in time. There was on display a good show of amateur-built apparatus including a fine P.A. amplifier constructed by 5514 and a midget portable made by a member from the college. 5541 presented two hard-to-get valves which were auctioned by 8DZ and realised 24s. for the P.O.W. Fund. After the meeting the party was taken round the factory and shown how silk fabric is manufactured. New and old members who have not yet attended meetings are invited to give support to future functions. G4LY, now in the M.E., has applied by airgraph for membership. G8DZ.

DISTRICT 5 (Western)

D.R.: R. A. Bartlett (G6RB), 31 King's Drive, Bishopston, Bristol. Bristol 46960.

Bristol.—The attendance was slightly better at the monthly meeting which took place on June 27. We were pleased to welcome VE3ADN, G6UB and 2FUX. A raffle in aid of the P.O.W. fund realised £1 18s. The D.R. has recently received Airgraphs from W. W. Cock, G3HN and R. E. Griffin, 5UH, both of whom are in the M.E. The former is congratulated on his rapid promotion to the rank of Captain. 5UH attended the second Cairo Convention-ette. Gloucester, Cheltenham and Swindon. Anybody alive in these parts ? G6RB.

DISTRICT 7 (Southern)

D.R.: W. E. Russell (G5WP), Milestones, Mayford, Woking, Surrey. Woking 1589.

Coulsdon.—The T.R. would like to have more news for these notes, so what about some of you oysters coming out of your shells awhile ? 2KU has temporarily left the district for a N.W. coast port where he has 8JV as his C.O. *via* 3003.

Croydon.—The June meeting was an "all rag-chew" affair with thirteen members attending including G2DP, 2JK, 3ST, 4NI, 5PY, 2HHD, 1545, 4324, 4603, 4814, 5859, 6064, and Mr. Turner. We welcome 5859 who hopes to attend meetings in future. 3ST submitted a few problems for discussion which were answered to his satisfaction—we hope ! 4NI has started building the pre-selector published in a recent issue of the BULL. At the August meeting G2DP will give a talk on "Direction Finding and the Weather" (see "Forthcoming Events" for the date and time). *via* 2DP.

Kingston.—Welcome to new member Cpl. Holmwood, 6503 who is stationed in Wiltshire with 3CU. They wish to meet the locals. Address from the DR.

Salisbury.—Although exigencies of the Service upset the plans of fourteen intending visitors (including several W's), 22 members were present at the Cathedral Hotel, Salisbury, on June 6. They included G2YN, 4AJ, 5JR, 6CJ, 6CL, 6NF, 8PP, GW8NP, 2CNT, BRS4822, 5087, 5474, 6218, and seven members of the Southampton University Radio Society. During the afternoon 6CL gave a most interesting report upon the Society's activities, assisted by his famous little black book ! 6NF also addressed the meeting. 2CNT did sterling work with a camera using the Cathedral as a background to the groups. The P.O.W. Fund benefited to the amount of £3 5s. 3d. as a result of 6CL's chat upon the good work the Fund is doing. *via* 8PP.

Southampton.—Seven members of the U.C. of S. Radio Society attended the Services meeting at Salisbury earlier in the month. 5LR received a visit from SU5KW and together they looked up 5554. It is hoped that it will be found possible to hold a meeting in Southampton during August. Details from G. Hersee, 6447, 90 Arundel Road, Littlehampton. BRS6448, who is taking Radio at U.C., is constructing a new receiver. G5WP

AUGUST ISSUE

Due to the August Bank Holiday period falling early in the month all D.R.s and scribes are requested to forward their Notes and News to Headquarters by July 27th, 1943.

DISTRICT 10 (South Wales & Monmouthshire)

Deputy D.R.: H. H. Phillips (GW4KQ), 82 Cottrell Road, Roath Park, Cardiff. Cardiff 2697 *during business hours.*

By air mail from the Middle East comes news of S./Ldr. Jack Sutton, 2NG, who is recuperating from a bout of malaria. He sends 73 to all friends in the District and hopes to meet 3AJ in the near future. GW5FI has also been convalescing at home following his air accident in the M.E. We are glad to learn that he is now back on duty.

A meeting is to be held at the home of GW8UH, 29 Ladysmith Road, off Penylan Hill, Roath Park, Cardiff, at 3 p.m., on August 22nd.

Swansea members do not appear to have any news as no reports have been received for some time. GW4KQ.

DISTRICT 11 (North Wales)

Deputy D.R.: C. Spillane (BRS1060), "Woodside," Meliden Road, Prestatyn.

As Prestatyn meetings have suffered lack of support recently, it has been decided to hold the next on August 22, thus giving members ample time to plan ahead. It is hoped that everyone will make a special effort to get along. At this meeting 2731 will hold another auction of gear, so please bring or send yours along before it goes out of date. BRS2731 has constructed a 3-valve Broadcast Receiver with self-contained aerial using 3 volts dry L.T. and 9 volts H.T. supply, overall size 10in. x 6in. x 3in. The set will be exhibited at the August meeting. (May we have an article, please ? Ed.). 2HIV, now at an R.A.F. station in Hants, reports meeting 3OW and 5CH. ZL2RI has arrived in the M.E., and sends 73 to District members. BRS1060.

DISTRICT 12 (London North and Herts)

D.R.: S. Buckingham (G5QF), 41 Brunswick Park Road, New Southgate, N.11. Enterprise 3112.

North London.—The informal dinner party held at The Cock, Cockfosters, on Friday, June 25, proved an even greater success than the one previously arranged, 25 members and their ladies taking part in a very pleasant evening. We were especially pleased to welcome P./O. L. Manton, G3UH, from District 15, who came along with G5FA from an A.T.C. Parade. As it has not yet been possible to arrange a summer outing, the next meeting will be held at The Cock, Cockfosters, on July 30. Those wishing to take the set meal (price 5s.) should advise the D.R. by July 26.

St. Albans.—Although only four replies were received to his recent appeal, BRS3412 has arranged to hold a meeting at his home (18 Sandfield Road) on August 1 at 3 p.m. Local members are urged to support this, the first war-time meeting arranged in St. Albans. G5QF.

DISTRICT 13 (London South)

A.R.'s: (South Eastern and Central), S. E. Langley (G3ST), 62 Dumbarton Road, S.W.2 (Western). E. H. Simmonds (G8QH), 17 Roedean Crescent, Roehampton, S.W.15. Prospect 1990.

South Eastern and Central.—Our June meeting, held in conjunction with District 7, was not very well attended due perhaps to the fine weather. Lt. Ilott (2JK) provided a surprise when he announced the safe arrival of a daughter, Pamela Marianne. All in District 13 will wish to congratulate him. He is to give a talk on U.H.F. aerials at the July meeting. An interesting air mail has arrived from L.A.C. Glass (2FFM) who states that 3HG and 3TA are with him in N.A., the latter attended the Cairo meeting. He has also contacted 5BR, 6PQ, 2DTQ and 4CG. 2FRM is in Rhodesia. It is hoped to arrange a Field Day shortly at BRS1545. This should be even better than last year's effort, when we had a very enjoyable day's outing. G2JB, GZ and 8TN were on leave in June, a week too early for the meeting. G3ST.

Forthcoming Events

July 24	District 15, 3 p.m. at The Excelsior Hotel, 1 Ladbroke Gardens, Ladbroke Grove, Notting Hill, W.11. (Buses 7, 15 and 52 or Met. Station.)
,, 25	District 4 (Nottingham section), 6.30 p.m. at G8DZ, 14 Epperstone Road, West Bridgford. Bus 11 from town, alight Patrick Road.
,, 25	District 5, 3 p.m. at 17 Colston Avenue, Centre, Bristol.
,, 25	District 14 (Chingford section), 3 p.m. at G2HR, 25 Clivedon Road, Highams Park, E.4. No. 35 bus to station.
,, 25	Scotland "A" District, 3 p.m. in Royal Technical College, George Street, Glasgow. Enter by Montrose Street.
,, 25	Scotland "C" District, A.G.M., 2.30 p.m. at 7 Airlie Place, Dundee.
,, 30	District 12. Informal Dinner Party, 7.30 p.m. at The Cock, Cockfosters (see District 12 notes).
Aug. 1	District 12 (St. Albans section), 3 p.m. at BRS3412, 18 Sandfield Road (turning off main Hatfield Road, between St. Paul's Church and Rats' Castle P.H.).
,, 8	District 7 (Croydon section) and District 13 (South London Central and Eastern area), 3 p.m. at Croydon Y.M.C.A., North End, West Croydon.
,, 15	District 7, 2.30 p.m. at West Building, University College, Southampton. Speaker: Dr. Zepler. Post card to G. Hersee, BRS6447, U.C.S. by 10th if attending.

DISTRICT 14 (Eastern)

Scribe: L. J. Fuller (G6LB), 167 Galleywood Road, Chelmsford, Essex. Telephone Chelmsford 3929.

Chelmsford.—The June Meeting was held at BRS5242, when our host demonstrated his very efficient P.A. Equipment—the musical interlude providing an interesting change from the usual topics. Mr. Smith is a master of his subject, and there is ample scope for a BULLETIN article here. What say, O.M.? The D.R. was recently home on leave, looking very fit. A cordial welcome is accorded to Messrs. Rippon and Hinton, our two newest members.

Brentwood.—We are glad to learn from his wife that G3LA is now a F./Sgt.; he would be glad to hear from any of his former colleagues at Brentwood. Address from G6LB.

Chingford.—This month's Bright Spot. In spite of the wrong directions in the BULLETIN—giving the venue as Ilford instead of Woodford—the meeting on June 20 was attended by G2HR, 8DG, 2DXL, 2FTH, 2ABC, 4215, 5684 and 5726, the last-named demonstrating his Franklin Frequency Meter. Apologies are offered to those who went to Ilford by mistake. 2ABC, a corporal in the R.A.F., is starting a Unit Library, and would appreciate any books of a technical nature, sent to his home, 22 Rayleigh Road, Woodford Green, Essex. The June Editorial was discussed, and the unanimous views held have been sent to the Editor. The F/M articles are particularly appreciated. Next meeting, see "Forthcoming Events."

Southend.—Congrats to G5XI now S./Lt., R.N.; 5UK now Sq./Ldr.; 6CT now Ft/Lt. 2SO, when on leave, met 5VQ, 6CT and 2GU. The latter, while in London, met a VE3 and an ON4. 4023 is "enjoying life" in Tripoli after a long spell in the desert. 2LC writes from Ruislip. G6LB.

DISTRICT 15 (London West, Middlesex and Buckinghamshire)

D.R.: H. V. Wilkins (G6WN), 539 Oldfield Lane, Sudbury Hill, Greenford, Middlesex. Byron 3369.

The June meeting, held at The Excelsior Hotel, saw G3SU, 3XD, 5LN, 5SR, 6WN, 8KZ, 2ADL, 2842 and 5056 present. Everyone enjoyed being back at the old haunt and we should like to express our gratitude to Mr. and Mrs. Green for their efforts. Discussion centred around a proposed social evening suggested by 2ADL. He was nominated to be co-opted to the social committee to assist 8KZ in an endeavour to arrange something for September. Watch for future announcements. In the meantime will members who think they could come along to either a tea or dinner party on a Saturday or Sunday please drop a line to the D.R. mentioning which day would be most suitable.

The High Wycombe Group recorded the smallest attendance ever at their June meeting, only G6IF, 4781, 4782 and 5666 being present. However, apparatus was discussed and displayed, including 112 Mc. receivers, field strength meter and 5666's receiver. Welcome to 5867, a new member at Beaconsfield, now with the R.A.F., and congrats. to 2947 on his recent marriage. We wish him and his wife "Good Luck." Our thanks to Mr. and Mrs. 4781 for providing refreshments at the meeting. No meeting will be held in July.

Cpl. Fletcher, 2FUX, is now at an R.A.F. station in Wiltshire awaiting a "Pre-Com" Course. He sends 73 to 2TJ, 5SR, 8KZ and 3718. 3XI reports fit, *via* 3UQ, from Tunisia. 3UQ advises that his son, who is in M.E.F., now has three tapes. 5027 has been discharged from the Army and returns to civvie street. He met several amateurs while at Mill Hill and sends 73 to G4KD, 6XP, 5KT, 2ADL and SP1QA. G6WN.

DISTRICT 16 (South Eastern)

Deputy D.R.: W. A. Scarr, M.A. (G2WS), 8 Beckenham Grove, Shortlands, Bromley, Kent. Beckenham 1131.

Letters have arrived from Paul Smith, 2FWV and Eddy Trowell, 2HKU. The former, stationed in Kent, is having plenty of opportunity to keep up-to-date with radio work. He gives news of D. L. Wood, 2FKC (West Wickham), who has obtained a technical commission in the R.A.F. 2FWV is anxious that District notes shall not be omitted from future issues of the BULLETIN. He would be glad to hear from members in the Westerham area with a view to arranging a local meeting. 2HKU (Sheerness) has now received definite news that 8SS is in a Java P.O.W. camp. Recent visitors to 2HKU have included 2ARY (Chester) and 4721. 2DHV has written to say that he is in a dug-out in the desert with a transmitter. G2WS.

DISTRICT 17 (Mid East)

D.R.: A. C. Simons (G5BD), Admiralty Road, Mablethorpe. (Phone 69.)

G5LL reports his safe arrival in North Africa. He is with the Americans but has met no amateurs yet. 2AUR had a 'phone chat with D.R. whilst on leave, he is stationed in London, somewhere near G8BQ, who he is trying to contact. 2BQC, also stationed "up there," frequently meets G6WN and others, and is appreciative of their hospitality. 8GI, now in Berkshire, reports that Geoff Hutson, 6GH, is fit and well in the M.E. He queries prospects for a district meeting this summer (will see what can be done. D.R.). 5MT is willing to act as T.R. for Grimsby, at least for the time being. Will local members get in touch with him? 5317 of District 13, now at 11 R.C.R.A.F. called on 4390 and 5345, but found them both absent on active service. G5BD.

DISTRICT 18 (East Yorkshire)

District Scribe: S. Davison (G6SO), 10 Sidney Street, Scarborough.

Hull.—G3PL is now back after a few weeks in the midlands 5MN visited the town recently and reported meeting 6OY. The latter is doing radio work in the R.A.F. Congrats. to 2ARP, whose wife recently presented him with a daughter. 8UL visited 2QO recently and was shown the modified "Hetrofil" in action. This certainly works well and eliminates a steady unwanted signal in a very satisfactory manner. We welcome a new member in P./O. C. Tudor, 6384. *via* G8UL.

Beverley.—Members in this area are asked to note the appointment of Mr. D. Armstrong, 3271, as Town Representative. As it is hoped to revive local meetings at an early date interested members should get in touch with Mr. Armstrong at 24 York Road. Thanks are expressed to the manager of the Marble Arch Cafe for the offer of accommodation free of charge.

York.—Mr. J. Casson, 3593, who is a civil engineer working for the R.A.F., is anxious to meet members in this area, especially those in the services. His address is 85 Manor Drive South, Acomb.

Scarborough.—Les. Tranmer, G6TG, paid a visit to the town recently. G6SO.

DISTRICT 19 (Northern)

D.R.: R. J. Bradley, G2FO, 36 Raby Road, Stockton-on-Tees.

Sunderland.—In a letter from "Somewhere in England," G3IV reports that 8JO is in the same unit and that 6HV, whose shack is now a heap of rubble as a result of a D4 contact, is in London. 3IV sends 73 to all in Sunderland.

Newcastle.—The T.R. reports a very disappointing response to his appeal for support for a local meeting. Will members please complete and return the questionnaire he sent to them? G8PQ is now Signals Officer at an R.A.F. station in the District after four years in VU, 3PH is at the same station.

G2FO.

Scotland

Scottish Records Officer: J. Hunter (GM6ZV), 51 Campbill Avenue, Glasgow, S.1. Langside 237

"*A*" *District.*—Congrats. to Ian McDermid on his promotion to Flight Lieutenant.

"*C*" *District.*—The April meeting was well attended when Mr. Ramsey, GM4HR, gave a lecturette on Workshop Practice. Many useful tips were picked up and the subject was well covered. At the May meeting Mr. J. Gouck completed the subject of Valves in his usual accurate and concise manner, also clearing up all the points of discussion. Our visitor from G at both meetings was BRS1608. The address of the D.O. is now 36 Park Avenue, Dundee.

"*H*" *District.*—Members will be glad to learn that Archie Wales, BRS3644, is no longer "missing," as he is reported P.O.W. in Malaya. 5319 has been roosting in a Signal School for a period. 8MQ is getting all kinds of work except radio. 2NQ has met G4NS and also his first ZL in the person of ZL2GF, a P./O. in the R.A.F. The next meeting at 2HBR (J. C. B. Carr, Windmill Road, Kircaldy) will take place on July 18 at 3 p.m. It is to be noted that due to factors beyond his control the D.O. regrets that he cannot always give actual dates for meetings in reasonable time as was done in the past. G4NS is given a "Welcome to the Far North"; G6LC has departed South. 8RI is to be congratulated on his recent promotion to the rank of corporal.

GM6ZV.

Northern Ireland

D.R.: J. N. Smith (GI5QX), 19 Hawthornden Drive, Belmont Belfast. Telephone, Belfast 63323. T.R. Belfast: R. Holden (GI5HU), 260 Grosvenor Road.

We are glad to hear that GI3ZX is doing well in New Delhi, and extend a welcome to 4351, 5557, 6219, 6225 and 6261. Incidentally 6219 is a "Y.L." Congrats to Ron Jenks, 2DYZ, on receiving the "dogs leg," and to "Curly" Plasschaert, W9KQQ, who has returned to the States to qualify for his commission. Ian Campbell, 2DDI, now in Harrogate, sends 73 to all at GI6YM. GI6TK wishes to thank W6OYD, 6UUJ, 6ASM, 6LD, 9ROD and 9NOP for the grand time they gave him on his recent visit to their base.

GI5QX.

Letters to the Editor

Was it Reflection?

DEAR SIR,—The fading described by G8HX in the June BULLETIN reminds me of a similar trouble I experienced with a television receiver during the summer of 1939 in the neighbourhood of Croydon aerodrome.

Whenever an air-liner passed directly or nearly overhead, the picture faded, slowly at first, then accelerating to one or two complete cycles per second, and finally slowing down again. Strangely enough, I cannot remember any similar fading on the sound channel, but this may be due to the comparative insensitivity of the ear to degrees of loudness.

At 45 Mc/s., I think the indirect ray can be counted out, and I should think it was due to reflection of low-angle radiation, interfering with reception by the direct path.

G8HX does not mention the height at which the Whitley was flying, but I should say the aircraft causing trouble with the television signal were flying at 1,000 feet or less. The fading reached its peak when the plane was viewed at an angle of 45° to 60° from the ground, more or less in a direct line with Alexandra Palace.

Yours faithfully,
W. E. MAXWELL (BRS4824.)

DEAR SIR,—I note in the June issue a query from G8HX re fading caused by the presence of aircraft.

This is *not* an isolated case, in fact, it is quite normal practice under similar conditions to that related by G8HX.

Part of the work on which I am engaged entails the use of a small transmitter of approximately the same power as that used by the average pre-war amateur.

For the purpose of accurate tuning and alignment a superhet receiver with a sensitive "R" meter is used as a field-strength monitor at a distance of anything up to two miles away.

If an aircraft flies within two or three miles of the transmitter the tests have to be abandoned until it is out of range.

The effect is always the same, first, a very rapid flutter as the aircraft comes into range, then it settles down to a slower but even fading, and finally as the plane passes its worst position, the signal fades right out for some seconds.

When the aircraft has passed over, the fading gradually speeds up to the high speed flutter and disappears.

The frequency I am testing on is a little above 14 Mc/s., but I have every reason to believe that it is possible on that frequency.

The cause is *not*, as G8HX suggests, absorption by the aircraft, but is the effect of the plane acting as a reflector, and as the distance changes, periods arrive when the reflected signal is 180° out of phase with the direct signal, and so "cancelling out" at the receiver.

Yours faithfully,
A. J. HALLETT (G3CQ).

DEAR SIR,—I read with interest of the unusual fading effect experienced by G8HX whilst working with G3XA on the 14 Mc/s. band in July 1939. I, myself, have had some personal experience of this phenomenon on various bands in recent months whilst listening to both nearby and distant short-wave broadcasting stations.

The explanation of the pulsating fade is, I believe, tied up with Radiolocation as it is generally most noticeable when aircraft are in the vicinity, and almost completely absent when the area is clear.

Mr. Brewley mentions the fact that a Whitley bomber flew across the line of transmission accompanied by this most disconcerting effect, and taking into account the date of his experience, it is reasonable to suppose that the Whitley in question was the centre of some "hush-hush" R./L. experiments.

In view of present conditions it is unlikely that any technical explanation of the effect would pass the censorship authorities, but it would be interesting to know if any other members have noticed this peculiar and sometimes highly annoying type of pulsating fade.

Yours faithfully,
E. B. GRIST (BRS4970).

Communication by Infra-Red Ray

DEAR SIR,—I have recently read in a well-known newspaper that equipment, shown in a demonstration at Cairo, enables speech to be heard over distances of six miles by means of the Infra-Red Ray.

The instrument is about the size of a typewriter, normal conversation is possible, and without the possibility of the message being intercepted or understood by the enemy.

The beams work equally well in darkness or fog, and are invisible.

It would be interesting to know how these waves are propagated, also the manner in which they are modulated, to say nothing of their reception.

Yours faithfully,
FRANK J. WADMAN (G2GK).

73.

G2KQ (Gibraltar), to G2CD, 3JR, 5UM, 6AB, DH, LL and all old friends.

G3LY (R.A.F., India), to G2DS, UX, ZZ, 3WX, 4FL, 6AG, CS, RH, VC, VX, 8GP, GX and IJ.

G3TA (R.A.F., M.E.F.), to G2DL, 3AD, HG, 4HW, 5KW, 8QV, 2FFM, 2FRM, and all other old District 13 friends.

G4CF (Ormskirk), to G2IX, LM, XU, 4DF, 5KX, ZI, ZT, 6YR, 8DQ and QG.

G4JS (R.A.P.C., York), to G2HW, 2TM, 3VV, 4BO, 4BM, 4CJ, 4FD, 4JJ, 6WH, 8FI, 8JA, 2AKK, 2CNQ and all old friends.

G4QC (Aigburgh, Liverpool, 17), to G2RF, 4BM, NU, 5RY, 8AA, AU, 2FZM, 4700 and VU2EU and all members of Liverpool District S.W. Club.

G6RF (R. Sigs, M.E.F.), to G5QA, 5SY, 6LL and all old friends.

G8GI to G8BQ, 2BQC, 4GI, 4DV, 6CI and 8CI.

GW8WJ (R.E.M.E., M.E.F.), to G3FM, 6VD, 8WI, GW4CK, 4CZ.

2AOL (Swansea), to G2UQ, 3DY, 4BJ, 6VD and 88H.

2BIL (R.A.F.), to G3JR, YY, 4KS, 5KV, 8LY, AB, 2CMH, CQJ, FYF, 179 and 3003.

2BOU (R.A.F.), to G3GS, WD, YK, GW3CR, QB, 88O, 2FNY and FOF.

2BTO (R. Sigs.), to G3CJ, 6QA and QF.

2CIW (R. Sigs., Gibraltar), to G2CD, YH, 3GF, LW, OA, 4FN, 5HN, 2AUA, BTO, CMW.

2HBG (R.A.F., M.E.F.), to G2IX, RI, 3BU, 5ZP, 6VD, IM, 8CZ, 2BLR, 2CFC and all in SU.

6398 (Plymouth), to 5181 and 6394.

HEADQUARTERS CALLING

May Council Meeting

Resume of the Minutes of a Council Meeting held at the Institution of Electrical Engineers on Monday, May 17, 1943, at 6 p.m.

Present.—Messrs. A. D. Gay (President), E. L. Gardiner, A. E. Watts, A. J. H. Watson, D. N. Corfield, J. Hunter, W. A. Scarr, E. H. Simmonds, S. K. Lewer, G. A. Jessup, W. H. Matthews, and W. E. Russell.

Apologies.—Messrs. H. A. M. Clark and G. M. Scott Farnie.

1. One hundred and forty-one applications for membership (including two Associates) were accepted. Twenty-two were supported by references, the remainder being sponsored by Corporate members. One resignation was accepted.

2. It was reported that on the occasion of the recent broadcast to the China Amateur Radio League, the Society's Press Relations Officer furnished 25 London and Provincial newspapers with a suitable press story.

3. It was announced that Society members have been invited to attend meetings of the I.E.E. Wireless Section. A vote of thanks was recorded to the Committee of the Wireless Section

4. It was announced that after a long delay the Paper Controller had issued a licence for sufficient paper to reprint a further 20,000 copies of the *Amateur Radio Handbook*.

5. It was reported that details of Society activities were now displayed at the London District Command Welfare Branch (Trafalgar Square).

6. Matters in connection with the new headquarters in central London were discussed and a draft lease was considered and passed to the Society's solicitors to be dealt with. A House Committee was appointed to deal with urgent matters. A suggestion to form a technical library was referred to the House Committee.

7. In view of the poor response received to the invitation extended to members in the April BULLETIN editorial entitled "THE BULLETIN in War Time" it was agreed to publish a questionnaire in the June issue and to invite views on BULLETIN features.

8. The following changes in District representation were agreed:
District 4. Mr. A. Clipstone, G8DZ, to succeed Mr. Vendy, G6VD, as Deputy D.R.
District 14. Mr. L. Fuller, G6LB, to succeed Mr. Varney, G5RV, *pro tem* with the title of Scribe.
District 17. Mr. A. Simons, G5VD, to succeed Capt. Gee, G2UK, with the title of District Representative.

Returned Bulletins

A considerable number of BULLETINS continue to be returned to Headquarters each month due to members failing to advise a change of address. Immediately a copy of THE BULLETIN is returned the appropriate stencil plate is removed and no further issues are sent until the member concerned forwards his new address. Due to paper rationing it is now impossible to maintain stocks of back issues, therefore, in their own interest members are urged to assist Headquarters by forwarding a change of permanent address *promptly*.

Mr. S. K. Lewer appointed Deputy Honorary Editor

In the absence from London of the Honorary Editor, (Lt. J. W. Mathews, G6LL), Council has appointed Mr. S. K. Lewer, G6LJ, Deputy Honorary Editor. Mr. Lewer has, for the past five years served on the Handbook Committee and has made numerous technical contributions to the Society's Journal. Mr. Lewer, Mr. E. Hayter Simmonds, G8QH, and the General Editor now form the "R.S.G.B. BULLETIN Committee."

Subscriptions to QST—An Important Statement

The A.R.R.L. informs us that the following notice is now sent to all overseas subscribers to *QST*.

"If your *QST* subscription entry is a new one, we have not been able to enter it with the issue specified because under present conditions, and also because of export control, we can only enter it with the issue current at the time the entry is made. If your subscription entry is a renewal, the foregoing also applies. After the war we shall be glad to supply upon request the missing issue or issues if they are available, at the rate of 25c. per copy, U.S. funds.

"Also under present conditions each monthly copy of *QST* mailed overseas is sent at the subscriber's risk, and we cannot duplicate copies."

In view of this new ruling members who subscribe to *QST* should forward a remittance to Headquarters at least four months before their subscription is due for renewal.

In certain instances individual overseas members send their renewal remittance direct to A.R.R.L. but this practice leads to further delays as the A.R.R.L. are required to submit the draft for collection through U.S. banks. In their own interest Society members who wish to subscribe to *QST* should place their order through Headquarters.

American Publications

The following American publications may be ordered through the Society:—

QST	17	6	p.a.
Radio Amateur Handbook (A.R.R.L.)	10	6	
Antenna Handbook (A.R.R.L.)	4	0	
"*Radio*" *Handbook* (E. & E. Ltd.)	12	0	

Delivery can be expected in about 3 months from date of order. Service addresses must not be used and cash must accompany each order.

Subscriptions to "*Radio*" cannot be accepted at present.

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A CORDIAL WELCOME IS EXTENDED TO THE

156

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* *Denotes Re-Elected to Membership.*

Letter to The Editor

The Sign of the Black Diamond

DEAR SIR,—During your address at the Leeds P.D.M. on May 23, I particularly noted your remarks regarding the attitude of the general public towards Radio Amateurs. You were right when you pointed out that no better time than the present could be found for " enlightening " the public as to the activities of our Society, when so many of its members are doing vital jobs in Allied Communications.

In February of this year I affixed an R.S.G.B. emblem on the front door of my house in Huddersfield. To say that the results were surprising, is to put it mildly. My wife and I have answered queries by the dozen, and since that date no less than 27 members have made 120 visits to our home. How about it D.R.'s and T.R.'s in fact, all members who are still " at home " ? A " sticker " on the window, or an R.S.G.B. car plaque on the door does the trick. Much can be done in this way to foster a more friendly interest in the Amateur Movement by the general public.

In addition, I would like to suggest that all D.R.'s and T.R.'s should leave their addresses at the local Y.M.C.A. to assist members in the Services to make contact.

Yours faithfully,
CHARLES HARTAS (BRS4976).

VALVE VADE MECUM *contd. from page 8*

16. *In the case of high power valves, the battery is replaced by a mains supply or generator. Why is this?*

For high power the electron stream must be large, both as regards the numbers and velocities of the electrons which comprise it. The electron stream is what we call an electric current, so that if this is large, a battery will not be able to cope with it. Accordingly a mains supply or a generator will have to be used.

17. *Is an electric current conventionally taken to flow in the same direction as the electrons which comprise it?*

No. Early workers had to reach agreement as to which way the current should be taken to flow round a circuit, and as the electron theory was unknown to them, they decided that electricity should be shown as flowing from the positive to the negative side of a circuit. Unfortunately, because electrons are negative, they flow in the reverse direction, *i.e.* towards the positive side, exactly opposite to the conventional direction of flow of current. Thus, in valve operation the electrons are streaming through the external circuit *away* from the plate, while a milli-ammeter shows the current to be flowing *towards* the plate.

18. *Do electrons produce any visible effect by their impact on the plate?*

Yes, electrons each have weight, though minutely small. They strike the plate, however, in such great numbers, and with such high speeds that they often raise the plate to red heat, and in extreme cases may even melt it. In fact, many transmitting valves normally operate with glowing plates and the colour then provides a useful indication of the correct operating power. This effect is exactly the same as the heating of a piece of metal when hammered, or the heating of the target by bullets from a machine gun.

(To be continued)

A Matter of Words

One of our members serving with the R.A.F. in B.N.A., recently conducted a Trades Test. The following two gems are vouched for:

Q.: What would you do if on erecting your station you found that the earth mat was missing?
A.: Use the chassis of the waggon. Dig a deep hole and tie the earth wire to any old scrap and bury the lot.
Q.: Define capacity.
A.: Ability to hold. In case of acc. amp. In condenser to store farads.

EXCHANGE & MART—ADVERTISEMENT RATES

MEMBERS' private advertisements 2d. per word, minimum 3s. TRADE advertisements 4d. per word, minimum 6s. Box Numbers: 6 words, plus 1s. 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 the 30th of the month for following month's issue.

ALL KINDS OF PRINT.—Send your enquiries to G6MN, Castlemount, Worksop.

BULLETINS wanted: April, July, August, September, 1937; May and December, 1940; January and June, 1941; May, 1942; also QST, December, 1939; offer 1s. 6d. "Bulls," 2s. QST.—8U5BO, A. Boa. Admirals, Little Badow, Essex.

CODE Practice Units. Heavy duty key, high note buzzer, battery, on polished wood base, 19s. 6d. each. Key only, 9s. 6d. each.—J. C. BUTTERY, 8 Fountain Street, Morley, Leeds.

FOR SALE.—Avo All-wave Oscillator, Avo test bridge, Cardwell FEX multiband condenser, Aladdin iron-core I.F.T.'s, Tripleft 0-100 mA, G.R. precision dial, valves, etc. Stamp for list.—29 Cumberland Road, Sale, Cheshire.

LOUDSPEAKERS.—Goodmans 8-in. P.M., heavy duty magnets, with transformers, suitable for P.A. work; condition as new. 30s. carriage paid. Cash with order.—Box 202, PARRS, 121 Kingsway, London, W.C.2.

MEMBER urgently requires A.C./D.C. Multi-Range Meter for servicing radio and electro-medical equipment. Must be 1,000 ohms per volt or better.—Particulars to GANT, "Plas Warren," Broughton, near Chester.

"RADIOLAB," complete valve and set tester and analyzer. 1,000 O.P.V. Exchange oscillator, communications receiver, sell £12 10s.—BRS4630, 2 Meads Road, N.22. Bowes Park 2140.

SALE.—Cathode-ray tube 6 in. Ediswan. Power supply for same. Also Ediswan double time base; what offers? 2,000 volt moving meter, 50s. Double button mike with table stand, 30s. Thordarson mike transformer, 20s. 2½ volt 10 amp. transformer, 17s 6d. Audio line transformer, heavy duty, tapped 800, 8,000, 10,000 ohms, weight 6lb., 25s. 0-1 mA moving coil meter, 3 in., 60s. J. B. Neut condensers, glass enclosed, 3s. Large number Raymart and Eddystone TX and RX condensers, chokes, etc. Enquiries please send stamps. Wanted: Service Manuals. Wired A.C./D.C. chassis American. 2 in. or 3 in. Cathode-ray tube.—W. B. STIRLING, GM6RV, Clutha, Yarborough Place, Ardrossan, Ayrshire.

SALE.—New McElroy Bug Key, 52s. 6d. Wanted: spring gramophone motor; 16 SWG enamelled wire; Osram PT7; efficient windcharger; "Television and Short-wave Worlds," "Short-wave" Magazines.—Box 195, PARRS, 121 Kingsway, London, W.C.2.

VALVES.—6K7, 6X5, 6J7, 6F6, 6H6, 9s. each. TSP4, 12s. 6d. Mazda T11, 30s. T41, 9/s.—BRS5766, 9 Ripley Road, Swindon, Wilts.

WANTED.—Eddystone Coils: Types P, 6P, G, 6G, GY, BR, 6BR, Y, R. Sell or exchange following new items: 6KB, 6A7, 6B5, AC/P, D1, Y63, 465Kc, BFO coil, BTH 21/25: 1 transformer, Heaybeard 1/4 KW auto-transformer.—D. PRICE, Langham Hotel, Bournemouth.

WANTED.—Leica and accessories, also cine tripod. Exchange Raymart oscilloscope, Brush Xtal Mike, Eddystone "A.W.2," Weston 0-1 mA meter, kit for 12-watt speech amplifier, also frequency meter (Eddystone and Stancor components).—F. A. JEFFRIES, 1 Lovelace Road, Oxford.

WANTED.—National HRO, NC100X or similar. State condition, year, price.—113 Redhill Road, Arnold, Nottingham.

WANTED.—Two 8-mfd. and two 16 mfd. Electrolytics. A.C. Record player. Avo or Taylor universal meter. Service oscillator, battery or mains. Good price for the right stuff.—Box 194, PARRS, 121 Kingsway, London, W.C.2.

WANTED.—Two-stage Preselector, instruction book or circuit Super Skyrider SX16, also oscilloscope.—Particulars to MURRAY (G3PT), 66 Belvidere Road, Liverpool, 8.

WANTED.—Universal Avo-Minor or D.C. Avo-Minor; good condition. State price.—Box 197, PARRS, 121 Kingsway, London, W.C.2.

28 S.W. Magazines, 1937–1939, complete files except three copies. All-Wave Radio/Radio News, 24 copies, 1937–1939. 1937 Call-book. Offers for lot.—2BVH, "Sandwycke," Sandpit Lane, St. Albans.

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

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