THE T&R

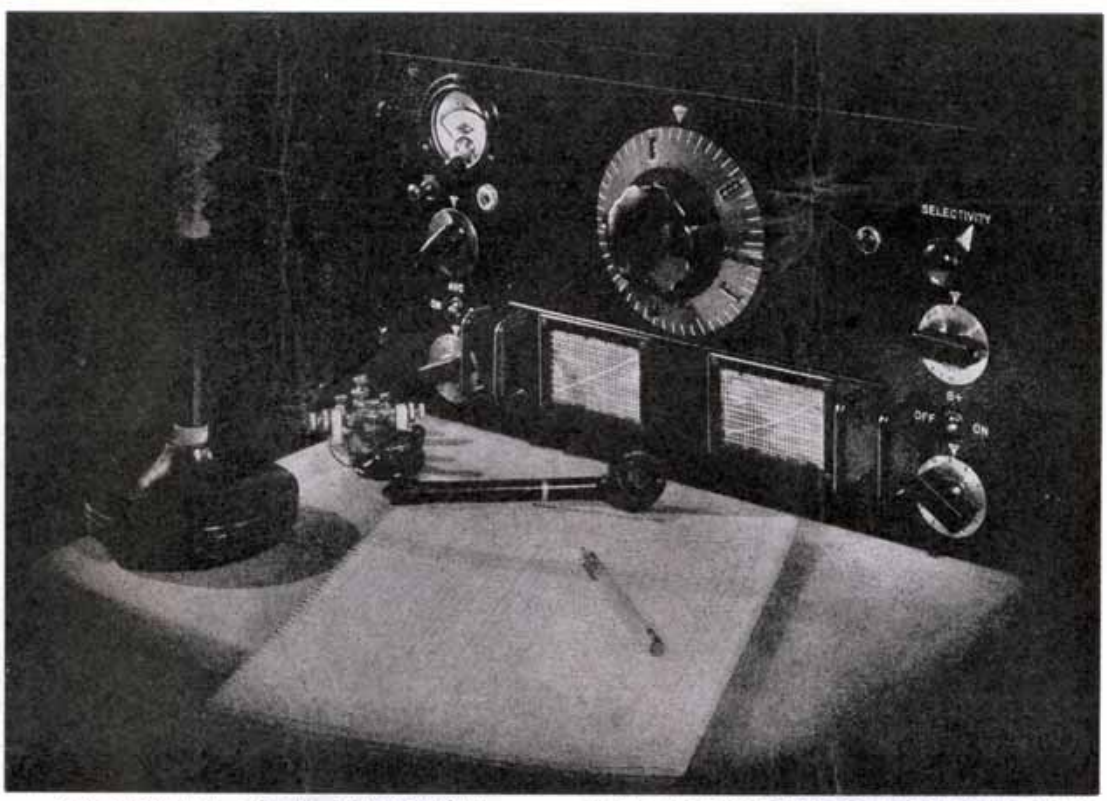
# BULLETIN

A JOURNAL FOR

# RADIO EXPERIMENTERS

Vol. 15 No. 9 MARCH 1940 (Copyright) Price 1/6

POSTAL CENSORSHIP PERMIT No. B.305



# THE T. & R. BULLETIN

OFFICIAL JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

DEVOTED TO THE SCIENCE AND ADVANCEMENT OF AMATEUR RADIO

Hon. Editor: ARTHUR O. MILNE

Secretary-Editor: JOHN CLARRICOATS

Advertisement Manager: HORACE FREEMAN

Vol. XV. No. 9. MARCH, 1940

## CONTENTS



## THE SOCIAL SIDE

IT was with particular pleasure that we gave advance publicity in our last issue to the first Gathering of Service members ever to be held. We know that all who were able to attend at the North Camp, Farnborough, Y.M.C.A. building, on Sunday, February 25, greatly appreciated the opportunity of meeting old friends of the air, whilst the presence of several prominent Canadian amateurs gave a touch of Empire status to the meeting.

Now that Service members in one part of the country have shown that a "get together" is possible, we hope that "live wires" at other important camps and training schools will follow suit. We realise the difficulties attendant upon the organisation of such meetings, but given co-operation from "high places" we see no reason why a full programme for the spring and summer months cannot be arranged.

From far and wide letters reach us with news of unexpected meetings with fellow amateurs. Those who have never been away from their own homes can scarcely realise the pleasure derived from a meeting, on strange ground, with someone possessing an affinity of interest.

Ham Radio with all its faults has the great virtue that class distinction ceases to exist on the common ground of the hobby it represents. We should indeed be thankful that in a year and age beset by difficulties it is still possible for men, and sometimes women, to join forces, for no other purpose than to discuss a subject which, due to the war, has changed many of them from amateur to professional radio engineers or operators.

During the next few months District and Town meetings will be held throughout the country. We feel it is the first duty of all who organise these meetings to obtain full publicity in advance, so that every Service member, or civilian for that matter, who is located within a reasonable distance of the venue chosen can be given an opportunity to be present.

An important social event is to be held on March 16 in South London. The support given to this project will be watched with especial interest, for it will enable the representatives of other London and Home Counties Districts to judge whether similar functions stand a chance of success in their own locality. It need scarcely be said that if gatherings on the lines of that held at The Horns, Kennington, are arranged elsewhere, a cordial welcome awaits every Service member who attends.

Last month the first war-time meeting took place at the Institution of Electrical Engineers, London. The term "informal" was used, for the reason that it was intended to give members every opportunity of discussing freely with "kindred minds" the many matters of mutual

(*Continued on page* 392)

# U.H.F. CIRCUIT DEVELOPMENTS*

By E. H. Conklin (W9BNX)
*Associate Editor, "Radio"*

IN 1938, the Planning and Development Division of the Civil Aeronautics Authority undertook the task of designing a receiver to cover the range from 60 to 132 Mc., with adequate sensitivity and stability for aircraft service. The results have been published in a 50-page pamphlet[1] which contains much material of interest to amateurs working on ultra-high frequencies.

A study of radio frequency tuned circuits quickly brought a decision to use short sections of concentric lines[2] in order to obtain an adequate image ratio without a very high intermediate frequency. The inductive reactance of a line of fixed length is proportional to the frequency, whereas the resistance is proportional to the square root of the frequency. For a given inductance, therefore, the $Q$ (that is, $X/R$) *increases* with the square root of the frequency. Thus such a line has a decided advantage at high frequencies over a coil in which the $Q$ *decreases* with frequency. The inductance of a line is a function of the ratio of conductor diameters and is not affected by the actual diameter; the resistance, however, is inversely proportional to the diameter, making $Q$ proportional to the diameter for a constant ratio of diameters. When either space or cost is limited therefore, it is well to note that the $Q$ is better in a line half as long, and twice as large in diameter. There is another advantage in short thick lines over long thin ones which appears when loading it even with acorn valves.

## Resistance of Metals

Table I gives some of the characteristics of the more common metals available for construction of a coaxial line—which can be applied equally well to other problems. It is seen that brass, bronze, and some forms of duralumin are not ideally suited to electrical applications, whereas silver, copper, chromium and aluminium are good in that order. When a metal of low conductivity is used, such as brass with 30 per cent. zinc, a thin plating of silver, copper, or even chromium will provide a high surface conductivity at ultra-high frequencies.

**Table I**
**Resistivity of Metals.**

| Metal | Resisitivity (Ohms/Cm³) × 10⁶ |
|---|---|
| Silver ... ... ... | 1·63 |
| Copper ... ... ... | 1·75 |
| Chromium ... ... | 2·6 |
| Aluminium (2S-H) ... | 3·04 |
| Duralumin (51S-T) ... | 3·85 |
| Duralumin (17S-T) ... | 5·77 |
| Brass (30 per cent. zinc) | 6·4 |
| Iron (99·98 per cent.) ... | 9·83 |

Inasmuch as the inner conductor contributes most of the resistance while the outer provides mainly cost and weight, it is well to use copper or a silver plated metal for the inner conductor. The use of 17 S-T duralumin in place of copper for the outer conductor in the lines to be described later, results in a 20 per cent. increase in calculated resistance and similar decrease in $Q$.

## How much Q?

While high values of $Q$ theoretically can be obtained with coaxial lines as resonant circuits, valve loading is severe and reduces it substantially. That is not to say, however, that an ordinary coil can approach such a line in effectiveness. With a 17 S-T duralumin outer conductor of 2⅛ in. inside diameter and ½-in. copper inner conductor *only* 8⅜ in. long, providing an inductance of 0·06 microhenry, the calculated $Q$ at 60 Mc. is about 3,000, and at 120 Mc. (where the length is a larger part of the ideal ¼-wave) it is 4,100. The lines are shunted by the input resistance of the valves which, at ultra-high frequencies, can reach very low values[3]. Best performance is obtained with the 954 acorn pentode.

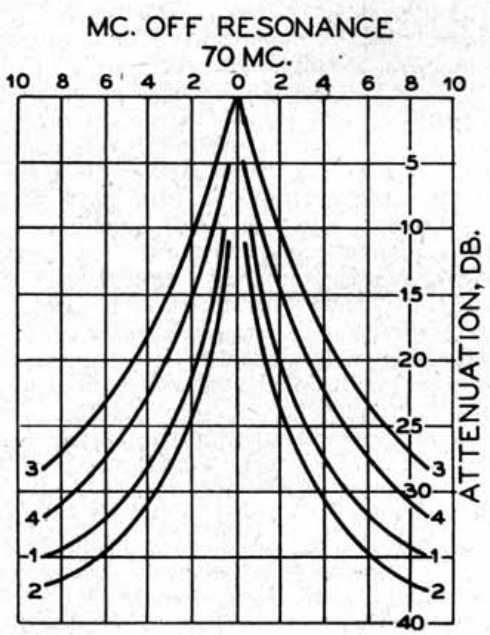



Fig. 1
**Effect of grid loading on the selectivity of the tuned circuits at 70 Mc.**
1. R.F. plate tank-coupling maximum.
2. R.F. plate tank-coupling minimum.
3. R.F. grid tank-coupling maximum.
4. R.F. grid tank-coupling minimum.

* *Published by kind permission of the Editor of "Radio," 1300 Kenwood Road, Santa Barbara, Calif., and with the agreement of the Author.*

At 60 Mc. this valve acts like a 55,000 ohm. resistor connected across the entire tuned circuit, reducing the $Q$ to about 1,300 without an aerial, and to half that value (650) if an aerial is connected in for maximum energy transfer. At 120 Mc., the $Q$ of 4,100 drops to 290 when the valve's 14,000 ohm. input resistance is connected across the line, again to be halved for optimum aerial coupling.

The effect of this loading upon the selectivity of the tuned circuits is demonstrated by Figs. 1 and 2.

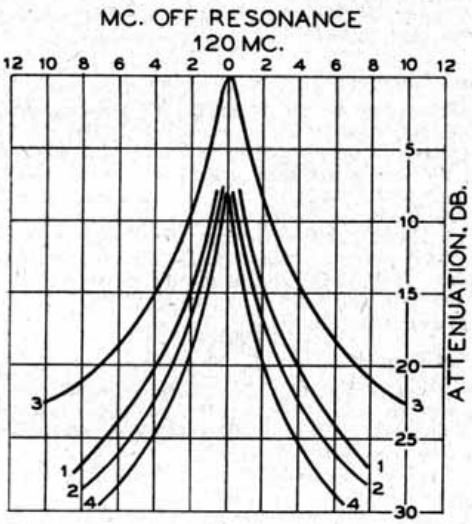



Fig. 2
**Effect of grid loading on the selectivity of the tuned circuits at 120 Mc. Curves as Fig. 1.**

Curves 1 and 2 are for the line in the mixer grid circuit with different grid coupling condenser values. Similarly the rest of the curves are for the r.f. stage. The overall r.f. selectivity curves shown in Fig. 3, indicate that for a 5·5 Mc. intermediate frequency, the image response is down 75 dB at 70 Mc., and 60 dB at 120 Mc.

Stage gain is determined in part by tuned circuit impedance while selectivity is governed by $Q$. At ultra-high frequencies, amateurs generally demand gain with its better signal-to-noise ratio if it can be increased without too much loss of selectivity. Short lines require less capacity to tune them if the ratio of conductor diameters is larger. A ratio of $3\frac{1}{2}$ or 4 should be selected in an oscillator where $Q$ is important, but a ratio of between 6 and 10 would increase the tuned circuit impedance. This should be kept in mind when designing efficient tuned circuits for transmitters and receivers.

Another factor is worth mentioning. Inasmuch as high (non-regenerative) gain in the first stage is necessary to obtain a high signal-to-noise ratio at ultra-high frequencies, for a given aerial pick-up and as high gain requires a high impedance output (plate) circuit in an r.f. stage, as well as a good input (grid) circuit, it is desirable to link-couple an acorn r.f. stage to an ordinary mixer valve, or use an acorn mixer placed close to the r.f. valve's output tuned circuit. Connecting a standard valve across the output of an acorn r.f. stage will reduce the latter's effectiveness.

### Valves

The characteristics of acorn valves at ultra-high frequencies are so far superior to those of standard types that no serious worker on 56 Mc. or above is likely to consider using anything else. Their cost is still above that of standard valves but early reports of short life should now be discounted. A life of some 2,000 *hours* is being attained at rated voltages. Satisfactory performance is reported by the C.A.A. in aircraft use, where vibration is encountered, with no evidence of short life.

### Sockets and Regeneration

Condensers at ultra-high frequencies contain a noticeable amount of inductance which makes it difficult to obtain adequate by-passes. Screen, suppressor, and cathode (if cathode bias is used) must be by-passed to earth effectively. This is best done by building a large condenser into the valve socket clips4. A short piece of tubing should surround the valve as suggested by R.C.A. in their recommendations on installation of acorn valves.

Unless these things are done, it may be found that a really efficient tuned circuit will cause a stage to oscillate or at least to regenerate ; the latter does not improve the signal-to-noise ratio so is deemed to be inadvisable. Effective by-passing can be tested when a receiver without an aerial is tuned to a local oscillator. Touch a screw driver to the valve clips and other circuit points that should not be at high r.f. potentials above earth ; if the local oscillator signal increases, the point is not at earth potential.

### Oscillator Circuits

Although an ordinary Hartley oscillator with a coil may be used in a receiver, advantage can be taken of the stabilising characteristics of coaxial tank circuits. The tuned-grid tuned-plate oscillator requires two tuned circuits ; if the coaxial line is placed in the grid circuit with the grid tapped on near the shorted end of the line, the frequency is somewhat altered by tuning the plate tank.

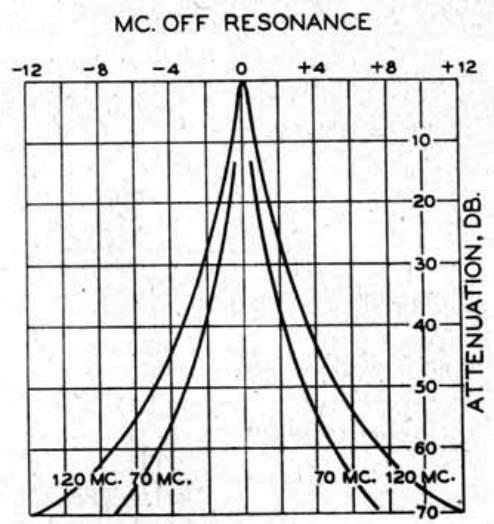



Fig. 3
**Radio frequency selectivity curve of receiver.**

It is often a constructional disadvantage, particularly when using long lines, to have the valve anywhere but at the open end of the line. To meet this situation and to eliminate the need for a plate tank, the circuit of Fig. 4A was used by W9SQE at the writer's suggestion. No measurements on its stability have been made as yet, but it is apparent that tapping the grid down on the line (which means placing the valve perhaps midway along the line and yet close enough to the mixer valve to accomplish oscillator injection satisfactorily) should improve the stability. Another variation of this circuit, using a cathode series capacity shunted by a choke or resistor, is shown in Fig. 4B.

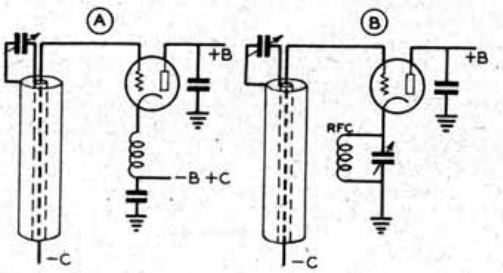



Fig. 4

**Types of single control oscillator with coil or condenser in cathode circuit to provide coupling between plate and grid circuits.**

Both the cathode and plate coil arrangements have been improved upon by R.C.A. in a 1 k W. oscillator[5]. In it the valve is best placed near the closed end of the line where the r.f. current is relatively high. The circuit is shown in Fig. 5. The plate is earthed to the outer conductor, through a by-pass condenser. Both the grid and the cathode (filament) are coupled to the line with half-turn links insulated from the outer conductor through which they pass, extending close to the inner conductor to which they are parallel. In a power oscillator, the aerial coupling can be handled in the same manner. The grid loop must be longer and closer to the inner conductor than the cathode loop in order to accomplish the same condition one finds in a cathode-above-earth ("electron coupled") oscillator. With this circuit, there are no long leads from the valve to the taps on the line. Interesting variations of this circuit are possible.

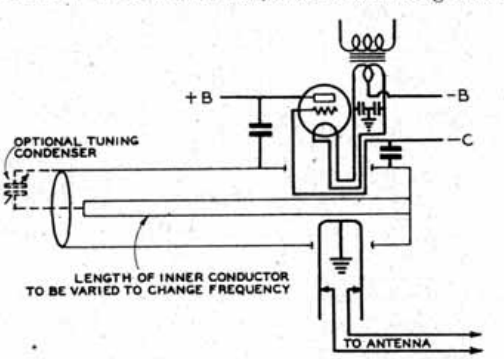



Fig. 5

**Single tuned circuit oscillator.**

Our own experience with a coil-tuned Hartley oscillator using a 955 acorn triode, and screen injection to the mixer, indicates that "pulling" of the oscillator is noticeable only on c.w. when the mixer and oscillator controls are not ganged. A pentode oscillator arranged for electron coupling at both valves may completely overcome this effect. Cathode injection—not normally to be recommended because of the ill effects of a long cathode lead—was chosen by the C.A.A. in order to reduce oscillator power requirements, for increased stability.

### Band Changing

There is no reason to expect that a concentric-line-tuned receiver designed for 112 Mc. will not operate well on 56 and even 28 Mc. by placing a padding condenser across the open end of the line. Coils on 28 Mc. and above, particularly when shunted with ordinary receiving valves, are not very effective; their performance will be outstripped by a relatively short—and practical—coaxial line if used with acorn valves. The amount of capacity necessary to resonate short lines can be calculated or read from available charts[1,6].

### References

1. P. D. McKeel, "*An Ultra-High Frequency Aircraft Receiver*," Report No. 2, Radio Development Section, Planning and Development Division, Civil Aeronautics Authority.

2. Avery and Conklin, "*An Ultra-sensitive 56 Mc. Receiver*," *Radio*, June, 1939.

3. W. R. Ferris, "*Input Resistance of Vacuum Tubes as U.H.F. Amplifiers*," *Proceedings I.R.E.*, January, 1936.

4. Reber and Conklin, "*An Improved U.H.F. Receiver*," *Radio*, January, 1939.

5. G. L. Usselman, "*Wide-Band Variable-Frequency Testing Transmitter*," *R.C.A. Review*, April, 1939.

6. E. H. Conklin, "*Transmission Lines as Circuit Elements*," *Radio*, April and May, 1939.

## Reminiscences of Forty

*Sleep on, dear Hams, your job of work is o'er.*
*Your early morning callings can be heard no more.*
*For Funf has spoke and with an iron hand,*
*Has cleared you from, the forty metre band.*

*Your freedom and that awful DX lust*
*Gone, now lie sprawling in the dust,*
*The XYL's in chorus saying, "Ah!*
*It's one good thing we're getting from this war."*

*Not so the Musketeers, who full of grief,*
*Are trying, o'er to turn, another leaf,*
*It's hard to part altho' from voices only.*
*And in their shack are now so very lonely.*

*The shack untouched, but now devoid of gear,*
*Remains to welcome p'raps a bright New Year,*
*With Funf destroyed and with his crimson hand,*
*For ever banished from this peaceful land.*

*Then burnish up your thoughts my lucky lads,*
*Get to your books, forget your little fads,*
*And if you can, do not forget to pray,*
*Reunion, on a not far distant day.*

THE THREE MUSKETEERS.
(In a sentimental mood.)

# THE MEASUREMENT OF RADIO FREQUENCY

By S. O'HAGAN (G2CR)

## PART I.

*The author of this important contribution has had many years of practical experience in the calibration of commercial crystals, and the information he has prepared should enable readers to improve their own equipment for the measurement of unknown frequencies.*

ALL measurements consist essentially of comparisons of the unknown with a pre-accepted standard. Universally accepted standards of all the usual units of measurement are kept by the Governments of each country and may be consulted upon payment of certain fees. From these standards, sub-standards are calibrated for use when the primary standards are not available. In a general sense, the common foot-rule may be considered a sub-standard, secondary to the " standard foot " which is preserved by the British Government in London.

In the case of frequency, we are fortunate, for the United States Department of Commerce makes the American National Standard of Frequency available at all times to whosoever cares to tune in to their Standard Frequency Transmissions from station WWV at Beltsville, Md.

In peace-time, the British Government also authorises the transmission of standard frequencies from the National Physical Laboratory Station, G5HW. Of the two, the American transmissions were the more popular, since they were, and are, made upon frequencies that are capable of a much better coverage, further they are on the air more frequently.

### WWV Standard Frequency Transmissions

The regular higher-powered transmissions from WWV, take place each Tuesday, Wednesday and Friday (except holidays) at the following times :— 15.00–16.30 G.M.T. on 5 Mc. ; 17.00–18.30 G.M.T. on 10 Mc. ; 19.00–20.30 G.M.T. on 20 Mc.

The Tuesday and Friday transmissions are modulated with short pulses of 1,000 cycle tone at 1 sec. intervals.

The Wednesday transmissions are modulated continuously by 1,000 cycle standard frequency.

The power used is 20 kW. to the aerial, and the accuracy of the frequencies transmitted is better than one part in ten millions, although fading may render the audio frequencies slightly less reliable for reasons that need not be discussed here.

### How Standard Frequencies are obtained

Measurements of frequency all originate from the fundamental idea of counting the number of cycles per second. In the case of standard frequency sources, this is achieved by means of frequency division, usually in steps of ten times, until an audio frequency is obtained which can be amplified and used to drive a synchronous clock. This clock keeps time that depends solely upon the frequency of the original frequency-source. It is checked regularly against the time signals sent out from the national observatories and, since this can be done with very great precision, the degree of error in the controlling source can be determined with similar precision.

The majority of frequency standards consist of quartz crystal oscillators with every precaution taken to reduce to a minimum the effects of extraneous influences. The crystal is cut to have zero temperature coefficient and is mounted in a holder designed to avoid vibration effects, enclosed in a partially evacuated chamber at constant pressure and temperature constant to within about one thousandth of a degree. The circuit is so designed to minimise the effect of changing reactances, valve characteristics, etc. The voltages applied are maintained automatically at a constant value within very narrow limits. Automatic gain control is used on the oscillator to maintain the oscillations at constant amplitude and the oscillator is isolated from the succeeding stages by at least two screen-grid buffer stages and the most complete screening that ingenuity can devise. Usually too, the whole plant is then installed in a cellar where nothing but an earthquake can disturb its constancy.

It is of some interest that the United States Bureau of Standards transmitter, WWV, is driven from a 200 kc. crystal which gives 5-volt peak to a chain of three type '47 frequency multipliers which give 100-volt peak at 5,000 kc. The oscillator, which is quite simple in design, was found to be able to maintain frequency to within one part in fifty millions, for periods of several hours. This degree of accuracy will be understood when it is appreciated that one fifty-millionth part of the distance from London to New York is about three inches !

The apparatus required to make use of these standard frequency transmissions is not necessarily complicated or expensive although where very high accuracy is desired, the refinements naturally add to cost and complexity.

### Sub-Standards

Since the standard frequencies cannot always be received in Great Britain, it is necessary to have some means available for " storing " them for use when they cannot be heard. An oscillator, capable of maintaining its frequency, constant to within the limits of accuracy desired, and of such a frequency that either its fundamental or a harmonic can be adjusted to zero-beat with the transmission, is all that is required. This will usually have a frequency of 50 or 100 kc., so that its harmonics give convenient points for subsequent measuring. This oscillator is termed a " sub-standard of frequency " or, if of reliability comparable with the original standard, but not equipped with the frequency dividers and clock, it is termed a " secondary frequency standard." It may be either a crystal controlled or electrical oscillator, according to the accuracy to be achieved.

The crystal oscillator is more commonly used, as it needs less skill in setting up in order to attain the stability required. Either the Franklin oscillator, electron-coupled oscillator, or reactance-stabilised Llewellyn-Colpitts oscillator will give very good results if carefully designed and constructed. This is, however, a much more complicated procedure than obtaining the same degree of stability in the crystal oscillator and the saving in cost is almost negligible.

If the oscillator does not produce strong harmonics, it will be necessary to use a harmonic generator consisting of a resistance coupled screen-grid stage or a multi-vibrator, to produce calibration points at the higher frequencies.

### Calibration of Sub-Standard

In use, the receiver (preferably a TRF) is tuned to the standard frequency transmission and the appropriate harmonic of the sub-standard adjusted to zero-beat. This is best done with the receiver in the non-oscillating condition. If the zero-beat is effected by ear, the two frequency sources will agree within 50 cycles which, at 5 Mc. represents one part in 100,000. This is adequate for all ordinary uses.

If greater accuracy is desired, the receiver should then be made to oscillate gently and detuned sufficiently to produce a beat-note with the transmission of about 1,000 cycles. This note will have a tremolo tone (T6 on the RST scale). Small adjustment of the sub-standard will then reduce the frequency of the ripple super-imposed on the note. With great care it can be made zero for short periods, representing an accuracy much better than one part in five millions. It is not to be expected, however, that an amateur-built oscillator will maintain such an accuracy for more than a few minutes, and agreement to within ten cycles should be looked upon with satisfaction.

A heterodyne frequency meter, which consists of a very stable oscillator of variable frequency can be used in conjunction with the frequency sub-standard already outlined and, with a check of its calibration points at frequent intervals, will give very good estimates of any frequency within the amateur bands. Provided care is taken, an accuracy of about one part in five thousand can be obtained, using standard parts. Where greater accuracy is needed, greater complexity in building and operation becomes necessary.

### The " Counting-out " Method

If the " counting-out " method of frequency determination is used, extreme accuracy can be obtained. By this method, the accuracy is limited by the accuracy of the frequency standard used rather than by the accuracy of any dial calibration.

The apparatus consists of a frequency standard, usually based upon a highly stable crystal oscillator stage working on a frequency of 50 or 100 kc., whilst a zero-temperature co-efficient crystal is used in an oven which holds the temperature to within a tenth or a hundredth of a degree. The holder is made to a special design in order to minimise movement of the crystal and changes of frequency resulting from this cause and from ageing of the holder.

The circuit is arranged to have very great stability against small plate-voltage and circuit reactance changes, and the components are chosen to have stability sufficient to retain their values within the limits in which the circuit is stable. Plate and other voltages are stabilised by neon regulators or derived from secondary batteries. All the components, other than the crystal, are kept in a metal box, thoroughly lagged and roughly thermostated to within a few tenths of a degree. The output of the oscillator drives a screen pentode buffer stage and this, in turn drives a harmonic generator which is another heavily biased pentode with its plate circuit tuned approximately to the frequency range desired. Also driven from the buffer stage output is the locking amplifier of a multi-vibrator switched to operate on 10 or 20 kc.

The multi-vibrator consists of a two-stage resistance-capacity coupled amplifier with its input and output circuits coupled. It oscillates with a saw-tooth wave-form, very rich in harmonics, at a frequency determined by the values of the grid condensers and resistors. Its frequency is very unstable and is readily locked into synchronism with any injected voltage of the same or a harmonic frequency. The output of the multi-vibrator (consisting of 10 or 20 kc. emissions and the harmonics thereof), is used to modulate the harmonic generator stage so that its output consists of the harmonics of 100 kc. modulated by the harmonics of 10 or 20 kc. This will cover the whole high-frequency spectrum and will appear, to an oscillating detector, as a series of " chirps " spaced every ten kilocycles and with every tenth a stronger one.

### Making Measurements

The method of making measurements with this apparatus is as follows : The receiver is switched on and with the 100 kc. source running, is roughly calibrated, so that each 100 kc. point can be identified. The 100 kc. source is switched off and the unknown frequency tuned in. The 100 kc. emission is then re-applied and the point immediately below the unknown is identified, and noted. The 10 kc. multi-vibrator is then switched on and the oscillating receiver slowly tuned from the 100 kc. point towards the unknown, counting the number of ten-kilocycle chirps passed on the way.

Suppose, for example, that the unknown frequency was identified as lying between the 140th and 141st harmonic of the 100 kc. source. We know then that its frequency is between 14,000 and 14,100 kc. Now suppose that seven of the ten kilocycle chirps were passed in tuning from 14,000 kc. to the unknown, then we know that the frequency of the unknown is between 14,070 and 14,080 kc.

If the receiver is not oscillating, two whistles will be heard in the phones, being the beats between the unknown and the 10 kc. points above and below. Unless the unknown happens to be exactly mid-way between them, the whistles will have pitches differing fairly widely, one being above 5,000 cycles and one below. Generally speaking, the higher pitched note will be attenuated by the selectivity of the receiver. There will also be the ten kilocycle whistle produced by adjacent multi-vibrator harmonics beating together but this is likely to be so weak as to cause no difficulty and, together with the other high-pitched note, can be removed entirely by a low-pass filter cutting off at about 5,500 cycles.

By this means, we have an audio note in the phones, of pitch between zero and 5,000 cycles per second, representing the difference between our

unknown frequency and the nearest 10 kc. point. This audio frequency can be measured by zero-beating with an audio oscillator covering the range 0–5,000 cycles. If this oscillator has the same dial as is suggested for the heterodyne frequency meter mentioned later, then it can be relied upon to at least one part in a thousand, or to better than five cycles. This means that, if we have (for the sake of argument), absolute accuracy of the frequency standard (and thus of the 10 kc. points), the total error of frequency measurement, regardless of the actual radio frequency involved will not be much more than five cycles or, at 14 Mc. an error of one part in two or three millions.

We now know that the unknown frequency lies between 14,070 and 14,080 kc. and that (let us assume) the audio oscillator calibration tells us the difference between the unknown and the nearest 10 kc. point is 3,050 cycles. The unknown frequency must thus be either 14,073·050 or 14,076·950 kc.

If now we switch the multi-vibrator from ten to twenty kilocycles, each odd ten-kilocycle point will disappear, together with any beat note previously produced by it. If then, the true frequency of the unknown is 14,073 kc., switching out the 14,070 kc. point will stop the 3,050 cycle beat-note, whilst if the true frequency is 14,076·9 kc. the switching will not alter the beat note. This gives the final decision upon the true frequency of the unknown.

This is the most accurate method available for quick measurement of any radio frequency since it takes much less time to perform than to describe and has an accuracy that is chiefly limited by the accuracy of the frequency standard or sub-standard used.

### Another Interpolation Method

Another method of interpolating between the ten kilocycles points is to use what is in effect a form of heterodyne frequency meter. A variable frequency oscillator covering 100–200 kc. is fitted with a very large and accurate scale and every precaution is taken to produce and maintain a straight-line-frequency characteristic. This interpolation oscillator is tuned to zero-beat with the unknown frequency and the dial read. It is then tuned to the 10 or 20 kc. points immediately above and below the unknown.

A simple graph can then be made of the dial readings of the two known points and the reading of the unknown is then interpolated thereon.

In theory this method is rather simpler than the previous one, but extreme difficulty is experienced in making a suitable interpolation oscillator. It is, however, the method used by the N.P.L. for frequency checking.(*)

*(To be continued.)*

* "*Wireless Engineer*," *June, 1937. "Frequency Measurement 1-70 Mc/s" by H. A. Thomas.*

# THE RADIO ABSOLUTE ALTIMETER

ABOUT two-and-a-half years ago at the conclusion of a lecture* dealing with measuring instruments, Mr. de Grouchy of *Messrs. Everett Edgcumbe & Co., Ltd.*, recommended that London members should give consideration to the problem of devising an altimeter which would give absolute readings above the terrain over which an aeroplane may be flying. It was pointed out that as the normal altimeter works on the barometric principle it is impossible for a pilot to read his height when flying above obstacles such as mountains.

Mr. de Grouchy suggested that it might be possible to transmit a short-wave signal to the terrain below and by some method measure the time interval between its despatch and return to the plane after reflection from the ground.

Readers of QST† may have noted that in the February 1940 issue of that journal, mention is made of a new *Western Electric* device described as an Absolute Altimeter. This apparatus appears to operate on approximately the same principles visualised by Mr. de Grouchy, namely, by sending a radio wave to the ground and timing the interval required for it to reach the ground and return after reflection. The frequency of the low-powered transmitter is varied to and fro from 420 Mc. to 445 Mc. at the rate of 60 times per second. Since the swing is 25 Mc. the rate of change of frequency is $2 \times 60 \times 25 \times 10^6 = 3 \times 10^9$ cycles per second. Depending upon the height above the reflecting medium, *i.e.*, the terrain below the machine, there will be a constant difference between the frequency of the transmitter and the reflected signal, caused by the finite time interval required for the radio energy to reach the ground and be reflected back. The reflected signal, as well as some of the signal direct from the transmitter, is fed into a special u.h.f. diode rectifier and the frequency of the resultant beat note is measured by a frequency meter which is mounted on the instrument panel of the machine. The frequency meter is calibrated directly in altitude, so the pilot reads the height above ground directly from the instrument. For a plane half a mile above ground the time required for the signal to reach the ground and be reflected back is :—

$$t = \frac{2 \times 0{\cdot}5 \text{ (miles)}}{186{,}000 \text{ (speed of radio waves)}} = {\cdot}0000054 \text{ sec.}$$

The difference frequency from the output of the detector is :—

$$f = 3 \times 10^9 \times 0{\cdot}0000054 = 16{,}200 \text{ c.p.s.}$$

which works out at 6·13 cycles per foot of altitude.

The aerials are of the half-wave concentric type and are mounted coaxially under the wing of the machine ; one on either side of the fuselage.

(*Continued on page* 392).

* "*Measuring instruments as applied to the Radio Field*," *November* 26, 1937.

† "*Quote and Unquote.*" *February, QST, Page* 42.

# RECEIVER STABILITY

## PART II.

By J. N. WALKER (G5JU)

THE final paragraphs of the previous article† dealt with the correct positioning of by-pass condensers, further examples are illustrated in Fig. 1. Here we have a detector valve followed by an L.F. stage, an arrangement in common use. In the first place, the "earthy" side of the reaction condenser C1 should be connected by a short lead direct to the cathode of V1, rather than be allowed to find its return path *via* the chassis. The fixed condenser C2 is often used to prevent stray R.F. reaching the grid of the output valve V2. Any such stray R.F. comes, of course, from V1 and therefore C2 forms part of the circuit of this valve. For the most effective by-pass action the lower end of C2 should be connected direct to the cathode of V1, as shown.

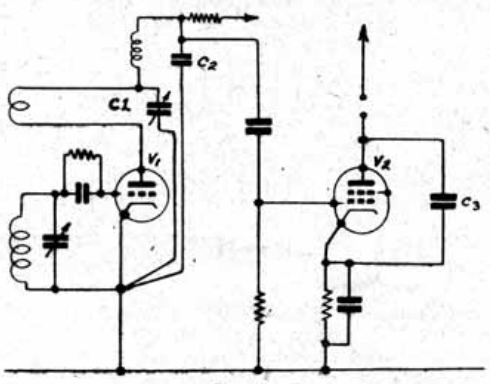



Fig. 1

**Reference to the text will explain the proper connections of the condensers enumerated.**

On the other hand, a condenser C3 is frequently inserted to by-pass any R.F. appearing at the anode of the output valve thus preventing any ill effects, such as body or hand capacity. In this case, the R.F. voltage forms part of the output of V2 and it is to the cathode of this valve that the condenser should be returned.

### Factors Affecting Impedance

The impedance of a condenser of ·002 μF is in the region of 14 ohms at a frequency of 7 Mc. The impedance of an inductance of one microhenry is of the same order at the same frequency and it does not require many inches of wire to form an inductance of this value, particularly if of a bent shape. As the frequency is increased, the impedance of the condenser would decrease if we were concerned with *pure* capacity only. In actual fact, the impedance may or may not decrease, depending on the inherent inductance possessed by the condenser, but the impedance of the connecting wires will definitely increase and increase rapidly, and, in the majority of cases, it will form the major factor in determining the overall effectiveness of the combination. From these facts it will be evident that it is most necessary to keep the leads extremely short. It is not sufficient to mount a condenser very close to a particular valve electrode and to have a fairly long wire on the other side of it running to earth. This lead will still form part of the by-pass circuit will add to its impedance, and will radiate a certain amount of energy. Admittedly the latter will be very small but nevertheless it may result in interaction with a nearby component. In fact, this latter effect is often responsible for self-oscillation in high gain I.F. amplifying stages. Liberties are often taken with the leads emerging from I.F. transformer "cans," several inches of unscreened wire being allowed to run to the by-pass condenser. The latter should be connected at the point of emergence of the wire, if at all possible. Alternatively, the wire may be covered with earthed metallic screening.

### The Detector Stage

An earlier article* gave a number of hints on securing the best results from the detector stage and if these are followed few difficulties are likely to be encountered. In consequence we shall confine ourselves to only a few additional hints.

One trouble quite often met with is double oscillation. On rotating the reaction control the detector valve breaks into normal oscillation but on rotating it further another "plop" may be heard and it quickly becomes evident, when tuning the receiver, that all is not as it should be. Sometimes the reaction control has to be advanced considerably before the effect occurs (if at all) but in other cases, and particularly with straight U.H.F. receivers, double oscillation breaks out far too quickly, and smooth control is impossible.

The reason for this undesirable effect is that the anode circuit has taken control of the tuning. The inductance in the anode circuit—leaving out for the moment any associated R.F. choke—should be much lower than that forming part of the grid circuit, and the resonant frequency therefore much higher than that to which the latter is tuned. Further, since the capacity across the anode inductance is widely distributed, its resonance curve is broad. When, however, the inductance and capacity in the anode circuit result in the natural frequency approaching that of the grid circuit, the former is liable to take control and rotation of the grid tuning condenser will have only a comparatively small effect on the tuning as a whole.

The remedy is to employ the very smallest number of turns in the reaction winding which will give adequate regeneration. Where a variable condenser is used to control reaction, 20 per cent. of the number of grid turns is ample for the lower frequencies although as much as 50 per cent. may be necessary on the ultra-high frequencies, depending

† *The T. & R. Bulletin, February, 1940.*

* *The T. & R. Bulletin, December, 1938.*

on the characteristics of the detector valve and the anode voltage applied. When the potentiometer method of control is used it is usual to insert a by-pass condenser of a fairly high value and it should be possible to reduce still further the number of reaction turns suggested above.

Trouble of the kind outlined may also be caused by an R.F. choke of insufficient inductance or one possessing subsidiary resonance points. When either is suspected, a choke of a different type should be substituted for the doubtful one or alternatively a resistance of 5,000 or 10,000 ohms placed in series with it on the H.T. side.

Before passing on to a consideration of parasitic oscillations it may be mentioned that it is possible for double oscillation and its kindred troubles to occur in the oscillator stage of a superhet. The symptoms will be (*a*) restricted range of tuning, (*b*) lining-up difficulties, and (*c*) heterodyne whistles. The cure will be as suggested for a detector stage.

## Parasitic Oscillations

Parasitic oscillations are liable to occur with almost any valve and therefore in any stage of a receiver and, for that matter, of a transmitter although it is with the former only that we are concerned at the moment. The usual symptoms are over-heating of the valve, rough tones on all c.w. signals and telephony carriers, poor gain (R.F. stages), distortion, and lack of power output (L.F. stages).

Parasitic oscillations are always associated with short wires connected to what may be called " active " electrodes of a valve, that is, the grid and the anode, although the screen grid cannot be entirely ruled out. Reference to Fig. 2 will make the point easier to explain. In this diagram the points marked " a " and " b " indicate the ends of the lead from one end of a normal tuned circuit to the grid of the valve—not just to the valve pin but including the length of wire inside the valve. Similarly points " x " and " y " indicate the length of wire from the anode to one end of an inductance which forms part of the anode circuit. Assuming that the residual capacities at points " a " and " y " are low, so that voltage antinodes can develop—C1 will of course be at minimum capacity—and assuming further that the lengths " ab " and " xy " are approximately equal, then the conditions are such that oscillation is liable to be set up on the two short wires at or near their resonant frequency—a very high one.

To make such oscillation possible some form of excitation must be present and this can be provided in two ways. One is by the normal capacitative coupling inherent in the valve and it will be obvious that the type of valve (its inter-electrode capacities, mutual conductance, etc.) will have a considerable effect. In practice, it can safely be assumed that the higher the mutual conductance the more likely is parasitic oscillation to take place. Modern " beam power " valves are particularly susceptible.

Parasitic oscillation may also take place by virtue of electronic action within the valve. The explanation is too long to be given here but, in brief, it depends upon the transit time of the electrons and therefore on the spacing of the electrodes and on the voltages applied to them. Oscillation of this type will only occur when the length of the external wire or wires—in this case it can take place with only a single wire—is of a length which results in its resonant frequency being at or near that required to satisfy the transit time factor of the particular valve and voltages used. In addition to the cures mentioned later the trouble in such a case may often be avoided by merely changing the voltage applied to one particular electrode.

It will be realised that the whole business is anything but simple, since many and various factors enter into it. As an example, if C1 in Fig. 2 is set at maximum capacity one end of the length " ab " is at earth potential as regards the U.H.F. oscillations. If under these circumstances the length of wire is half its previous dimension, thus forming what might be pictured as a quarter-wavelength instead of a half-wavelength, correct conditions for parasitic oscillation are again set up. The same principle applies also to " xy "—the point " y " may in some circuits be at earth R.F. potential.

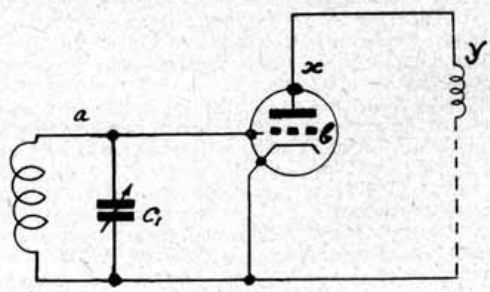



Fig. 2

**Illustrating how parasitic oscillations may be set up. The components shown would be replaced by transformers in an audio frequency stage**

The foregoing remarks may clarify a problem which many readers have come up against. Bearing in mind that C1 may be in either the grid or the anode circuit, parasitic oscillation will take place whilst this condenser is at minimum, will diminish as the vanes enmesh and will usually finally disappear. The explanation of course is that the movement of C1 alters the characteristics and natural resonance of the length " ab " (or " xy " as the case may be) so that the conditions for U.H.F. oscillation are upset. The converse sometimes occurs, although more rarely. If " ab " is short compared to " xy," parasitic oscillation may take place with C1 at maximum capacity, and die away on reducing the tuning capacity.

## Cures

The cure in each individual case will depend to a large extent upon the service in which the valve is being employed. The first and major point is to avoid, if at all possible, the existence of long leads to the grid and anode electrodes. This is not always easy, particularly in the case of valves fitted with either grid or anode top caps. Then one can only pay special attention to the circuit layout in order to keep the length of lead to a minimum. In such cases it should be possible to make the lead to the complementary electrode extremely short. Attention to these points is very necessary where the valve is employed for R.F. amplification since it is not permissible to insert by-pass condensers or stopper resistances close to the valve pins unless one is

prepared to sacrifice a certain amount of gain. In fact rather than do this it would be better to increase the length of the offending lead to a degree which will prevent the conditions necessary for U.H.F. oscillation being set up.

Turning to L.F. stages, the length of connecting lead is relatively unimportant since a cure can be effected quite simply. The insertion of a resistance close to the valve electrode (or electrodes) will be equivalent to the introduction of a comparatively high impedance to the parasitic oscillation. The latter will be damped out completely when a value of resistance is used which represents only a negligible percentage of the total audio frequency impedance presented to the valve. All that is usually necessary is a resistance of 50 to 100 ohms on the anode side, whilst on the grid side any value up to 10,000 ohms or even higher may be employed, except in Class B circuits.

Another expedient which may be used in the case of L.F. output stages is the insertion of a by-pass condenser placed close to the anode or grid of the valve. "By-pass" is somewhat of a misnomer here—the condenser may by-pass any residual R.F. of the frequency being handled by the detector stage but for the present purpose it serves chiefly to alter the U.H.F. characteristics of the anode circuit and so prevent oscillation. It must not be forgotten however that in certain cases the length of wire necessary to connect the condenser to earth may provide the very circuit needed to set up parasitic oscillation. Hence care must be exercised to ensure that no deleterious effect results from the insertion of the condenser. The capacity need not exceed 100 $\mu\mu$F, a ceramic condenser of this value being desirable. Its effect on the quality of the output will be entirely negligible.

A detector valve fitted with a grid top cap is prone to parasitic oscillation. This may be detected by gradually bringing the hand near to the top cap when, first of all, the normal oscillation will be heard to cease. On approaching still further the parasitic oscillation, previously inaudible, will also be heard to stop. A further effect is the reception of false signals through some form of heterodyne action. Such a phenomenon is particularly liable to happen on the U.H.F. and it should be carefully guarded against. If making the lead very short does not cure the trouble the effect of altering the position of the grid condenser may be tried. If all else fails, a piece of thin resistance wire should be used to form the lead—the parasitic oscillation will be damped out at the expense of a very slight loss of sensitivity.

### Push-Pull Circuits

As is well known, push-pull amplifiers are prone to set up parasitic oscillation especially when the layout is of a symmetrical nature. In equipment operating on Class A principles, the advice previously given applies equally as to a single valve—a moderate degree of added resistance in the grid circuit will have no appreciable effect, neither will a small resistance in the anode circuit, so that the actual layout is relatively unimportant.

In Class B or "low-loading" amplifiers, the valves do not normally run into grid current but it is wise not to exceed 5,000 ohms as the value of grid stopper resistances. On the anode side, considerable fluctuations of current occur, and attention should first be paid to the wiring. It should be possible to effect a cure by destroying any symmetry that exists, perhaps by lengthening one lead considerably with respect to the other. If resistances are found necessary they should be of a value not exceeding 40 ohms.

The same advice applies to Class B amplifiers except that since grid current flows at peaks, the grid resistances are best omitted being replaced by condensers of moderate capacity connected direct from the grid pin of the valve-holder to earth. Similar condensers may be employed on the anode side but it should be remembered that the peak voltages encountered will be much higher than the applied D.C. voltage, and the condensers chosen accordingly.

# U.H.F. DEFINITIONS

MR. E. H. CONKLIN, Associate Editor of *Radio*, has conceived the idea of preparing a list of definitions applicable to ultra-high frequency work. In order to give publicity to the suggestions we have obtained the author's permission to reproduce them for the benefit of members who have not seen his original article in *Radio*.

* * *

*Horizon*, local, or direct point-to-point reception refers to two points between which there is no obstruction to the waves. This may be one mile or two hundred, depending upon the altitude of the aerials and the nature of the intervening land. In the case of dead smooth ground, there is actually no discontinuity of the signal at the horizon; that is an aeroplane taking off beyond and below the horizon would begin to encounter the signal below an altitude actually in sight of the transmitting aerial. So already the next class of conditions has been entered.

Because the signal is heard consistently beyond the horizon, the term *ground wave* is usually applied out to 30 or more miles—and much longer when one or both aerials are so high that the horizon is distant —which is consistent at a good location using suitable equipment, with very little or no fading. The waves are propagated, presumably by *diffraction* or dispersing around the curve in the earth's surface in the same way as light is diffracted around a sharp corner. Out to this distance the transmitting and receiving aerials are reported to give best results when both are either vertical or horizontal.

The terms *Pre-skip*, *Extended Ground-wave*, and *Low Atmosphere Bending DX* are sometimes used to indicate the same thing. All refer to distances out to perhaps 200 or 300 miles, in the absence of unusual aurora or magnetic activity. Beams are pointed close to the direct line between the stations. The first two terms refer to the distance, but not to the method by which the transmission is accomplished, and presumably differ from the local or ground wave type only because the greater distance is covered as a result of more power, better aerials, or more sensitive receivers. *Low Atmosphere Bending*, on the other hand, in the narrow sense, refers to pushing the signal over at the same distance with the aid of a temperature inversion in the lower atmosphere

which bends the waves, rather than by employing the brute force methods implied by the other terms. This type is often accompanied by slow fading at an interval of perhaps several minutes. It averages better at night than in daytime, better in summer than winter, and is generally predictable from weather information several days in advance, but is not so noticeable on normal wavelengths as the types which follow.

The same and longer distances can be reached during periods of visible Aurora Borealis displays and during magnetic disturbances. This has been called *Aurora-Type DX*. It is not generally accompanied by "skip" although transmission may not be possible in all directions. Signals may be accompanied not only with fade, but also with tone or rough modulation which may make telephony unintelligible. It has often been reported that if a beam is used for receiving, best signals result when it is pointed in a northerly direction, regardless of the true direction of the transmitting station. Presumably the beam should be pointed the same way for transmitting. This type of condition was not noticed much before 1939, but during this year it may be prevalent during strong magnetic disturbances, which are expected to reach a peak in 1940. Low frequency bands often act abnormally (such as poor signals on 3·5 Mc.), due to a "churning" of the ionosphere, giving an indication that something may happen on 56 Mc.

*Sporadic-E layer DX* takes place in hops out to 1,250 miles each, with a skip distance that may be as short as 300 miles during a summer which falls at the sunspot peak, but now (in 1940) may be 600 to 1,200 miles. Two-or three-hop signals were reported on only five or six days in 1938 and 1939. This type produces the strongest and best long-distance signals on 56 Mc., and usually identical DX on 28 Mc. The condition may last for a few minutes or many hours, at any time of the day or night, but is much more likely between May and August than during other months. Horizontal aerials are apparently every bit as good as verticals for this work, and the polarisation of the transmitting aerial need not be the same as that used for receiving. Beams show some directivity, but generally are not as sharp as in pre-skip DX, possibly due to better signal strength or to an angle of reception several degrees above the horizontal.

$F_2$ *Layer* transmission out to about 2,200 miles per hop, with a skip distance of probably 1,600 to 1,800 miles, is theoretically possible in the early afternoon in midwinter during the peak of the sunspot cycle. There was some evidence of transmission by this method in 1937 and 1938, but the ionosphere and sunspot records suggest that it may be 1947 or thereabouts before there is another favourable time for this kind of work.

The National Bureau of Standards points out that an irregular *G layer* may explain some poor quality 28 Mc. work, but most of the reports attributed to it apparently could have been Sporadic-E layer reflections.

* * *

We believe that some British u.h.f. enthusiasts may wish to comment upon the definitions given above, in which case we shall be glad to open our columns to expressions of opinion. There is but one proviso—letters should be short, for space is valuable.

J. C.

## Horizon Distances

The following formula is useful for calculating the distance from a given height to the horizon.

$$\text{Horizon} = \sqrt{\frac{h \times 8{,}000}{5{,}280}}$$

where $h$ equals height above ground.

The approximate distance of the horizon as seen from various heights is given below :—

| | | | |
|---|---|---|---|
| 10 ft. | ... | ... | 3·9 miles. |
| 20 ft. | ... | ... | 5·5 miles. |
| 30 ft. | ... | ... | 6·7 miles. |
| 40 ft. | ... | ... | 7·8 miles. |
| 50 ft. | ... | ... | 8·7 miles. |

Assuming the summit of Snowdon to be 3,570 ft., the horizon from such a height is roughly 73 miles.

## Ionosphere Data

Mr. Goodacre, G6GO, advises us that the *National Physical Laboratory*, Teddington, are continuing the publication of Ionospheric Data Sheets. We understand the data is usually two or three months in arrears, but even so it should prove of value to those who are continuing ionosphere observations.

The charge for the sheets remains unchanged at 2s. 6d. per annum.

## Service Members

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

# KHAKI AND BLUE

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

Merton Trier, G8VH, writing from France, where he is serving as an L.A.C. with the R.A.F., tells of an interesting personal QSO with F8OT. We are beginning to wonder whether the blue ankle ribbon has indeed been adopted as a means of identification between hams! He sends 73 to all old friends in District 7 and elsewhere.

* * *

From that Aircraft Carrier, which "Lord Haw-Haw" sunk some months ago, comes a breezy letter from H. L. Cunningham, ex-ZB1A and more recently G5CI. He expresses his pleasure that the Society is remaining active and sends greetings to old friends. H. L. C. is a Telegraphist on the Ark Royal.

* * *

Tel. Beardow, G3FT (photo herewith), Sgt. Bowles, BERS481, and Bmbr. Waddington, BERS 474, send greetings to all old friends. They had the pleasure of meeting G5OQ when he called at Gibraltar last month.

* * *

**Rowland Beardow, G3FT, Hon. Secretary of the Romford and District Amateur Radio Society, now serving in the R.N.V.(W.)R.**

J. Goffin, G3UX, who was recalled to the Army Reserve in December, is serving with the Royal Artillery, although attached to the R.A.F. He is anxious to meet other amateurs located at aerodromes near Nottingham. Letters should be sent *via* his home address, 64 Blair Atholl Road, Sheffield, 11. He wishes to convey greetings to friends in his home town including G3FA, 3FN, 3MK, 3RP, 4HT, 5HK, 8KD, 8PX, 8RX and 2FOG.

* * *

Tony Chapman (G2IC) and F. Roden White (G8TX), are together at No. 2 E. and W. School, R.A.F. Both have been granted commissions in the R.A.F.V.R. What a galaxy of ham talent there must be at that training centre!

* * *

Jerry Walker (G5JU) is attached to a Norfolk R.A.F. squadron as Signals Officer. He hopes to make personal contacts wth G2XS and other District 9 members.

Apropos our Editorial remarks in the last issue, Ian Anstruther (2FAR), tells us that he has reached the rank of full Corporal in the Royal Corps of Signals at the age of 17¾ years. Well done, young man!

* * *

**R. V. Beekar, who in peace-time operated from Llangwstenin, North Wales, under the call GW3WY, now serving as a Bombardier in the Royal Artillery.**

A. Mears, G8SM, now a Private in the Gloucester Regiment, wishes to be remembered to his friends, especially to G8MH.

* * *

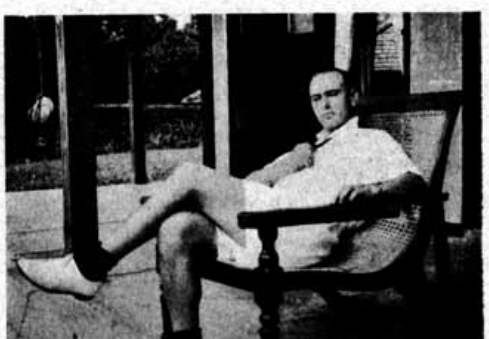
Pte. P. Reddock, stationed in Gibraltar, sends greetings to G2OI, 8JS, 8RI and other friends in District 1.

* * *

J. Simpson, G4JS, of Darwen, who is serving as a Private in the Army Pay Corps, will be pleased to hear from old friends. Letters should be sent c/o Mrs. Cook, 16 Christian Road, Preston.

* * *

From a R.A.F. station "Somewhere in the Midlands" Cpl. J. M. S. Watson, G6CT, writes "I am



**Bert Leefe, G5XI, a prominent member of the Southend Group is serving as a Telegraphist in the R.N.V.(W.)R. Here we see him reclining in style at his quarters in Ceylon.**

struck by the Ham Spirit shown by many of my old and new amateur friends and appreciate very much the knowledge I have gained as an amateur which has enabled me to get down to an interesting job of work. After all this business is over I shall suggest a week's Convention as I am quite sure I shall not be able to see and talk to all the people I know in any shorter time ! "

* * *

Several members located at the No. 2 E & W School, R.A.F., have discovered that the surest way of making contact with other Hams is to take a copy of THE BULLETIN into the instruction rooms and canteen. The familiar green cover is a veritable " open sesame."

* * *

A.C.2 Harvey, 2CQT, writing from No. 2 Wing, R.A.F., asks us to mention that he is in Hut Y25. He will be glad to meet fellow members in the camp. Recent contacts have been made with G3KB, 4AY, 4BQ, 5NA, 6DX, 6KQ, and 2FON. 2CQT also finds that the " Bull " is an invaluable aid to introductions.

**ALDERSHOT & FARNBOROUGH**

**MEETING**

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

**Ham Gathering**

on

**Sunday, 17th March, 1940**

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

* * *

Congratulations to H. E. Bennett, G8PF, who has just been promoted to the rank of Sergeant in the R.A.F. He would like to hear from those members of the C.A.R.T.S. and R.A.F. A.R.S. who were at No. 1 E & W.S. during the years 1935–7. Letters should be sent *via* his home address, 227 Lexden Road, Colchester, Essex.

* * *

Martin Railton, G8AB, has been posted to a west country E. & W. R.A.F. School, as technical instructor. He will be pleased to hear from old friends *via* his home address, 35 Priory Road, Loughton, Essex.

* * *

## R.A.F. Radio Mechanics

The R.A.F. announces that a Radio Mechanics' Grade has been introduced. Those accepted are given the rank of L.A.C. and pay is at the rate of 5s. 6d. per day plus allowances. Age limits are 18–50.

Applicants are required to have a sound radio knowledge and be able to maintain and construct transmitters and receivers. A knowledge of morse is not essential.

Applications should be addressed to either the Air Ministry Information Bureau or to a local combined recruiting centre.

A free travelling voucher will be issued to enable applicants to attend before a Trade Test Board.

J. Wood, G3VG, and G. Beaumont, G4OY, are both serving as AC2's (W.E.M.-W.O. grade) somewhere in Yorkshire. G3VG is on the left.

## Ham Coincidence No. 2

Base Camps are big places, yet Bert Allen, (G2UJ) when returning to France from a spot of leave in Blighty literally " bumped " into Cpl. Robertson (G6GQ), who was in the camp for a bare couple of hours. We believe these two well-known G's will be able to tell a pretty tale one day of their unexpected meetings whilst on the other side.

SOMEWHERE IN SNOWLAND

How a few of Britain's " hams " spent some of their time during the Great Wx Mystery. Extreme right Sgt. Tremaine, G8PB, third from right the one and only Max Buckwell, G5UK, Second from left K. R. Bunker, 2DFY.

# ON ACTIVE SERVICE

## SIXTH LIST

WE publish below our sixth list of radio amateurs on active service. Additional details and corrections should be advised to Headquarters as early as possible. The present list contains information received up to March 1, 1940.

| Rank and Name | Regiment or Branch | Pre-war Call or B.R.S. |
|---|---|---|
| — R. A. Archer ... | R.A.F. ... | 2AXP |
| A.C.2 G. Beaumont* ... | R.A.F. ... | G4OY |
| Stf./Sgt. H. Biltcliffe ... | R.A.O.C. ... | G5HB |
| L.A.C. K. Birch* ... | R.A.F. ... | 2FOS |
| Aircraft Fitter A. Bryan | R.N. ... | 2CAJ |
| Sgt. J. E. Bryden ... | R.A. ... | 2BOL |
| A.C.2 E. T. Burkett* ... | R.A.F. ... | G3TB |
| A.C.2 C. Call ... ... | ,, ... | 3748 |
| P./O. G. A. Chapman... | R.A.F.V.R. | G2IC |
| Cpl. Cockle ... ... | R.A.F. ... | 3196 |
| — K. Cook ... ... | R.N. ... | 3754 |
| A/A. T. G. Dickinson... | R.A.F. ... | 3747 |
| Gnr. W. A. Dix ... | R.A. ... | G5IX |
| L.A.C. A. B. Dixon ... | R.A.F. ... | 1814 |
| Lt. W. H. Glen-Dobie... | R.E. ... | G6DO |
| A.C.2 N. E. Dunkerton | R.A.F. ... | G3NX |
| A.C.2 M. Edwards ... | ,, ... | G3MV |
| L./Sgt. Art, A. L. Forge | R.A. ... | GM4MQ |
| L./Bdr. J. Goffin ... | ,, ... | G3UX |
| L./Cpl. G. Hare ... | C. M. Police | 2270 |
| Pte. W. H. Hill ... | R.C. of S. ... | G8BP |
| A.C.2 J. P. Humphreys | R.A.F. ... | G4SS |
| L./Cpl. R. Hunting* ... | R.A. ... | G3OC |
| Gnr. F. H. Jackson ... | ,, ... | G2KZ |
| Sig. R. D. R. Jaques ... | R.C. of S. ... | 2CFW |
| P./O. D. H. Johnson ... | R.A.F.V.R. | G6DW |
| Tel. B. C. Leefe ... (Recorded as J. W. Leeke in List No. 5.) | R.N.V.(W.)R. | G5XI |
| Pte. A. Mears ... ... | Gloucester Rgt. | G8SM |
| P./O. J. F. Mortimer ... | R.A.F.V.R. | G2MF |
| A.C.2 H. L. McGlade ... | R.A.F. ... | G3MG |
| P./O. J. V. Newson ... | R.A.F.V.R. | G3GY |
| A.C.2 W. H. Nuttall ... | R.A.F. ... | 2AGP |
| Lt. J. M. O'Kane* ... | R.A.M.C. ... | 2FVI |
| A.C.2 T. Paton... ... | R.A.F. ... | 2DVV |
| L.A.C. B. Pettit ... | ,, ... | G3VD |
| A.C.2 R. L. Pluck ... | ,, ... | G4AY |
| Tel. L. Pollard ... | R.N.V.(W.)R. | 3231 |
| Cpl. P. J. Prevost, B.Sc. | R.A.F. ... | G4NA |
| C.P.O.(A.) G. Richmond | R.N. ... | BERS 325 |
| Pte. J. Simpson ... | R.A.P.C. ... | G4JS |
| A.C.2 J. F. Stalley ... | R.A.F. ... | G8IS |
| L./Tel. C. R. Thomas ... | R.N. ... | G6NL |
| A.C.2 G. L. Turner ... | R.A.F. ... | G3LA |
| Sig. N. Turner ... | R.C. of S. ... | 3547 |
| A.C.2 F. A. Vost ... | R.A.F. ... | G2DF |
| Lt. C. D. Walkington ... | Royal West African Fr. Force. | BERS 255 |
| Cpl. J. M. S. Watson ... | R.A.F. ... | G6CT |
| P./O. F. Roden White | R.A.F.V.R. | G8TX |
| Tpr. J. E. Wilby ... | Sherwood Rangers Yeomanry | 3577 |
| L./Cpl. S. Wild* ... | Manchester Regt. | 2BBV |
| Gnr. E. B. H. Woolley... | R.A. ... | 2FRO |
| A.C.2 H. T. Wood ... | R.A.F. ... | G3PX |
| A.C.2 J. Wood ... | ,, ... | G3VG |

* *Non-Members.*

## Canadian Amateurs

Mr. H. W. Willis, G6OU, 67a Southern Road, Basingstoke, and Miss C. Hall, G8LY, North Waltham Rectory, Winchester, will be pleased to welcome any Canadian amateurs who may find themselves in their locality. It is hoped to arrange a Ham gathering at either Winchester or Basingstoke, or at the camp.

## An Evacuee Boys' Club

From Mr. A. Jotcham, 2FWB, we learn that Mr. C. A. Grover, 2FCK, and other members of the Newbury Short-Wave Club have recently undertaken a useful service for the benefit of boy evacuees living in their area.

Mr. Grover, who is Hon. Treasurer of the Newbury Club, has rented a room in the town to which the boys are invited to attend for elementary wireless instruction. The Club meets on three evenings a week and on Saturday afternoons when morse practices and general lectures are given.

When the boys first attended they knew little about radio but thanks to tuition they are fast becoming good operators.

Members in other parts of the country would be rendering a useful service by inaugurating similar clubs for the benefit of boy evacuees.

## Magazines for Members on Service

Several members serving abroad with the B.E.F. have intimated that they would be glad to receive technical and other magazines. Those in a position to forward books direct to France are asked to write to Headquarters for the names and addresses of Service members who have informed us that they would like to receive them.

Service members are likewise asked to communicate with Headquarters in this connection.

## Bulletin Articles

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

# EXPERIMENTAL SECTION

By A. M. H. FERGUS (G2ZC)

A FURTHER encouraging sign that the Section is doing its best to carry on, is shown by the publication of the first war-time issue of *Aurora*, the magazine of the Aurora Sub-Group. A brief review of the contents appears in the Propagation Group report printed below. This Sub-Group is up to full strength but any member who wishes to co-operate should communicate with the Group Centre, Mr. S. W. Allcorn (2FIH), Leighton House, Holland Park Road, London, W.14. The members of the Group receive our congratulations upon their initiative in continuing activities.

The E.S. Manager suggests that members who are unable to continue their pre-war lines of experiment due to their Sub-Group being dormant, should join up with one of the active groups.

G2ZC.

## Propagation Group

As briefly recorded above, the Aurora Sub-group have resumed publication of their magazine and the latest issue contains details of the Turkish earthquake. It is proposed to give a monthly survey of earthquakes and also of the night sky. Mention is also made of a report of " a catastrophe of colossal proportions through the explosion of a sun in the Milky Way," which was observed on January 18. Another interesting contribution is entitled " Ring round the Earth." A series of tests in North America suggest that " encircling the earth at an altitude of from 20,000 to 30,000 miles, is a ring composed of charged matter shot out from the sun at such velocity that the particles make the 93,000,000 miles' trip in 17 hours. Sunspot activity serves to continually replenish the ring."

The 28 Mc. Sub-group has resumed circulation of a letter budget and the Character Figure scheme for recording conditions on this band is being continued. It is the general opinion of the Sub-group, that after allowing for the reduction in activity on the 28 Mc. band, conditions are much poorer than in recent years. Observations on the upper frequency limits for distant signals show a considerable drop on last winter. G6DH found the average upper frequency limit during January, 1940, to be 28 Mc. compared with 37·25 Mc. for January, 1939. The noon decrease of ionisation in the F2 layer is also discussed in the latter budgets.

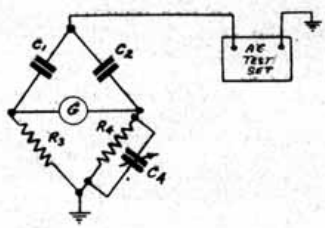
G2XC.

## Receiver Group

Referring to the A.C.–D.C. Test set described in our last notes, it is now proposed to suggest briefly a few experiments which may be conducted with it.

Ordinary A.C. insulation breakdown tests on materials, such as paper or press-board, can be carried out by placing the material between two electrodes consisting of a base plate of brass or copper about 3 in. in diameter, and a movable electrode of the same material about 1½ in. in diameter. The sharp edges of the upper electrode should be removed with a file; this is specially important at higher voltages in order to avoid corona effects. When the insulation has been set up in between the necessary electrodes the voltage should be applied *slowly and uniformly* starting from zero. It is important to note that the full testing voltage should not be applied at once, as the " switch surge " may cause a breakdown which would not otherwise occur. A.C. test or breakdown voltages are valueless unless the duration time of the test or the time taken to break down the insulation is stated, because the ultimate breakdown value is a function of time as well as voltage. When testing paper condensers it is usual to apply the testing voltage for one minute, but its value should be two or three times greater than the actual working voltage.

Sleevings and round tubes may be tested by placing a closely fitting rod or wire inside the insulation, the outer contact being made by either dipping the test piece in tap water or 5 per cent. brine or by wrapping a strip of tin foil, 1 in. wide, around the outside. The same general procedure should be adopted as with sheet insulation.




**Schering Bridge** for measuring the capacity of condensers.

Interesting experiments can be carried out by measuring the capacity of condensers under various voltages, by means of the Schering Bridge as shown in the diagram. C1 is the condenser under test and C2 is an air condenser whose constants are fixed and known. The capacity balance is effected by means of R3 which is variable. The power factor balance is made by adjustment of C4. G is the galvanometer. In very good condensers the power factor will remain practically constant while the voltage is raised, whereas in poor specimens it will rise, showing ionisation in the insulation.

When testing for D.C. breadown the time factor is not so important unless the D.C. resistance of the insulation is low, in which case the leakage current will cause a temperature rise and lower the breakdown voltage; however, the insulation has to be very bad for that to occur. The D.C. test is most useful for measuring high resistance and leakage paths in valve-holders, etc., and also for measuring the leakage current of electrolytic condensers. In this case a milliameter must be inserted at X as shown in last month's diagram. When testing a condenser which has not been used for some time it is interesting to plot the curve of leakage current against time, as the current very often falls off after the D.C. voltage has been applied for a few minutes.

G5HF.

# Cosmic Notes

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

### Sunspots

DATA has been received for the period December 31 to February 3. As was reported widely in the press, a large sunspot group, visible to the naked eye crossed the visible hemisphere of the sun during early January. The central meridian passage of this group is given by Tokio Observatory as January 5.

The International astronomical Union's Quarterly Bulletin of Solar Data for the period July to September, 1939, has been received. The mean daily sunspot numbers were:—July 97·6, August 105·8, September 112·6. The numbers for the corresponding months in 1938 were 165·3, 115·7 and 89·6.

### Magnetic Elements

During the same period several magnetic disturbances were recorded. The passage of the large sunspot group during the opening days of January was accompanied by several small storms. The most severe of these began at 14·42 G.M.T. on the 3rd, the magnetic character being 1·5 on a scale 0 to 2. Another disturbance was reported on January 10 lasting until the 12th. Moderately disturbed conditions prevailed on January 18 and from January 30 to February 3.

It may be of interest to any who regularly copy the Cosmic Data broadcasts from NAA on 9,250 kc. to have some information about the new K index being used to describe geomagnetic activity. An index is given for each three-hour period successively during each period of 24 hours ending at midnight G.M.T. Indices range from zero (very quiet) to 9 (extremely disturbed). A magnetic storm is characterised by 5 or higher.

NAA is being received much better now, but the time of the transmission 22.30 G.M.T. makes it impossible for the writer to copy this transmission regularly. Offers of assistance in this matter will be appreciated.

### Radio Conditions

Measurements at Washington, U.S.A., show that the critical frequency at mid-day for the F2 layer has been as follows:—Wednesdays, beginning January 3, 8,200 kc., 11,600 kc., 11,400 kc., and on January 31, 9,600 kc., and on February 21, 10,400 kc.

The last month has seen a considerable improvement in late evening conditions for U.S.A. signals. From observations made occasionally during the same period it appears that the conditions for daytime propagation on the higher frequencies have been much below the standard of the past few years.

Owing to the need for economy in paper, etc., the Cosmic Data sheets giving more complete details of cosmic matters are now being sent only to those members who are known to be in a position to use the information. If anyone who still desires to receive the Data sheets has been missed from the mailing list in recent months a postcard to the writer will result in a resumption of the service.

# Contemporary Literature

By L. FRYER (G2FR)

ASYMMETRIC-SIDEBAND BROADCASTING. N. Koomans, Non-member I.R.E. Proceedings of the I.R.E., November 1939.

The paper describes a method of radio transmission designed to economise frequency space in broadcasting, wherein one sideband and the carrier are transmitted, together with the lower audio-frequency components of the other sideband. By retaining the lower frequencies of the second sideband there is minimised the distortion to which pure single sideband gives rise in the types of broadcast receivers now generally used. Instead of setting up the usual double-sideband transmission and then filtering out the undesired high-frequency components of one sideband, the asymmetrical spectrum is produced by combining a double-sideband modulation of the lower frequencies only with a single sideband of the upper range of frequencies. Details of an experimental application of the method are given.

* * *

STROBOSCOPIC-LIGHT SOURCE. Heinz E. Kallmann, A.I.R.E. Proceedings of the I.R.E., November 1939.

A description of a high-speed stroboscope is given. A blocking-oscillator circuit is used to produce short pulses of several amperes of anode current in a high-vacuum tube, the anode of which is coated with flourescent material.

* * *

TRANSATLANTIC RECEPTION OF LONDON TELEVISION SIGNALS. D. R. Goddard, A.I.R.E. Proceedings of the I.R.E., November 1939.

The results of daily observations at Riverhead, L.I., N.Y., since September, 1938, of the English television transmission on 41·5 and 45·0 Mc. are summarised and discussed. A photograph of one of the television images received during this period is shown. A resumé is made of the signal strengths observed since January, 1937. During each winter of this period signal strengths of between 10 and 500 microvolts per metre were frequently received.

* * *

THE APPLICATION OF LOW-FREQUENCY CIRCUIT ANALYSIS TO THE PROBLEM OF DISTRIBUTED COUPLING IN ULTRA-HIGH-FREQUENCY CIRCUITS Ronald King, A.I.R.E. Proceedings of the I.R.E., November 1939.

The general problem of coupling between circuits which extend beyond the near zone is investigated theoretically. Integrals defining generalised coefficients of inductance are displayed and discussed

*Continued on page* 392.

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

By ARTHUR O. MILNE (G2MI)

IT is pleasing to record an increase in the number of reports received. Please keep it up !

A letter from I1IR brings greetings to British amateurs and the interesting news that Italian amateurs have been in touch with their Government on the matter of licences. They recently presented a scheme of rules which has received official approval but in his opinion, little is likely to come of it until Peace rages once more in Europe. I1IR anxiously awaits cards from VP5PZ, HC1JW, HH2MC, KA1PP, J3FC, OA4I and PJ7B. Should this catch the eye of any of those concerned, will they kindly forward cards to G2MI who will ensure their safe delivery. American papers please copy. He also mentions that I7AA is no longer active.

### Hic et Ubique

One of our members has recently met SU2TW, VQ4CRE, VK6NP, VK3AG, F3AN, a VU and a VE in the course of his duties—a chap must do something to make up for the BERU Contest !

G2MI has received a card from SP1XA giving a Rumanian address to which cards for former SP hams may be sent. We are glad to announce therefore that we can once more accept cards for our Polish friends. G8UN has mapped out a listening programme for himself and reports D4BUF and D4BSU still active ; other apparently genuine calls are OK3VA, TF1B and CT1CX, whilst PK1TQ, PK1OG and PK4RI are still on regularly. G2SO has received a letter from W4CCH recording several contacts with a station signing CC4W who speaks excellent English and gives QRA as " somewhere in Western Europe."

G6CL, after 13 years of effort, celebrates the arrival of a card from K6CGK, who sends a batch of cards for certain other British stations worked in 1939. G2NJ heard OH1FK calling CQ at 20.10 G.M.T. on January 24 on 7 Mc. RST. 579. No one replied.

G8TD has heard from VQ2GW who offers a further card to anyone who has not received one from him. He also gives the surprising news that four telephony stations are still active on the 7 Mc. band in Northern Rhodesia and suggests that we might hear them in this country around 17.00–18.00 G.M.T.

The address of OX7ZL is Stilling Berg, Angmagssalik, Greenland, but don't get restive, he only has one mail per year !

G8IL has heard many W's working VR2D but thinks as we do ! G3PZ has been keeping an eye on the 75 metre band and has logged many U.S. 'phones at great strength. He snaffled his W.A.C.—just in time—during the D.J.D.C. Contest.

G4AB must have either the world's best location or a special line in ears, for besides hearing W5FPZ, W6JYX, W7BLN, W7BLT, W7EXR, LU4PA, XE1R and YV1AD on 7 Mc., he also reports receiving all continents, with the exception of Oceania, on the medium wave broadcast band ! His list includes Tokio JOBK, Cairo, Rabat, Tunis, Buenos Aires LR6, Salta LV9, Rio de Janeiro PRE8, and Havana CMBF, besides numerous North American stations ; the best of these being WSM Nashville, Tenn., KPM San Francisco, KFWB Hollywood, KOA Denver, WOAI San Antonio, Tex., WHO Des Moines, Iowa, WTCN Minneapolis, CFCN Calgary, CBF Montreal, CBL Toronto, KMOX St. Louis and WDOD Chattanooga. This amazing work provides ample evidence that the lower frequencies are improving, just as the almost complete close down of 28 Mc. proves that the high frequencies are rapidly deteriorating. The virtual fade-out above 9 Mc. just after sundown each day is still further proof of the changing conditions. 4AB has logged over 200 DX signals on 7 Mc. this winter.

G4CP's war-time gloom has been lifted somewhat by the arrival of VK3XB's card which gives him WBE and WAC. On January 28 W1DQ was heard calling D4BIU on telephony ; also at 16.54 G.M.T. on the same day a S9 'phone using the call SM5BC called W1AKR and several other U.S. stations, apparently without success.

Cards have arrived from VP7NS and HB1CE, so anyone who has not yet had one, has no envelopes at the bureau, or else didn't work 'em.

### Thanks Ceylon

Vic Sims, G5VS, who is in Ceylon is recuperating from a bout of malaria and tells of the great kindness and hospitality he has experienced from VS7JB and his wife. 7JB spotted our remarks about 5VS in

## DX PERSONALITIES, No. 9.

Jose Sierra, EK1AF, of Tangier, International Zone, who has given a new country to hundreds of DX enthusiasts. He is famed for his promptness in sending a QSL.

this feature and straightway got into touch with him. 7PW also extended hospitality to him. What a wonderful brotherhood is Ham Radio ! Here is a fellow dumped down unexpectedly in practically a new world only to find himself amongst friends.

### A Question of Dates

W2CMY has just raised a card from ZB2B, via G2MI who managed to straighten out a small tangle regarding same. The misunderstanding arose due to the fact that whilst an American shows the date June 11, 1939 as 6.11.39, the rest of the world shows it as 11.6.39. ZB2B received his card from W2CMY with a contact claimed for 6.11.39 but as he was closed down in September he concluded that someone was trying to work " a fast one " over him and put the card in the dustbin. In the meantime, poor old 2CMY seeing cards coming in for his pals but none for him, thinks ZB2B is a rotten sport and so on ! Anyway, its all O.K. now but this does look like a case for some sort of international standardisation. Many amateurs QSL only when they receive a card, and as so few people keep a card index, it is quite likely that many badly needed QSL's are not forthcoming due to this date anomaly.


**Just to prove that an amateur does (or did) exist on Mars, a reproduction of his card recently found in G2MI's back garden. An unmistakable odour of green cheese proves that it must have passed close to the Moon on its long journey.**

As W2CMY puts it " The boys certainly started something when they thought up DXCC. It has converted a bunch of reasonably likeable and decent chaps into a pack of ravening wolves, hounds or what have you. Someone should be persuaded to undertake a serious study of the QSL situation and prepare a paper entitled ' Why a DX station QSL's to my competitors and ignores me even though I worked him first.' " Well, perhaps we have found the answers !

### American Chat

W1JPE in February *QST* says cards are coming through from LX1SS and TA1AA. If the card purporting to be from the latter which is illustrated in *Radio* is what he means, well, all we can say is that someone seems to be working an expensive leg-pull. In fact, to quote Inspector Hornleigh, " He gives himself away." If you look carefully at the card it is easy to see how !

W1WV, in his monthly letter, which, incidentally, took a month to get here, laments the scarcity of DX during the early part of the year. He has some doubt about PZ6ZK who claims to be in Surinam, but K4KD is positive that he is O.K. and says he QSL's by list *via* A.R.R.L. After all, WV was lucky with his LZ1ID contact. The card has just arrived. W1LZ *via* W1WV reports things very quiet, apart from a chase after AC4JS. WV sent along a sample card from his card index which for completeness must rival the Gestapo ! We did not notice any record of the colour of the chap's hair but have no doubt it would be there if he had mentioned it. KB6RSJ provided him with his 115th DXCC confirmation.

We had intended publishing some details of the Byrd Expedition this month but space will not permit, so we shall have to hold them over until the April issue.

### A.R.R.L. Contest

A.R.R.L. are valiantly running their annual DX Contest again this year but owing to prevailing conditions there is considerable modification to the rules. The contest will run during the 3rd and 4th week-ends of March and not over the usual nine-day periods. One is led to assume from the mass of verbiage in which the rules are set out that inter-W contacts are being allowed to count for points. These rules have always been renowned for their almost incomprehensible wealth of detail and this year they have surpassed themselves. Knowing something of the running of a contest and the varied interpretations which ingenious " nit-wits " manage to place on our own comparatively simple rules, we can but contemplate with genuine sympathy some of the teasers which must confront the A.R.R.L. each year. One point which is a definite improvement is the abolition of the zone multiplier and the substitution of a States-per-band multiplier in its stead. This should be very popular with most people after the war, especially if it is supplemented by the addition of the 10 Canadian states.

### The Spirit of Finland's Hams

Almost the last thing to leave Viipuri in the face of the Russian onslaught was a wad of QSL cards from the local hams, which has arrived safely at the Bureau.

For sheer cool courage, these OH boys take some beating ! The picture of a Finnish amateur with the shells and bombs falling round him, quietly making out his remaining QSL's before evacuating his home is worthy of a statue in the new Finland which will assuredly rise again like the phœnix, from the ashes of the present holocaust !

### Tailpiece

The wholesale destruction of the British Navy by " Reichsender Hamboursh " has been supplemented by the annihilation of a certain aerodrome by the German Air-force, according to Lord Blitzspitch. One of our members, who was on duty at the time, says he noticed nothing unusual at the hour mentioned ; but then, no doubt, he has been bribed with a brand new HRO to keep it dark !

Don't forget those reports. 73.

**QSL BUREAU**

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

# THE 28 Mc. BAND

By NELLY CORRY (G2YL)

DURING most of February there was not much to be heard on 28 Mc., but conditions during the period February 11–21 were decidedly better than those of the previous month.

No signals were reported from Oceania or Asia, but from Africa OQ5AB was heard on February 11, 20 and 26, and W's could be heard calling him on other days. Under present conditions, a CQ from OQ5AB has about the same effect as a small piece of bread thrown into a pond full of hungry ducks!

South American signals showed a distinct improvement, and a few were heard on at least 15 days after February 9. PY1HP, who was audible nearly every morning of February last year, was logged by BRS3003 between 14.00 and 15.00 G.M.T. on 10 days of February 1940, his signals occasionally peaking to S8. HC1JB was reported on five days, PY4EJ on four, and BRS3003 heard YV1AQ and LU8AB on February 11 and 25 respectively.


Central America and West Indies stations were heard on February 11, 15, 17, 18 and 20, and included CO2AM, K4DDH, K4EZR and NY4AD reported by BRS3003, and K4KD, TI2FG, XE1CE and XE2FC by BRS3179.

W's were audible on about 15 days and were at their best during the third week. BRS3179 logged a solitary W6 c.w. station on February 18, but usually only the East Coast districts came through. Stations in W5 were reported February 17 to 20 inclusive, and W9's on February 11, 17 and 18. W5FTA, "Portable Mobile Marine" in the Gulf of Mexico was logged by BRS3003 on February 15 at 18.04 G.M.T., but on most days the band went dead about an hour earlier.

From Europe, UE3YW and UK3AH were heard, and D4BUF, "HA3UH," "LX1UU," "LX2OK" and "ZZ1A" were worked by U.S.A. stations. The Hissing Phenomenon was heard on February 27 at intervals between 14.00 and 14.30 G.M.T., and at 14.09 was audible, at reduced strength, as low as 7 Mc.

Reports from 2BGN, BRS3003, 3179 and 3585 are acknowledged with many thanks.

# THE ULTRA-HIGH FREQUENCIES

By CONSTANCE HALL (G8LY)

THE chief development of interest reported from the States in recent months has been the use of wide-band frequency modulation on 112 Mc. It is understood that Mr. Egerton, G8MU, has prepared an article on this subject for publication in our next issue, therefore, the writer will make no further comment other than to express the hope that the A.R.R.L. tests will prove successful.

The article published in this issue, from the pen of our old friend, Mr. E. H. Conklin, on Ultra-High Frequency developments should prove of great interest to all readers. The U.H.F. enthusiasts of Great Britain deeply appreciate the kindness of both Mr. Conklin and the Editor of *Radio* who have given permission for this and other U.H.F. articles to appear in this Journal.

We were amused to read a paragraph in Mr. Conklin's notes published in the February issue of *Radio* wherein he referred to the reprinting of one of his earlier contributions. To quote "An article by your Conductor was translated into ***English*** by THE T. & R. BULLETIN, such words as civilisation, aerial, motor car, connection, favourable, and centre are noted."

* * *

The present writer will be glad to hear whether readers prefer a different type of news in these columns to that at present provided. Suggestions will be greatly appreciated otherwise a deep slow fade may set in permanently! G8OS and 2BIL are thanked for their recent reports, whilst the writer has been pleased to make personal contacts at Farnborough and elsewhere with many of those interested in U.F.H. work.

News for this column should reach G8LY by the 25th of each month.

## "Topical Topics"

It is the turn now of that go-ahead Romford Amateur Radio Society to receive our warm congratulations upon the production of a most worthwhile local magazine which has just appeared under the above title. The editor is Mr. A. J. Hallett, G3CQ, chairman of the Society.

The method of disseminating news is most ingenious, each contributor taking part in an imaginary Round Table telephony QSO.

The gossip is interesting, informative and in good style. We believe that *Topical Topics* will fulfil a useful purpose providing the Editor continues to receive the support which crowned his initial efforts.

# BRITISH ISLES NOTES AND NEWS

*District Representatives.*

**DISTRICT 1 (North-Western).** (*Cheshire, Cumberland, Lancashire, Westmorland.*) MR. J. NODEN (G6TW), "Fern Villa," Coppice Road, Willaston, near Nantwich, Cheshire.

**DISTRICT 2 (North-Eastern).** *Yorkshire* (*West Riding, and part of North Riding*). MR. L. W. PARRY (G6PY), 13 Huddersfield Road, Barnsley, Yorks.

**DISTRICT 3 (West Midlands).** (*Shropshire, Staffordshire, Warwick, Worcester.*) MR. V. M. DESMOND (G5VM), 199 Russell Road, Moseley, Birmingham.

**DISTRICT 4 (East Midlands).** (*Derby, Leicester, Northants, Notts.*) MR. L. RIDGWAY (G2RI), 90 Romway Road, Leicester.

**DISTRICT 5 (Western).** (*Wiltshire, Gloucester, Hereford.*) MR. R. A. BARTLETT (G6RB), 31 King's Drive, Bristol.

**DISTRICT 6 (South-Western).** (*Cornwall, Devon, Dorset, Somerset.*) MR. W. B. SYDENHAM (G5SY), "Sherrington," Cleveland Road, Torquay.

**DISTRICT 7 (Southern).** (*Berkshire, Hampshire, Oxfordshire, Surrey.*) MR. W. E. RUSSELL (G5WP), "Milestones," Westfield Road, Mayford, Woking, Surrey.

**DISTRICT 8 (Home Counties).** (*Beds., Cambs., Hunts. and the towns of Peterborough and Newmarket.*) MR. S. J. GRANFIELD (G5BQ), 47 Warren Road, Milton Road, Cambridge.

**DISTRICT 9 (East Anglia).** (*Norfolk and Suffolk.*) MR. H. W. SADLER (G2XS), "The Warren Farm," South Wootton, King's Lynn, Norfolk.

**DISTRICT 10 (South Wales and Monmouth).** MR. G. R. SCOTT FARNIE (GW5FI), "The Grange," Cefn Coed, Breconshire. *Scribe:* MR. S. HOWELL (G5FN), 38 Africa Gardens, Cardiff.

**DISTRICT 11 (North Wales).** (*Anglesey, Carnarvon, Denbighshire, Flintshire, Merioneth, Montgomery, Radnorshire.*) MR. D. S. MITCHELL (GW6AA), "The Flagstaff," Colwyn Bay, Denbighshire.

**DISTRICT 12 (London North and Hertford).** (*North London Postal Districts and Hertford, together with the area known as North Middlesex.*) MR. S. BUCKINGHAM (G5QF), 41 Brunswick Park Road, New Southgate, N.11. *Deputy:* MR. P. SOLDER (G5FA), 35 Torrington Gardens, New Southgate, N.11.

**DISTRICT 13 (London South).** MR. J. B. KERSHAW (G2WV), 13 Montpelier Row, Blackheath, S.E.3.

**DISTRICT 14 (Eastern).** (*East London and Essex.*) MR. T. A. ST. JOHNSTON (G6UT), "Normandale," New Barn Lane, Little Hallingbury, Bishops Stortford.

**DISTRICT 15 (London West).** (*West London Postal Districts, Bucks, and that part of Middlesex not included in District* 12.) MR. H. V. WILKINS (G6WN), 539 Oldfield Lane, Sudbury Hill, Greenford, Middlesex.

**DISTRICT 16 (South-Eastern).** (*Kent and Sussex.*) MR. W. H. ALLEN (G2UJ), 32 Earls Road, Tunbridge Wells. *Deputy:* MR. W. A. SCARR, M.A. (G2WS), 8 Beckenham Grove, Shortlands, Kent.

**DISTRICT 17 (Mid-East).** (*Lincolnshire and Rutland.*) MR. W. GRIEVE (G5GS), "Summerford," New Waltham, Lincs.

**DISTRICT 18 (East Yorkshire).** (*East Riding and part of North Riding.*) MR. E. MITCHELL (G5MV), 40 North Marine Road, Scarborough.

**DISTRICT 19 (Northern).** (*Northumberland, Durham, and North Yorks.*) MR. R. J. BRADLEY (G2FO), "High Crest," Yarm Road, Eaglescliffe, Co. Durham.

**SCOTLAND.** MR. JAMES HUNTER (GM6ZV), Records Office, 51 Camphill Avenue, Langside, Glasgow.

**NORTHERN IRELAND.** MR. J. A. SANG (GI6TB), 22 Stranmillis Gardens, Belfast.

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

## DISTRICT 1 (North Western)

*Cumberland.*—G6WR and 2AUM are keeping the flag flying at Whitehaven. 3BW has been home on leave again from R.N. 8RZ has settled down at his new home 500 ft. above sea level with no trees and 300 acres of land upon which to erect aerials! There is one snag—he has no mains!

*Bury.*—The T.R. apologises for the non-appearance of local news in the past few issues—this is not in any way due to lack of interest as members are as enthusiastic as ever. The usual monthly meetings are being held and are well supported.

The local "hamfest" was held at the old Boars Head Hotel, Bury, on January 7 and 14 members attended. Owing to restricted travelling facilities and the "Blackout" the attendance compared badly with last year's 43. However, those present had a very enjoyable evening. The T.R. wishes to thank G6QA for bringing along the home built

Second Annual "Hamfest" held by the Bury group on January 7. Left to right, 2HCL, G8NF, 2HW, 8NL, 2GA, 6QA, Mr. Lawton, G3ZN.

petrol engine he is constructing for future N.F.D. use. Thanks are also extended to 6QA, 6AX, 3BN, 2HW, 2HCL and 2FTR, who came from other towns to support the meeting.

Morse practice will be conducted at future monthly meetings and subjects for discussion are being arranged.

## Forthcoming Events

| | |
|---|---|
| Mar. 17 | Scotland "A" District, 2.45 p.m. at Y.M.C.A. Residential Club, 100 Bothwell Street, Glasgow. Talk by D. Macadie (GM6MD). Subject: "A Midget Pre-selector and a Convertor for 14 to 56 Mc." |
| ,, 17 | District 7, Ham Gathering at Y.M.C.A., North Camp, Farnborough, 2 p.m. (see special announcement under "Khaki and Blue"). |
| ,, 19 | District 14 (Southend Section), 7.30 p.m. at G4GT, "St. Martins," Southend Road (near Warners Bridge), Rochford. |
| ,, 24 | District 11, 7 p.m. at GW6AA, "The Flagstaff," Colwyn Bay. |
| ,, 29 | London Meeting, 5 p.m. at Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2. Charge 1s. Discussion: "The Manufacture of Quartz Crystals," opened by Mr. E. A. Dedman (G2NH). |
| ,, 30 | District 15, 3 p.m. at The Excelsior Hotel, Ladbroke Gardens, W.11. |
| ,, 31 | District 4, visit to Laboratories of University College, Nottingham. Meet 2.45 p.m. at College entrance, University Boulevard. |
| April 4 | District 12, Orpheum Cinema Café, Temple Fortune, Golders Green, N.W.11. Tea from 5.30 p.m. Discussion 7.30 p.m. "Will the War produce any fundamental changes in Amateur Radio Technique." |
| ,, 26 | London Meeting, 5 p.m., at Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2. Charge 1s. |
| ,, 28 | Midlands Provincial District Meeting, 12 noon, Hope and Anchor Hotel, Edmund Street, Birmingham (see separate announcement under District Notes). |

G8QS is now "Somewhere in England," 3YJ· 8NL and 8NF are discussing the merits of their respective receivers and aerial systems and 2GA, 3ZN, 3CJ, BRS3626, BRS3682, BRS3693 and BRS3703 are carrying on their restricted activities.

G6TW *via* G6CX.

## DISTRICT 2 (North Eastern)

*Leeds*.—Mr. W. F. Wilson, BRS2317, 4 Stratford Street, Leeds, 11, has succeeded G3WH as T.R. The latter is now serving in the R.A.F. The new T.R. asks for reports to be sent to him by the 25th of each month. His own activities have been somewhat curtailed recently due to the arrival of a Junior Op. (Congrats O.M., G6PY.) He has, however, been carrying out experiments with grid condensers and promises an article later.

*Barnsley*.—On February 21, 13 members met at the home of G4JJ, who since then has joined the R.A.F. A most enjoyable evening was spent. The next meeting is fixed for 7 p.m. March 20, at G6PY.

## DISTRICT 4 (East Midlands)

Because of transport difficulties brought about by the blackout, petrol restrictions and the possibility of unlicensed cars it was thought best to defer our first district meeting of the year until after Easter. Accordingly, arrangements have been made for a tour of the laboratories at the University College, Nottingham, to take place on Sunday, March 31, when a full description and explanation of the gear will be given. It need hardly be said that such an opportunity should not be missed. Members are asked to meet at the College entrance on University Boulevard (Highfields Baths bus stop) at 2.45 p.m., promptly. The bus service is No. 4 from Council Square, Nottingham.

Although a large number of *Mansfield* members have been scattered amongst the services, we understand that Christmas Eve saw a grand re-union of the "Robin Hood Gang"; the resultant rag-chew made up for many missed QSO's. The T.R. (G8SA) is getting good support in his efforts to keep things going.

From *Worksop* we learn that members are feeling their loss so much that they can hardly look the shack in the face. However, it can't last for ever, and a resumé of what they are doing in the meantime would fill a book for it certainly lacks nothing in variety. G6MN has constructed a model electric railway of considerable merit and in extremely accurate detail. It is sectionalised and controlled from a central operating table which contains nearly as many switches as a full-blown TX (so that's where it all went to!). G8PO is entering the navy as a telegraphist, 2CAJ has already joined as an aircraft fitter and his only grouse is that the uniform might be more romantic; he says he looks so much like a railway porter that people ask him the time of trains! After sorting them out on 7 Mc. he should know where to find the stations! G8SD is now in the artillery so the "one-watt-wonder" has changed his low power for the QRO guns. G8ON, who has gone "all scientific," is studying astronomy, in a mild way. He tells us you can get good DX at this game and they can't ration it. We wonder if he will find out how to work VK via The Great Bear! 8ON suggests that the DX stations who are missing the G's should spend some of their spare time getting QSL up to date.

*Nottingham* and *Leicester* are quiet, but things are well under control. The list of members in the Services grows longer and we are proud to say that pre-war amateur training is being put to good use. The latest additions are 2HBG and G6IM, both of whom are in the R.A.F., and going strong. 2CFC has fitted out a new shack in the form of a home for

his recent bride. Our hearty congratulations and good wishes to them both.

Just one last thing—give some thought to the Gear Sweep between now and March 31. See you soon. G2RI.

## DISTRICT 6 (South Western)

*Torquay.*—There is little to report due to lack of activity, but G5SY has been pleased to receive visits from BRS3171 and 3487. The latter has invested in some new test gear including a Taylor Signal Generator and an HT7 Frequency Standard. The apparatus should prove of great interest to members when we are again able to hold meetings.

*Plymouth.*—Informal meetings are being held on Saturday evenings at G3TX, and all who can are asked to turn up, especially members in the Forces. 3TX is now the possessor of a 3-in. Cathode Ray tube and is busy building and testing gear for it. 8PN and 2HLS are constructing superhets. We are glad to learn that 2FKO, after a long spell in hospital, has now recovered. A number of local members are with the Forces, including G6RF and BRS3547 (R. C. of S.); BRS2932 (Tank Corps); BRS3182 (Navy). 2HLS and BRS3464 may soon be Radio Technicians. Thank you for the interesting report, Plymouth. We hope to have many more (D.R.). G5SY.

## DISTRICT 7 (Southern)

*Aldershot.*—The meeting at the Y.M.C.A. North Camp on February 25 was one of the most successful ever to be held in this District and the bumper attendance must have gladdened the hearts of Bill Wadsworth, VE5ZM, and Jim Kirk, G6ZO, the organisers of the event. Grateful thanks to both for a thoroughly enjoyable afternoon.

It was decided to have a repeat performance and this is to take place at the same venue, Y.M.C.A., Camp Road, North Camp, on March 17 at 2 p.m., when it is hoped that we shall have another opportunity of meeting all the VE contingent as well as those G's stationed locally. If you missed the previous meeting make a note of the date.

*Portsmouth and Southsea.*—At the meeting held on February 4, Mr. E. J. Williams, G2XC, regretfully tendered his resignation as T.R., and Mr. Stevens, G8WC, 65 Ebury Grove, Copnor, was elected in his place. At this meeting G8LO gave an interesting account of his past activities with portable equipment.

All amateurs in this area will be especially welcomed at the next meeting which is to be held at the home of the new T.R. on Sunday, March 31, at 2.30 p.m. Local members extend good wishes to G3WZ who is leaving us to take up new duties.

*Weybridge.*—Apologies are tendered to the one or two members who arrived for the cancelled February meeting. Unfortunately it was not possible to warn everyone that it had been deferred because most of the locals seemed to be suffering from " D4 Measles " ! G5WP.

## DISTRICT 8 (Home Counties)

A word of thanks to those who expressed appreciation at the re-appearance of the notes last month. News is at a premium, yet every member we meet is asking, " What has happened to old so-and-so (meaning *you*, dear reader) these days ? " Come on, fellows, let's hear from you.

*Cambridge.*—Several of the locals have succumbed to the prevalent malady—" Leslie Henson " Throat —including G5JO, 5DR, 5BQ, 5DQ, and 8SY, It's a good thing that the old mike is on the shelf *pro tem !* 3CY, down from Oxford for good, is doing research at the Cavendish Laboratories. Incidentally his father, Professor J. A. Ryle, was the unsuccessful candidate in the recent University Parliamentary by-election.

Signalman W. Bartholomew (G8CK, of Watford), and Signalman D. Green (2HIF) recently visited G5BQ, and 5JO.

*St. Ives.*—G5OV confirmed by phone that he is still at home. During the conversation we remarked on the healthy c.w. signal in the background, to which Cecil retorted that conditions were good on 14 Mc. ! How the boys out East must miss him. XZ2DY, who was to have returned to Burma on the ill-fated " Yorkshire," has now arrived back safely, taking a new TX, and RX, with him.

G6FL is still with Murphy's at Welwyn, and 5RL still at St. Ives, although contemplating joining the R.A.F. Pat Crisp, 6DX, is in the R.A.F. He was stationed near home, but is now in the south of England. 4AZ is anxious to take up astronomy, and would appreciate guidance from any member with experience. Address: The Rookery, Fenstanton, Hunts.

*Peterborough.*—G6LX is now at an Air Defence Experimental Establishment in the South of England. 3DY would like a Sunday afternoon re-union in Cambridge, and this we hope to manage soon. 2NJ pricked up his ears the other evening when he heard a " Test " call on 7 Mc. It turned out to be a Russian amateur, however ! Incidentally 2NJ mentions that he has made tentative arrangements for a " Peace Supper " at The Talbot Inn, Stilton—where *the cheese and pickles* come from ! Well, O.M., " Your courage, your optimism . . . etc."

*Luton and Bedford.*—No news this month, although we know that G3KG is busy just now. His big news item next month. G5BQ.

## DISTRICT 9 (East Anglia)

It is hoped to arrange a District meeting as soon as the days are long enough for our scattered members to return by daylight. Suggestions would be welcomed by the D.R.

*Ipswich.*—We are glad to note that the Ipswich Group held an enjoyable gathering on February 4. Those present included G6TI, 30J, 8CU, 5MI, 3CZ, 2JD, 8IS, 8WN, 2AN, and 5UC who was home on short leave from the R.A.F. Those who were present wish to thank G8MU for his hospitality.

G8WI has been in hospital at Ipswich but has now recovered and returned home. 8IS has joined the R.A.F. as radio mechanic. 3CZ expects to be called shortly to serve in " Signals."

*King's Lynn.*—G4LM has been endeavouring to improve his microphone technique by crooning at local charity concerts ! 3IP and 2HBZ are busy giving Radio instruction to the local air-cadets. 3SZ is sitting for his L.A.C. exam and we wish him luck. GM8CN, who is stationed in the area, has visited 4LM and 2JS.

Now then Norwich and Yarmouth what news have you ? Let us have it by March 25, please.

G2XS.

### DISTRICT 10 (South Wales & Monmouthshire)

We are pleased to announce that Mr. S. Howell, G5FN (the energetic pre-war Hon. Secretary of the Medway Amateur Radio Society who was recently transferred on business to Cardiff) has kindly offered to act as District 10 Scribe. Members in the District are asked to send details of their activity to him, at 38 Africa Gardens, Cardiff. *Editor.*

**The First War-Time**
**MIDLANDS**
**Provincial District**

**MEETING**

will be held at

**THE HOPE AND ANCHOR**
**Edmund Street - Birmingham**

on

***Sunday, April 28, 1940***

| | |
|---|---|
| Assemble .. .. .. .. | 12 noon |
| Lunch .. .. .. .. | 1 p.m. |
| Technical Talks .. .. .. | 2 p.m. |
| Brief Business Meeting .. .. | 4 p.m. |
| Tea .. .. .. .. .. | 4.30 p.m. |

*Inclusive Charge 5/-*

*All Reservations to : Mr. V. M. Desmond, G5VM, 199 Russell Road, Moseley, Birmingham, not later than April 21, 1940.*

The February meeting of the Cardiff group was held at GW8WU when the following attended GW2GV, 2UH, 3VL, 5FN and 8UH. The meeting was informal and discussion mainly centred around 56 Mc. work.

It is hoped to hold regular meetings in the town to suit the convenience of members. Local members and those in the Services located near Cardiff are asked to communicate with the Scribe.

G5FN.

### DISTRICT 11 (North Wales)

As only *two* members responded to the notice published in the January issue, the D.R. assumes that activity in the district is at a very low ebb. It is hoped, however, that as many as possible will attend the meeting which has been arranged to take place on Sunday, March 24. (See " Forthcoming Events.") There will be free refreshments and Service members in the District will be cordially welcomed.

It is suggested that members should bring along to the meeting any photographs they have taken during recent 56 Mc. Field Days, etc. This will enable us to have a pleasant half-hour of " reminiscences " !

The following are known to be still working on the receiving side : GW3GL, 3KY, 4CX, 5TC, 6AA, 6MX, 6OK and 2FMM.

### DISTRICT 12 (London North and Hertford)

*North London.*—Local meetings continue to be held at members' homes, the last, at G8TY, being attended by 10 members, including Eric Woodhouse, ex-G2SX, who was welcomed back to the fold after a long absence. Various topics were discussed, ranging from the gentle art of code operating to future radio developments.

In connection with the latter subject and in view of the many opinions expressed, it was agreed to stage a debate at the next meeting on the question as to whether fundamental changes to amateur technique are likely to occur as a result of the accelerated development taking place during war-time. Old-timers who do not normally attend District meetings are cordially invited to be present to give their views on this important subject.

This meeting, the first full District meeting since the war, is to be held at the Orpheum Cinema Café, on Thursday, April 4. For the convenience of members working in town, who do not wish to go home first, arrangements have been made for tea to be served in the café from 5.30 p.m. The discussion will commence at 7.30 p.m. after a preliminary ragchew. It is suggested that lady friends of members may like to spend the evening at " the flicks " !

Plans are afoot to hold a District Picnic at G6LL's home in Cuffley, on Sunday, May 26. Details will be arranged at the April meeting.

Several District 12 members have promised to support the high tea to be held at The Horns, Kennington, on March 16. If this event proves a success, it is anticipated that District 12 may try a similar experiment.

Activity reports are few, but we know that a number of members are busy in one way and another. G8NY, having constructed a rotary 14 Mc. half-wave beam, reports that he can now hear the W's for 24 hours a day.

North London members send greetings to Andrew Boa (SU5BO, ex-G5BO), who recently had an exciting journey from Suez to Alex.

Latest reports from our D.R. (G5QF) indicate that he is making good progress after a temporary setback due to gastric 'flu. G6CL and 6OT recently visited him. He sends 73 to all old friends in No. 12 and elsewhere.

*Watford.*—Peter Spencer, G8MH, the T.R., reports that little success has attended his efforts to arrange local meetings. Circulars were sent to 24 members of the R.S.G.B. and the local society, and only three replies came to hand. Come on, fellows, wake up and put your town on the map !

We understand that G8MH's new receiver, which measures 28 in. × 14 in. × 11 in. and weighs half a ton, is taking shape ! G5LU and 8GQ, both well-known DX men, are now working with G8MH.

G5FA.

### DISTRICT 14 (Eastern)

*Brentwood.*—Most of the local group are serving in H.M. Forces, including the T.R. (G3LA) who is in the R.A.F. with 3MV and 3VD, G8HV and 4AK are in the Navy, 8KM is in the R.C. of S., G8RC is working on radio equipment at a R.A.F. station, whilst 4AG and 2ZJ are carrying on business until required, 2WG is a "special," 3JW is still with the G.P.O.

*Chelmsford.*—G5CA, 5RV, 6LB, 8GV and BRS.3650 were present at the February meeting when receiver design problems provided the main topic for discussion. 3OX, 4AC and 4PG are kept busy on local mobile police work. The latter obtained his licence two days before the "master switch" was pulled! 2SA reports receiver activity. The T.R. (G5RV) has had a very cheerful letter from G5XI who is stationed in Ceylon with G5VS

*Ilford.*—At the third war-time meeting held in this area G2XP, 3MD, 6AH, 6OF, 8TL and 2BRH were present. The former was host. An interesting discussion took place regarding the instability of strong signals received on the commercial superhet



used by G6OF. Numerous suggestions were put forward but as 2BRH has offered to service the set the actual reason will no doubt be known in due course. News of members serving with the Forces was exchanged and pre-war contacts discussed.

*Southend.*—The seven members who attended the meeting held at G6IF were pleased to welcome G3WP who had at last succeeded in fitting in his duties to be present. Local members are active on the receiving side, whilst several are building non-radiating equipment against the time when the ban on transmitting is lifted.

G6UT.

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

The first District meeting of the war, held at the Excelsior Hotel, turned out to be one of the best for some considerable time, as no less than twenty-eight members and visitors attended. We were very pleased to see the R.A.F. so well represented, whilst two others in khaki added colour to the gathering which was so successful that others are to be arranged at the same venue, with the help of G5LN, the proprietor. See Forthcoming Events.

An interesting lecture was given by G2MQ who described in detail the construction of his close-spaced rotary beam. The design allows the operator to climb to the top and walk along the member supporting the aerial, thereby enabling it to be changed to suit the frequency in use. Some excellent photographs were passed round showing the construction, and views of the surrounding country-side taken from the top. We now know the reason for his DX!

Congratulations to all members of the District who are assisting the war effort in any way. One, in particular, Jack Payne, G6PR, is busy converting all sorts of receivers for battery operation, for use by either the Navy or Army. Anyone interested should write to him or G2MI (the organiser of the scheme) for information. Other members are busy with A.R.P. and similar services.

2FUX has now returned to town, and is living at 42, Mount Avenue, Ealing, W.5, at which address he will be pleased to see visitors any Friday evening; his telephone number is Perivale 3403. 2DZN also welcomes visitors on Sunday mornings at 80, The Heights, Northolt, as does G2GL at The Studio, 46a, Flanders Road, Bedford Park, Chiswick, W.4 (Chiswick 3097).

Mr. E. R. Radford (G2IM) is the new Hon. Secretary of the Edgware Radio Society, and all future communications should be addressed to him.

A fund has been started on the suggestion of the D.R. to send cigarettes to members of the District serving abroad. G8KZ who has consented to conduct this fund collected £1 3s. at the last meeting. He will be glad to accept other contributions and to hear from those who can supply the address of any member in the District who has been sent overseas.

G6WN.

### DISTRICT 16 (South-Eastern)

Reports are to hand from G3WR (Brighton and Hove) and G2IZ (Gravesend), while G3NQ (T.R. for Canterbury) writes to say that he is very anxious to start meetings in that area but so far members have failed to make themselves known to him or to report individual activity. Will those living in or near Canterbury please write to him at 10, Burgate, Canterbury or to his private address, "Hillrise," Court Lees, nr. Whitstable.

*Brighton and Hove.*—The meeting of the local club held on February 1 was a rather belated A.G.M. postponed from September. The meeting was well attended, there being present several evacuee Hams including G2UX, G4DC and G6OW. Mr Clacy (G6CY) was again elected Chairman, whilst Mr. Chick (C3JF) was appointed Secretary in place of Mr. Price (G8OQ) who did not wish to continue in office.

The next meeting will be held on the first Thursday in April, and future meetings will take place on a similar evening each month. The venue is the Imperial Hotel, Queen's Road (2 minutes from Central Railway Station), and a special invitation is extended to all members who may be temporarily in the area.

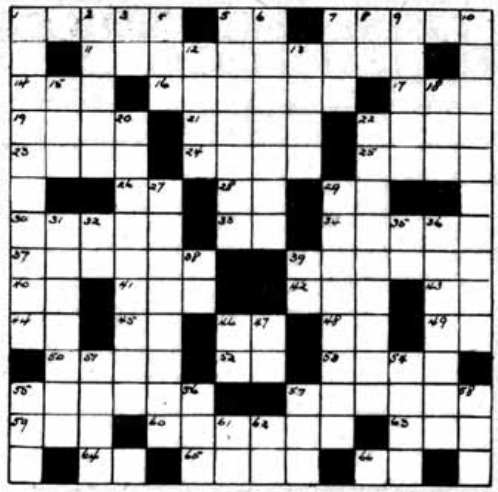
Best wishes are extended to 6RM who is shortly taking up an Air Ministry appointment.

*Gravesend.*—A well supported meeting of the Gravesend Society was held at G4FN's home in Grays, on Sunday, February 18. This is the second occasion on which the club has met at this member's home and those who attended are indebted to Mr.

(*Continued on page* 388.)

# "HAM-RADIO" CROSSWORD No. 3

**Prepared by R. E. WOOD (G3TK)**



## CLUES

ACROSS.

1. To purchase a big one now you must have a G.P.O. permit.
5. A C.W. ham's way of saying "Hello" on a Saturday night.
7. Almost a necessity in a "bottle."
11. You must have this in the TX whether you use an xtal or not.
14. There is only one here, but you have twelve and an Eddystone coil former has eight.
16. Well-known express and good DX at any time.
17. E. for Empire (25-29 metres).
19. Hams are usually full of them.
21. Tommy Handley.
22. Plus ONI makes a real old timer.
24. A Sudan Liberia QSO.
25. Milnes make one for H.T.
26. All pirates from here.
29. Initials of well-known ham store advertised in "Bull."
30. A rarefied fluid without which radio would be impossible.
33. Your wireless programmes are here (abbreviation).
34. A QSO with this U.S.A. State is very F.B.
37. — — · — · · —
39. Your RX may be "home—," but it sounds more like a beverage.
41. A whole receptacle in G., but only ½ in F.
42. MNI TKS—RPRT.
44. Lots of hams in here now.
45. A S. American prefix with two vowels (reversed).
46. Good DX could also be chewed.
49. Ceylon, Hong Kong, or Malaya?
50. It's everybody's—to help win the war.
52. Good Asiatic DX.
55. PSE QSM.
57. A well-known chocolate sounding like "Test De."
60. They may be in a sandwich cake, or you may QSO the moon without them.
63. A Scottish county which one would think was connected with radio.
64. U.S.A. State (abbreviated).
65. You get this on entering the shack these days.
66. Interjection or a European prefix reversed.

DOWN.

1. A tuner of 20 years ago.
2. Once you planned these with your antenna, now you just carry a pair around with you.
3. Federated Malay States.
4. Should be O.K. if you have a good frequency meter.
5. Rig T Let (anagram).
6. Component part of a directional antenna.
8. Prefix for Belgium (reversed).
9. Musical instrument very popular on the radio.
10. Found inside a radio valve.
12. Maybe the XYL's name or a flower.
15. Nearly an idea, or is this the XYL's name.
18. Regrets in code.
20. Tate a tune (anagram).
22. We felt this way when our gear was collected.
27. A regal craft which appears to have nine lives.
29. These are dug-outs in Paris.
31. Always switch off if this gets bad.
32. Hungary.
35. A radio weekly of a few years ago (abbreviated).
36. The way time hangs just now.
39. One type of oscillator in a communication receiver.
46. Not a nut, just a S. American prefix.
47. Antenna direction approx. E. 32° N. for this DX.
51. Above Belgium.
54. Another good W QSO.
55. This is smaller now than on Sept. 1/39.
56. Found on many antenna coils.
57. Half of energy.
62. Within, in France.

**(SOLUTION NEXT MONTH).**

Wakeman and his wife for their hospitality. G3GF's talk on super-het design had to be postponed but a good general discussion took place instead. G4FN demonstrated his communications receiver and the excellent DX conditions made members envious. His shack was flooded after the recent frosts, owing to a burst pipe, so for the first time he was glad that the G.P.O. had his gear in a "dry store"!

G6VC is doing useful work as telegraphy examiner to the local Boy Scouts while 5SU is busy studying electro-technics.

Four club members, including 2BBB and 2CIW, have enrolled as R.A.F. Wireless Mechanics and so will be missed from meetings for a while.

Deepest sympathy is extended to ex 2BDL in the loss of his father and to G2TN whose mother passed away after a brief illness.

The next meeting of the club will be held at the home of a Gravesend member (details from G2IZ, 41, Mayfield Road, Gravesend) and it is hoped that these meetings will be continued at least monthly. A morse class for the younger members is shortly to be commenced.

G2WS.

### DISTRICT 18 (North and East Yorkshire)

*Hull.*—Although this city is without an official T.R., a welcome letter has been received from G8UL, who reports that he is very pleased with the way in which his new pre-selector (with 6J7G) improves 28 Mc. signals on his E.C.R., the difference being on the average three "S" points. He is experimenting with negative feed-back in speech amplifier design, and is starting a collection of obsolete receiving valves.

Recent visitors to Hull have included G3AT 6GA, and 2DNS. It is reported that 3PL is in the Signals, 5GC and 5HA in the R.A.F., whilst 4IR is on a tanker. 6OS has parted with his C.R. oscilloscope to the Forces.

*Scarborough.*—It has not been found possible to hold meetings since September, but most of the club equipment and furniture will be available when required. Thanks are due to 2BGO and others for storage facilities. Members are occupying their spare time in various ways :—morse practice, receiver reconstruction, recovery from the effects of the first skating for at least five years, and in one or two cases "just mooning around looking miserable." Cheer up lads, Scarborough will still be a safe holiday resort this year even if we *have* had to postpone the proposed P.D.M.!

*Thirsk.*—G3MB writes a chatty letter from this out-of-the-way part of the District. He has some very definite opinions on British and American communication receivers which cost more than twice the price of the average BCL receiver, yet require the addition of a pre-selector stage before second channel interference can be eliminated. The writer of these notes (G6TG) agrees with this view, as it is apparently an accepted fact with receiver manufacturers that 465 kc. is the only I.F. which can be used. With this it is impossible to design a single ganged H.F. stage (and consequently non-regenerative) to give sufficient pre-selection to prevent 19-metre interference in the 20-metre amateur band. This is not the only place where images occur, but they are most noticeable and troublesome at this part of the spectrum. The use of a higher I.F., say 1,600 kc. as in some American receivers, minimises the images but does not by any means cure them, as they are only removed to another part of the band and replaced by C.W. images. As commercial occupancy increases, post-war receiver designers must tackle the problem properly, either by using ultra-high I.F. of at least 6,000 kc. or by dual conversion. Nearly all receivers suffer from images if a proper search is made for them.

G8OH has a new *Howard* receiver; model not stated. G3MB with the help of others have given their first concert for the troops. The D.R. and Scarborough members wish their new venture the best of luck.

G5MV *via* G6TG.

### Scotland

News is still very scarce and the only report is from "*A*" *District*, who advise that the February meeting was well attended when H. Jefferies (GM8HJ) gave an interesting talk on the difficulties encountered in super-het construction. He brought along his latest model, which aroused considerable interest.

At the meeting to be held on March 17, a talk of a practical nature will be given by D. Macadie (GM6MD). The subjects to be discussed are "A Midget Pre-selector" and a "Converter for 14 to 56 Mc."

GM6ZV.

### Edgware Short-Wave Society

An excellent progress report was presented at the third Annual General Meeting of this go-ahead Society. Membership increased from 42 to 54 during 1939, and the financial provision is better than ever before. Over 50 members and friends attended the Annual Dinner in December when Mr. H. R. Adams, G2NO, was chief Guest.

Several members including G3VW, 4FZ, 4GB, 4JO, 6ZO and Mr. Frisby are serving in H.M. Forces.

Affiliation with the R.S.G.B. is to be continued. Subscriptions for 1940 have been reduced to 2s. 6d., whilst full membership has been granted to those in the Services.

The 1939 Committee has been re-elected, except that Mr. E. R. Radford, G2IM, has replaced Mr. F. Bell, G4VU, as Hon. Secretary, who has enlisted. Messrs. L. Gregory, G2AI, and P. Thorogood, G4KD, are President and Chairman respectively, Mr. H. Pope, G3HT, is the Hon. Treasurer, whilst Messrs. Harris, G3LT, and Filkin continue as Committee members.

Mr. H. Pope was awarded the Enthusiasts Cup for 1940. Votes of thanks were recorded to Mr. Bell, Mr. Harris and Mr. Pope for services rendered during the year. The former very kindly placed his home at the services of the members during the winter for their weekly meetings which are to be continued. The successful morse class which has in the past been conducted by Mr. Bell is now to be held at 68 Colin Crescent, Colindale, the home of Mr. Fryer.

G4KD.

# THE SOUTH GREETS THE CANADIANS

ALTHOUGH the Aldershot and Farnborough Ham Gathering on Sunday, February 25, was primarily arranged to provide an opportunity for a ragchew between VE and G Service hams stationed in the neighbourhood, many civilians from District 7 and elsewhere seemed desirous of meeting their friends from across the Atlantic. The company, numbering nearly sixty, was welcomed by the organisers "Bill" Wadsworth, VE5ZM, and Jim Kirk, G6ZO, the former including in his talk a description of the medicinal properties of the lemon! Exactly what happened to the particular fruit exhibited is not recorded! Mr. A. D. Gay, G6NF (Vice President) replying on behalf of those present,

**The VE contingent present at the Farnborough meeting. VE5ZM third from left back row.**

expressed the pleasure R.S.G.B. members feel in being able to make personal contacts with their Canadian colleagues.

Apart from the stalwart contingent from Canada—which included VE3AAT, 3AGC, 3AMB, 3AMY, 3APG, 3ATK, 3AYO, 3KE and 5ZM—Northern Ireland, Scotland, Wales and Bahrein Island were represented, the latter by VU7BR who repeated his assurance that he will despatch a card to anyone who has not received one from him.

After a general chat a move was made into the open when a battery of cameras made a permanent record of a most enjoyable afternoon. Tea brought the official proceedings to a close, but for long afterwards it took a considerable effort to prise the last of the reluctant ragchewers out of the hall, the VE's seemingly wanting to hear the story of 10 watt DX once again, and the G's to learn more about kilowatts and 120 ft. high rotary beams!

**The G.'s in Khaki who attended at Farnborough.**

Good though the attendance was, many service amateurs were unable to be present due to illness or duty; accordingly it was agreed to hold another meeting on Sunday, March 17, in the same place—Y.M.C.A. Camp Road, North Camp. Our Secretary (G6CL) hopes to attend, but there will still be room for dozens more, so roll up!

G5WP.

**The R.A.F. was represented by Sgt. Gilhespy, G6GS, Flt. Sgt. A. E. Lambourne, G5AO, Sgt. E. J. Laker, G6LK.**

## Pre-Selector Articles

The Secretary-Editor will be pleased to consider for publication constructional articles dealing with R.F. Pre-selectors, built around a battery or mains R.F. Pentode and R.F. Tetrode. Band spread and regeneration, with only one tuned stage, would be useful advantages in such a design.

Articles describing home constructed super-heterodyne receivers are also needed.

A circular entitled "Hints to Contributors" will be sent post free to any member willing to prepare an article.

## Ham Hospitality

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

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

| Name | Call | Address | Telephone |
|---|---|---|---|
| S. G. Keeble | G2AN | 139 Sidegate Lane, Ipswich. | — |
| Dr. C. G. Lemon | G2GL | 46a Flanders Road, Chiswick, London, W.4. | Chiswick 3097. |
| H. W. Sadler | G2XS | Warren Farm, South Wootton, Kings Lynn | Castle Rising 233. |
| F. A. Robb | GI6TK | 60 Victoria Avenue, Sydenham, Belfast. | — |
| R. F. Armstrong | 2HDX | 21 Walter Road, Swansea. | Swansea 4765. |

The City of Belfast Y.M.C.A. Radio Club located in Wellington Place, Belfast, also welcomes visitors. Their club night is Wednesday and the telephone number 259451.

# HEADQUARTERS CALLING

## London Meetings

In view of the success of the first informal meeting held last month at the Institution of Electrical Engineers, London, it has been decided to hold further meetings on Friday, March 29 and Friday, April 26.

Members will meet from 5 p.m. and tea will be served from 6 p.m. A charge of 1s. will be made (in view of the recently reduced London subscription rate) to cover the cost of refreshments and the hire of rooms.

At the March meeting Mr. E. A. Dedman, G2NH, is to give a talk on the production of quartz crystals for frequency control.

It is hoped that London members will give this and the following meeting their support.

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

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

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

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

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

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

## " Radio " Subscriptions

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

## Anonymous Letters

Occasional anonymous letters are received from members containing " bright ideas." One such epistle arrived recently from the Preston, Lancs, area, dealing with post-war licence regulations. We give notice that any anonymous communication will be destroyed on receipt.

## Kilocycles-Metres Conversion Tables

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

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

## Members Notepaper

Members Notepaper is now available in packets of 100 sheets at 3s. per packet, post free, or two packets for 5s. 9d.

## Back Issues

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

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

## Situations Required

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

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

## Service Photographs

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

## Civil Defence

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

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

## " Radio " Handbooks

Due to a printer's error, the price of the new " Radio " Handbook was given as 3s. 6d. instead of 8s. 6d. in the *Webb's Radio* small advertisement printed in the February issue.

## Returned Bulletins

Readers are asked to assist us in tracing the present whereabouts of the following members who have moved from the address given below without advising Headquarters :—

W. O. Bridgeman, 52 Leeside Crescent, Golders Green, N.W.11 (BRS15).

R. L. Coombes, " Faraway," Otterton, Devon (G5QI).

W. Hawcroft, 14 Cleveland Street, Upperthorpe, Sheffield (ex-SU1WH).

R. J. Lawrie, 95 Overton Road, Kirkcaldy, Fife (2APA).

L. J. Thomas, A.A. Militia Training Battalion (BERS407).

J. K. Wilkie, Royal Liver Buildings, Liverpool,19 (G5SF).

R. F. Weston, 12 Somerset Road, Swindon (G6PZ).

R. G. Wilson, 33 Brook Lodge, Golders Green Road, N.W.11 (BRS1252).

L. A. Yaxley, 1 Matlock Road, Thorpe Road, Norwich (2FLC).

## New Members

P. J. C. PREVOST (G4NA), 15 Nottingham Road, South Croydon.
B. W. WARREN (G6CI), 1 Crackley Crescent, Kenilworth, Warwicks.
A. J. BAYLISS (G8PD), 90 Thurlby Road, Wembley, Middx.
B. O'BRIEN (2AMV), " Caldy," Irby Road, Heswall, Cheshire.
G. F. EGLESFIELD (2CLL), 60 Buckingham Avenue, Feltham, Middx.
A./A. T. G. DICKINSON (BRS.3747), R.A.F.
C. CALL (BRS.3748), 20 Plemont Gardens, Bexhill-on-Sea.
A. H. A. WYNN, M.A. (BRS.3749), 9 Willow Road, N.W.3.
W. E. BROWN (BRS.3750), 45B Arragon Road, Twickenham, Middx.
S. G. PYE (BRS.3751), 79 Compton Road, North End, Portsmouth.
C. R. HAWKINS (BRS.3752), 227 Newbridge Road, Bath.
P. C. W. GREEN (BRS.3753), 147 Howard Road, Upminster, Essex.
K. COOK (BRS.3754), H.M.S. " St. George."
K. E. ROBERTS (BRS.3755), 2 Chestnut Close, Southgate, N.14.
C. A. B. BETTS (A.), 19 Wychall Lane, King's Norton, Birmingham, 30.
R. G. E. KNIGHTLEY (VE3ES), Agincourt, Ontario, Canada.
F. H. B. SAXON (VE3SG), 302 Lee Avenue, Toronto, Ontario, Canada.
A. R. WEST (BRS.3744), 96A New Walk, Leicester (this was erroneously given as 92A in our last issue).

## W.B.E., H.B.E., and B.E.R.T.A. Certificates

The following certificates have been issued since the last list appeared :—

*W.B.E. (Telegraphy)*

| *Name* | *Call Sign* | 1939 |
|---|---|---|
| S. Stanley* ... ... | G8GO ... | Nov. 1 |
| W. A. Lippman* ... | W6SN ... | ,, 1 |
| S. Levings ... ... | G3AO ... | ,, 10 |
| W. V. Champion ... | G8CY ... | ,, 10 |
| J. S. T. Ruddock ... | GI8TS ... | Dec. 8 |
| R. E. Wood ... ... | G3TK ... | ,, 19 |
| W. W. Barnes ... ... | G2FI ... | ,, 27 |
| R. Wilkinson ... ... | G4HW ... | ,, 30 |
| J. R. Garrett-Pegge ... | G3MI... ... | ,, 30 |
| | | 1940 |
| C. R. Perks ... ... | G4CP... ... | Feb. 14 |
| K. Kallemaa* ... ... | ES5D ... | ,, 29 |
| G. Ross Kent* ... ... | ZS6L ex ZT6R | ,, 29 |
| R. G. Pretorius* ... | ZS2AG ex ZT2H | ,, 29 |

*W.B.E. (Telephony)*

| | | |
|---|---|---|
| I. Jones ... ... | GW3KY ... | Jan. 9 |
| Dr. M. F. de Almeida ... | CT1PK ... | ,, 19 |
| K. Kallemaa* ... ... | ES5D ... | Feb. 29 |
| G. R. Kent* ... ... | ZS6L ex ZT6R | ,, 29 |

*W.B.E. (28 Mc.)*

| | | |
|---|---|---|
| A. Pollard ... ... | G2PN ... | Feb. 14 |
| | | 1939 |

*H.B.E.*

| | | |
|---|---|---|
| O. Baumann* ... ... | HB9X ... | Nov. 29 |
| R. E. Wood ... ... | G3TK ... | Dec. 30 |
| | | 1940 |
| N. P. Haskins ... ... | G8JR ... | Jan. 23 |
| A. O. Milne ... ... | G2MI... ... | Feb. 14 |

*B.E.R.T.A.*

| | | | |
|---|---|---|---|
| | | | 1939 |
| No. 83 | R. McCarty ... | W9KA ... | Nov. 10 |
| ,, 84 | O. Baumann* | HB9X ... | ,, 29 |
| | | | 1940 |
| ,, 85 | G. B. Butler*... | ZL2FA ... | Jan. 19 |
| ,, 86 | R. M. Marti*† | K4FCV ... | ,, 19 |
| ,, 87 | E. A. Longtine, Junr. | W1IOZ ... | Feb. 5 |
| ,, 88 | A. Pollard ... | G2PN ... | ,, 14 |
| ,, 89 | L. W. Parry ... | G6PY ... | ,, 16 |

* *Denotes non-Members.* † *First award.*

## Trade Notice

*Taylor Electrical Instruments, Ltd.*, advise us that their factory and offices have been removed to 419/422 Montrose Avenue, Slough (Telephone 20061). Extensions to their original Slough factory will enable the Company to concentrate upon relieving the present stock position in view of the pressure of orders they have on hand.

The high grade meters manufactured by this Company are especially useful for experimental work. A copy of the latest Taylor catalogue will be sent free of charge from the above address.



**INDEX TO DISPLAYED ADVERTISEMENTS**

## EDITORIAL

(*Continued from page* 361)

interest which bind them and the Society together. The meeting proved so successful that others are being arranged forthwith.

From the Midlands, news has reached us that a Birmingham Provincial District meeting is planned for April 28th. Other parts of the country will also have an opportunity, if they so desire, of staging similar meetings, and although it is unlikely that Headquarters can be represented at them all the organisers can rest assured that the utmost publicity will be given to their plans, provided information reaches us in time.

The extraordinary success of winter meetings, notwithstanding black-out and transport difficulties, has demonstrated forcibly that the keen radio amateur will go to great lengths for a chance to meet his colleagues. With brighter and longer days before us meetings should receive even more support. So long as the social side of the Society's work can continue there should be little to fear in the future. J. C.

## RADIO ABSOLUTE ALTIMETER

(*Continued from page* 367)

The altimeter will not indicate the height above objects having a relatively small area, whilst passing over a building will cause only a momentary dip on the meter. Very rough ground will produce sufficient irregularity in the reflected wave to cause the meter needle to swing back and forth over a small arc of the scale.

Using this device it is now possible for a pilot to know his instantaneous height above ground in any type of country throughout a range of 50 to 5,000 feet. The indication is of course independent of charges in air pressure, temperature inversion, humidity, cloud layers and other variable weather factors.

We are tempted to enquire whether there are not a few radio amateurs on the staff of the Bell Laboratories who are to be credited with the development of this interesting device !

We should also be interested to hear whether any member followed up the suggestion made at the previously referred to London meeting. J.C.

## CONTEMPORARY LITERATURE

(*Continued from page* 378)

for the case of the near zone, and in general. As an application, the specific problem of determining the current distribution in two coupled circuits which extend beyond the near zone is examined, and solved for the special case of two loosely coupled sections of parallel line. It is proved that the electromotive force induced in the secondary by the primary oscillator may be treated as though concentrated at a point opposite the centre of the oscillator provided the current distribution in the oscillator is symmetrical with respect to this centre. The conclusions are generalised to include other circuits than the parallel line, in particular an aerial coupled to a symmetrical oscillator.

Experimental curves are shown which verify the general theory.

Printed in Great Britain for the INC. RADIO SOCIETY OF GREAT BRITAIN, 53 Victoria Street, London, S.W.1, by Sir Joseph Causton & Sons, Ltd., Brettenham House, Lancaster Place, London, W.C.2.