
# July 1949

*The original front cover for this edition was not available.*

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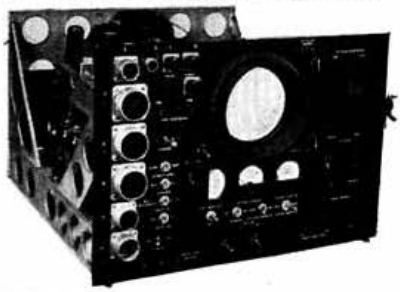
# *Outstanding Offers for the discerning Amateur*

## 40 VALVE RADAR RECEIVERS.



**Type R-31 APS-2E.** A magnificent instrument. Absolutely brand new and unused in original manufacturer's packing cases. Fitted two Cathode Ray Tubes. One type 5FP7 5" diameter Magnetic deflection and one 2AP1 2" electrostatic. Valves fitted comprise 8 6L6G, 13 6SN7, 1 2X2, 2 6H6, 2 6X5, 8 6AC7, 3 VR105, etc. Has Blower motor cooling fan, 3 panel meters and a fabulous quantity of components. Input 115 V. 400 c. Size 26" × 19" × 12" housed in a fine black crackle case.
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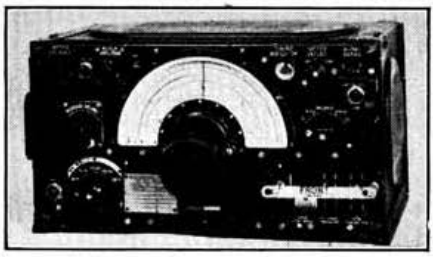
## The Famous 1155 COMMUNICATION RECEIVER



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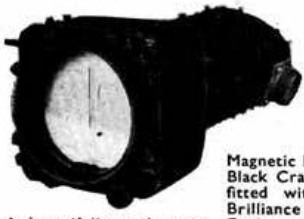
## 5FP7 CATHODE RAY TUBES



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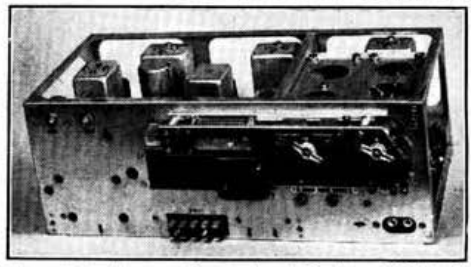

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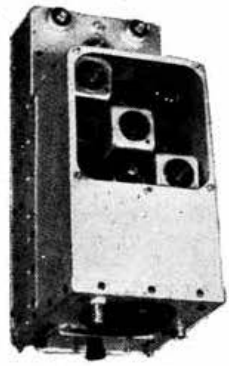

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# R.S.G.B. BULLETIN

OFFICIAL JOURNAL OF THE INCORPORATED RADIO SOCIETY OF GREAT BRITAIN

**Published on or about the 15th of each month. Issued free to members**

*Editor:* JOHN CLARRICOATS

*Editorial Office:* NEW RUSKIN HOUSE, LITTLE RUSSELL STREET, LONDON, W.C.1

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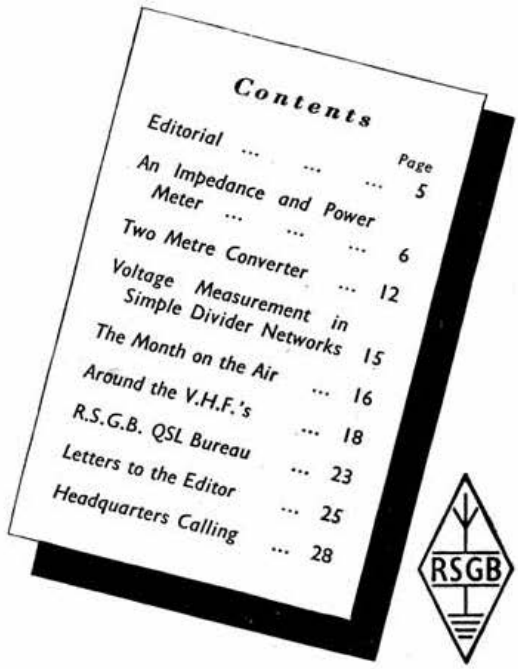
*Advertising Office:* PARRS ADVERTISING LTD., 121 KINGSWAY, LONDON, W.C.2

*Telephone:* Holborn 2494




# Forthcoming Events

### REGION 1

**Ashton-under-Lyne.**—August 7, 3 p.m., New Jerusalem Schools, Katherine Street.
**Bolton.**—August 2, 8 p.m., Y.M.C.A.
**Burnley.**—August 3, 7.30 p.m., Mechanics Institute, Manchester Road.
**Bury.**—August 11, 7.30 p.m., Atheneum, Market Street.
**Darwen and Blackburn.**—July 22, 7.30 p.m., Weaver's Institute, Darwen.
**Manchester.**—August 8, 7.30 p.m., Reynold's Hall, College of Technology, Sackville Street.
**Rochdale.**—August 7, 3 p.m., Drill Hall, Baron Street.
**Southport Radio Society.**—July 18, August 15, 8 p.m., 38A Forest Road, nr. St. Luke's Station.
**Wirral Radio Society.**—July 20, August 3, 7.30 p.m., Y.M.C.A., Birkenhead.

### REGION 2

**Barnsley.**—July 22, 7.30 p.m., King George Hotel, Peel Street. (No August meetings).
**Bradford.**—July 26, 7.30 p.m., Cambridge House, 66 Little Horton Lane.
**Catterick.**—Tuesdays, 7 p.m., Loos Lines, Catterick Camp.
**Darlington.**—Thursdays, 7.30 p.m., Club Room, British School Yard, Skinnergate.
**Doncaster.**—Wednesdays, 7.30 p.m., 73 Hexthorpe Road.
**Harrogate.**—Wednesdays, 7.30 p.m., rear of 31 Park Parade.
**Huddersfield.**—August 3, 7.30 p.m., Plough Hotel, Westgate.
**Hull.**—July 27, 7.30 p.m., Ye Olde White Harte, Silver Street.
**Newcastle-on-Tyne.**—August 22, 8 p.m., British Legion Rooms, 1 Jesmond Road.
**Pontefract.**—Thursdays, 7.30 p.m., Travellers' Rest, Purston.
**Sheffield.**—July 27, 8 p.m., Dog and Partridge, Trippet Lane. August 10, 8 p.m., Albreda Works, Lydgate Lane.
**South Shields.**—Thursdays, 7.30 p.m., Trinity House, Laygate.
**Spenborough.**—August 3, 17, 7.30 p.m., Temperance Hall, Cleckheaton.
**York.**—Wednesdays, 8 p.m., 29 Victor Street.

### REGION 3

**South Birmingham.**—August 7, 21, 10.30 a.m., Stirchley Institute.

### REGION 5

**Chelmsford.**—August 2, 7.30 p.m., 184 Moulsham Street.
**Southend.**—July 20, 7.45 p.m., G2BHA, 27 Park Road.

### REGION 7

**Barnes and Putney.**—August 9, 7.30 p.m., 28 Nassau Road, S.W.13.
**Brentwood.**—July 22, August 5, Drill Hall, Ongar Road.
**Croydon (Surrey R.C.C.).**—August 9, 7.30 p.m., Blacksmiths Arms.
**Edgware (E. and D.R.S.).**—July 20, 27, August 3, 10, 17, St. Michael's School, Flower Lane, Mill Hill.
**Enfield.**—July 17, 3 p.m., George Spicer School, Southbury Road.
**Finsbury Park.**—July 19, 7.30 p.m., 164 Albion Road, N.16. Lecture on 144 Mc/s. equipment.
**Hampstead.**—July 22, 8 p.m., Broadhurst Hall, 1 Broadhurst Gardens, N.W.6 (behind John Barnes).
**Hayes.**—August 1, 7.30 p.m., The Vine, Uxbridge Road.
**Hoddesdon.**—July 21, 8 p.m., Salisbury Arms.
**Holloway (Grafton R.S.).**—7.30 p.m. Grafton School, Eburne Road, N.7 (Mondays, Wednesdays and Fridays).
**Kingston Radio Society.**—August 3, 7.45 p.m., Kingston Hotel. Lecture by Mr. C. A. Pratt of AVO.
**Peckham.**—August 1, 7.30 p.m., The Kentish Drover, Rye Lane.
**St. Albans.**—August 10, 8 p.m., The Beehive, London Road.
**Welwyn.**—August 2, 8 p.m., Council Offices.

### REGION 8

**Brighton.**—Every Tuesday, 7.30 p.m., Eagle Inn, Gloucester Road
**Southampton.**—August 6, 7.30 p.m., 22 Anglesea Road, Shirley

### REGION 9

**Exeter.**—August 5, 7 p.m., Y.M.C.A., 41 St. Davids Hill.
**Plymouth.**—July 16, 7 p.m., Tothill Community Centre, Tothill Park, Knighton Road, St. Judes.
**Torquay.**—July 16, 7.30 p.m., Y.M.C.A., Castle Road.

### REGION 11

**Rhyl.**—August 21, 2.45 p.m., Crown Hotel.

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Space for batteries is provided inside. Size 14½" × 11" × 8", fitted with handles, Khaki finish.

The receiver unit YA4915 with valves 3/XH1, 5 V. (HIVAC), 1/XP1, 5 V. (HIVAC), which are in series parallel for 3 V. fil. supply. H.T. 67·5 V. Space for batteries is provided inside the unit. Dimensions 7" × 6" × 2", finish Khaki, with pick-up Coil.

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Clydesdale's price only, **25/-** each. Post paid.

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R·S·G·B

# BULLETIN

For the advancement of Amateur Radio

VOLUME XXV No. 1 JULY 1949

## MASTS AND TOWERS

RIGHT from the earliest days of wireless, the keen experimenter was free to erect on his own plot of ground any form of mast, tower or pole for the support of his aerial system, provided the height of the structure was restricted if his station was located near to an airfield, and so long as it did not infringe local by-laws or the terms under which the land was held.

To-day, as a result of the Town and Country Planning Act which became law on July 1, 1948, the position is somewhat different. Under Section 12 of the Act, permission must now be obtained from a Local Authority in respect of any development of land. Broadly speaking, " development " means the carrying out of any building, engineering, mining or other operations in, on, over or under the land, and in the view of the Society's legal advisers, this could undoubtedly be construed to cover aerial masts and towers, particularly those of a complicated or lattice construction supporting beam arrays.

Some Local Authorities will no doubt determine that the proposed operation does not constitute or involve development of the land within the meaning of the Act. Other Authorities will, however, decide that the proposal constitutes development and requires permission. The safest and wisest course therefore, is to consult the local Town Planning Officer and follow his advice. This may lead to a request to submit an application for determination to the Local Authority.

The necessary forms should be completed as carefully and accurately as possible, and although the innumerable questions may appear frightening at first sight, it will be found on closer examination that many do not apply to the case in hand. Such plans or drawings as may be required for the information of the Town Planning Committee, when considering the matter, need not be produced by a qualified surveyor or draughtsman and should be well within the capabilities of anyone who feels technically competent to erect a mast or tower in his garden.

Apart altogether from the requirements of the Town and Country Planning Act it should be borne in mind that every Local Authority has a set of by-laws which cover, among other things, all forms of building within its own boundaries. The provisions of the by-laws are designed to ensure that all intended structures are soundly constructed and to protect the interests of the community at large. All those who contemplate erecting structures such as a lattice mast or tower would be well advised to seek guidance from their local building inspector, before submitting final plans.

If for any reason difficulties arise the member should consult his own legal adviser, as no universal ruling can be sought. Each case must be treated on its merits. It should be borne in mind however, that in the unlikely event of a Planning Authority refusing consent to develop under Section 12 of the Town and Country Planning Act, the applicant has the right of appeal to the appropriate Minister. In such a case the great national benefits and advantages of Amateur Radio should be stressed when pressing the appeal.

Whilst most people will lament the introduction of legislation that tends to restrict their right to do as they like in their own home and garden, it is recognised that some form of control over the erection of lattice masts and towers, particularly in built-up areas, is desirable. The point to remember is that once permission has been granted the applicant has little to fear from his neighbours. He will have the additional satisfaction of knowing that his plans have met with the approval of highly qualified engineers.

# AN IMPEDANCE AND POWER METER

# for the 144 Mc/s Band

by H. A. M. CLARK*
G6OT

## Introduction

CURRENT practice on the two metre amateur band is to use beam aerials and other complex arrays. Quite small changes in the dimensions of such systems tend to produce large changes in impedance which in turn may introduce appreciable standing waves on the feeder. When timber has been used in the construction of a beam aerial pronounced changes have been noticed in wet weather.

With the knowledge that such effects existed the author decided to examine the possibility of devising an instrument for measuring R.F. impedances, which could also, if required, be left permanently in a transmitter feeder to show whether or not it is matched. The arrangement finally chosen, in addition to performing these functions, is also able to indicate the R.F. power delivered to the feeder, whether matched or not.

An impedance matching device known as a "Micromatch" was described by Corfield and Cragg in the May, 1948 issue of the R.S.G.B. BULLETIN, but this will not function satisfactorily above 60 Mc/s., chiefly because it measures impedance in terms of a standard resistor which is difficult to construct accurately, and without reactance, at very high frequencies.

A resistance which *can* be reproduced fairly accurately is the characteristic impedance of a transmission line with air dielectric, since this depends only upon the diameters of the inner and outer conductors, and is independent of frequency.

If the impedance to be measured is used as the termination for a section of transmission line of known characteristic impedance, the value of the unknown impedance can be determined from the standing waves of voltage or current in the standard line. To detect the standing wave, either the current in the line or the voltage across it must be measured along its length. At V.H.F. it is easier to measure voltage accurately than current. In radio laboratories it is common to explore the voltage distribution along a line by means of a travelling "probe" to which some form of voltmeter is connected. Such a device requires accurate mechanical construction which can only be achieved with the aid of machine tools, but the value of the impedance being measured can be readily calculated from the results.

Another method and the one which forms the subject of this article, is to measure the voltage at three fixed points along the line at distances of one-eighth and one-quarter of a wavelength from the impedance to be measured. From these voltages both the impedance at the end of the line and the power into it can be calculated. The disadvantage of this method, which has been described by E. C. Cork in Brit. Pat. No. 584250, is that the calculations are somewhat tedious to carry out, but all calculations can be avoided by the use of the charts given later in this article.

* *H. A. M. Clark, B.Sc. (Eng.), A.M.I.E.E. (G6OT), 119 Wynchgate, Southgate, London, N.14.*

## Principles of the Method

In Fig. 1A is shown a transmission line connecting a load $Z_3$ (consisting of a resistance $R_3$ and reactance $X_3$ in series) to a source of alternating voltage. The voltages at one-quarter wave and one-eighth wave from the load, and across the load are indicated by $V_1$, $V_2$ and $V_3$, respectively. If these voltages are measured then it is possible to calculate $Z_3$ and the power delivered to it.

The equations are given in the Appendix but all the user requires are the *results*, and these have been plotted in the charts which follow. To simplify the reading of the charts the ratio $V_1/V_3$ is called $a$, and the ratio of $V_2/V_3$ is called $b$. Knowing these two numbers, the values of $R_3$ and $X_3$ in terms of $R_0$ (the characteristic impedance of the line) can be read directly from the chart (Fig. 2) which covers the range of values commonly encountered.

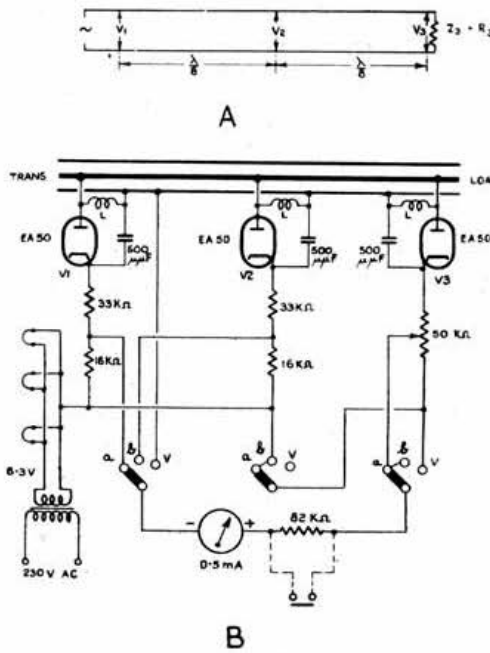



Fig. 1.

A. Simplified circuit. B. Actual circuit. All fixed resistors should be of the high stability type (*Welwyn* ½ watt or *Erie* Type 100). The potentiometer must be wire wound and as near to 50,000 ohms as possible. The dotted connections show the suggested addition of a push-button to short-circuit the series resistance for final balancing adjustment.

## The Measurement of R.F. Impedance

As a simple example suppose $V_1 = 12$ volts, $V_2 = 11$ volts and $V_3 = 10$ volts. Then

$$a = \frac{V_1}{V_3} = \frac{12}{10} = 1{\cdot}2$$

$$b = \frac{V_2}{V_3} = \frac{11}{10} = 1{\cdot}1$$

The intersection of the lines of $a = 1{\cdot}2$ and $b = 1{\cdot}1$ on the chart occurs on the line $\frac{X_3}{R_0} = 0$, and between

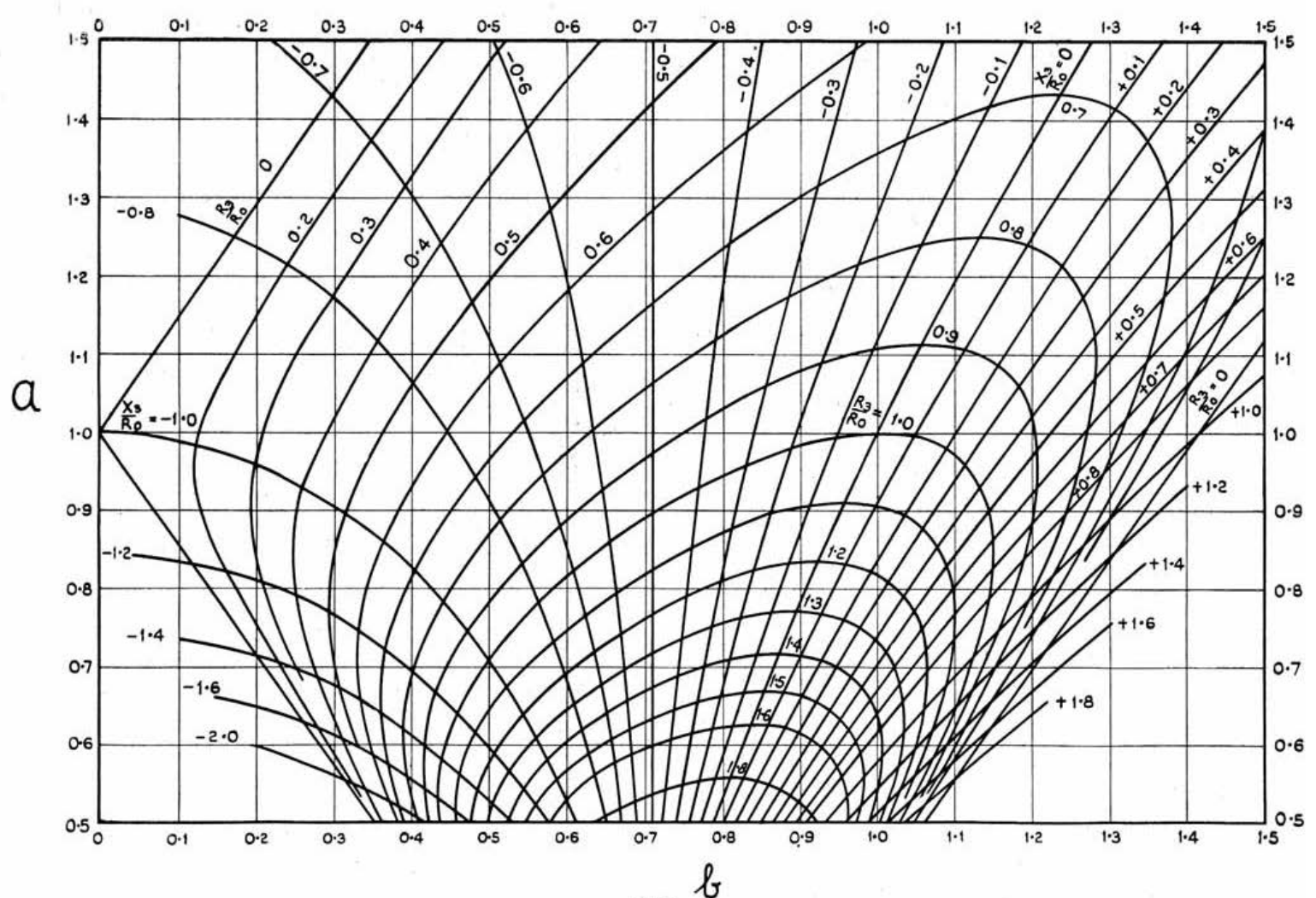



Fig. 2.

Chart to determine impedance of load, in terms of $a = \frac{V_1}{V_3}$ and $b = \frac{V_2}{V_3}$ Knowing $a$ and $b$, the values of $\frac{R_3}{R_0}$ and $\frac{X_3}{R_0}$ are found from the chart. These values, multiplied by $R_0$, (70 ohms for the instrument described) give the resistance and reactance $X_3$ of the load.

the lines of $\frac{R_3}{R_0} = 0{\cdot}8$ and $\frac{R_3}{R_0} = 0{\cdot}9$. By rough interpolation, $\frac{R_3}{R_0} = 0{\cdot}83$.

Now it is assumed that the value of $R_0$ can be accurately calculated. In the actual instrument to be described $R_0 = 70$ ohms.

$$\therefore X_3 = 70 \times 0 = 0$$
$$R_3 = 70 \times {\cdot}83 = 58{\cdot}1 \text{ ohms.}$$

Thus $Z_3$ clearly consists of a pure resistance of 58·1 ohms.

If $V_2$ had been equal to 8 volts

$$b = \frac{V_2}{V_3} = \frac{8}{10} = 0{\cdot}8.$$

Entering the chart at $a = 1{\cdot}2$, $b = 0{\cdot}8$ the result is $\frac{X_3}{R_0} = -0{\cdot}4$; $\frac{R_3}{R_0} = 0{\cdot}73$

$$\therefore X_3 = -0{\cdot}4 \times 70$$
$$= -28 \text{ ohms.}$$
$$R_3 = 0{\cdot}73 \times 70$$
$$= 51{\cdot}1 \text{ ohms.}$$

Thus in this case the load consists of a resistance of 51·1 ohms in series with a negative reactance of 28 ohms.

If $Z_3$ were the end of a co-axial line feeding an aerial it would be an easy matter to find whether or not it is correctly matched. If it *is* matched, $R_3$ will be equal to the characteristic impedance of the cable and $X_3$ should equal zero.

## The Measurement of Power

To measure the power delivered to the load the chart given in Fig. 3 is used. This chart enables a quantity $K$ to be found for various values of $a$ and $b$.

In the first example, when $a = 1{\cdot}2$ and $b = 1{\cdot}1$, $K = 0{\cdot}0172$ by interpolation between the lines, $K = 0{\cdot}016$ and $K = 0{\cdot}018$. Then the power is given by the simple equation

$$P = K \times V_3^2 \text{ watts.}$$
Thus $P = 0{\cdot}0172 \times 10^2$
$$= 1{\cdot}7 \text{ watts.}$$

In the second example, $a = 1{\cdot}2$, $b = 0{\cdot}8$, $K = 0{\cdot}015$

$$\therefore P = 0{\cdot}015 \times 10^2$$
$$= 1{\cdot}5 \text{ watts.}$$

## Circuit Description

The circuit used to perform these measurements is shown in Fig. 1B. At the top is shown a co-axial line, to the right of which is connected the impedance to be measured, a transmitter or oscillator of correct frequency being connected to the left hand end. Three diodes V1, V2 and V3 (EA50 or VR92) have their anodes connected at intervals of one-eighth of a wavelength along the line, V3 being at the *extreme* end where the load is connected. This is important. An L.T. transformer supplies the three heaters in parallel and the cathodes are by-passed to the outer of the line by the shortest route possible.

The first version of the circuit used a milliameter which could be switched alternately in series with each diode load to measure the three voltages. However to overcome the necessity of calculating the ratios $a$ and $b$ the alternative scheme shown in the diagram was adopted.

## Method of Operation

When the ganged switch is in the position marked "V," the meter, which reads 0·5 mA. for full scale deflection, is connected to the cathode of V3 in series with a 50,000 ohms potentiometer and an 82,000 ohms fixed resistance. With this value of load (132,000 ohms) full scale deflection of the meter is obtained with an R.M.S. voltage of 50 volts on the anode. The actual value of $V_3$ is thus read directly on the meter scale by multiplying the current reading by 100.

When the switch is in position "$a$" the meter is connected, in series with the 82,000 ohms resistor, between the slider on the potentiometer and the junction of two resistors of 33,000 ohms and 16,000 ohms, respectively, which form the load of diode V1.

When the voltage on the anode of V1 is equal to that on V2 (*i.e.* $a = 1$) the meter will read zero when the slider is one-third the way up the potentiometer. When the voltage on V1 is three times that on V3 the meter will read zero when the slider is at the cathode end of the potentiometer. When there is no voltage on V1 the meter will read zero when the slider is at the earthed end of the potentiometer. By suitably calibrating a scale on the potentiometer, and adjusting it until the meter reads zero, the ratio $a$ can be read on the scale for any value from 0 to 3. The value of $b$ can similarly be read when the switch is in position "$b$".

For accurate results the diode voltmeters should put no appreciable load on the line. The effective damping of each diode is equal to one-half of its load, *i.e.* 25,000 ohms which is sufficiently high compared with the line impedance, or any practical load on it, to cause no appreciable error. The capacitance of the diode anode in its holder, however, is about 2 $\mu\mu$F which has a reactance of only 550 ohms at 145 Mc/s. and this can produce a noticeable error. Fortunately this capacitance can be tuned-out by means of a small inductance L connected from the anode of each diode to the outer conductor of the line. The value of these inductances (approximately 0·6 $\mu$H) can be adjusted in the manner to be described later.

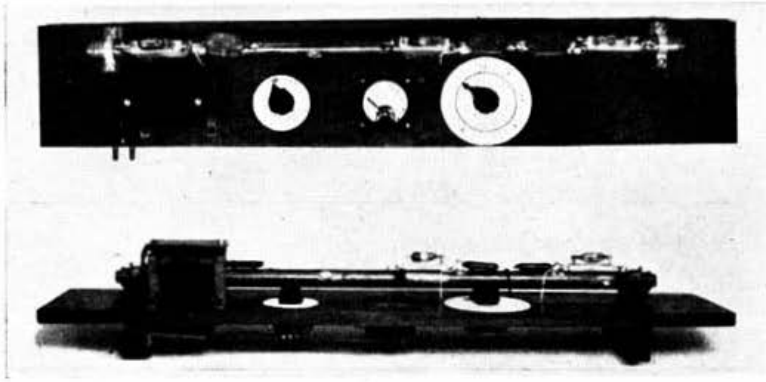


Fig. 4.
General view of instrument.

## Practical Construction

The lay-out and general arrangement of parts will be apparent from Fig. 4. This shows the quarter wave co-axial line mounted on a wooden base which

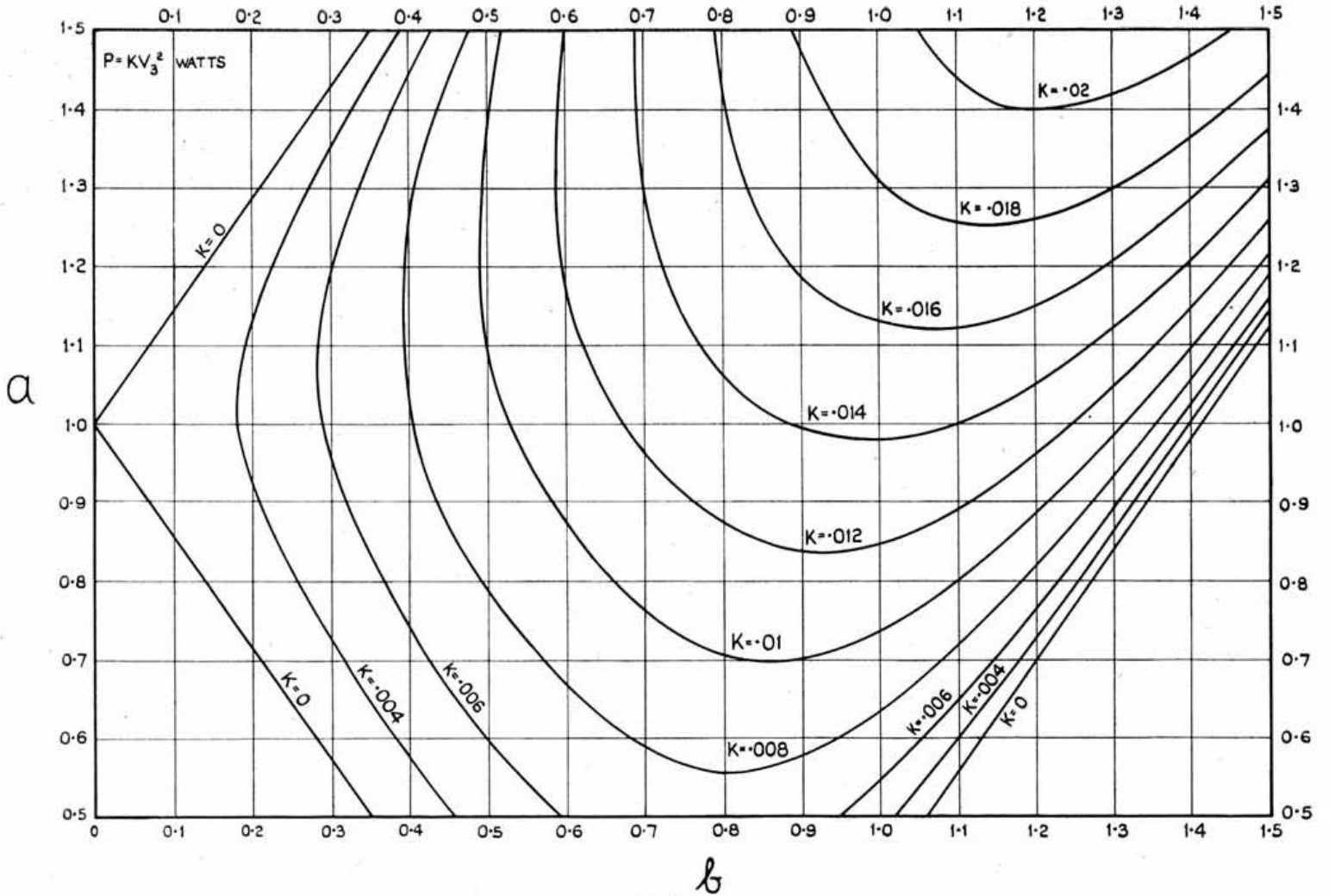



Fig. 3.
Chart to determine power in load. Knowing $a$ and $b$ the value of $K$ is found from the chart. Then $P = K \times V_3^2$ watts.

has two battens screwed underneath it to raise it from the bench and to allow room for the components mounted underneath. Fig. 5 gives some details of the construction. The brass tube forming the outer conductor of the line rests on two small wooden blocks and is secured by means of a saddle clip on each block. In the centre of the base is a flush-mounting 0·5 mA. meter, to the right of which can be seen the potentiometer. A paper scale, calibrated in the manner described later, is stuck to the baseboard. On the left of the meter is a wafer type 3-pole, 3-way switch with a paper scale indicating the three positions *a*, *b*, and V, reading from left to right.

At the extreme left-hand end of the baseboard is a 6·3 volt heater transformer. The one used by the author was supplied by *Webb's Radio* and is the type specified for use with a Type D wavemeter adapted for mains operation. A two pin 5 amp. plug is screwed to the baseboard and wired to the transformer primary terminals. The fixed resistors and all the wiring are beneath the baseboard.

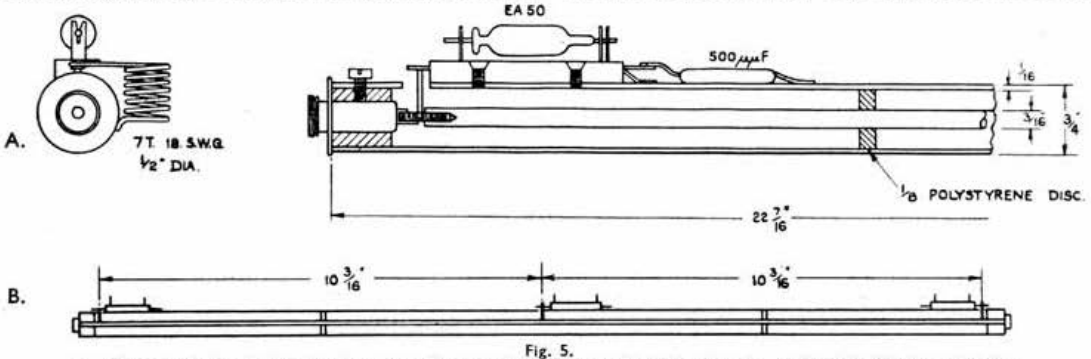



Fig. 5.
A. Detail showing assembly of cable connector and diode at one end of co-axial line. B. Position of diodes along line.

## Construction of Co-Axial Line

The only part of the construction which calls for a detailed description is the co-axial line itself. It is necessary that this is made to certain exact dimensions upon which the accuracy of the whole device depends. The line is formed of a $\frac{3}{16}$" diameter brass rod, supported by the minimum amount of insulation, inside a brass tube of $\frac{3}{4}$" outside diameter and $\frac{1}{16}$" wall thickness. The inside diameter is therefore $\frac{5}{8}$". The ratio of this inside diameter to the diameter of the centre rod is

$$\frac{\cdot 625}{\cdot 1875} = 3 \cdot 33$$

which would fix the characteristic impedance at 72 ohms if the whole dielectric were air. Two discs of Trolitul (or polystyrene) each $\frac{1}{8}$" thick are pushed on to the centre rod and serve to support it at the positions shown in Fig. 5B. It is calculated that the presence of these discs reduces the effective impedance very slightly to just about 70 ohms. The length of the line is made exactly equal to one quarter wave at 145 Mc/s. but the error introduced for any frequency between 144 and 146 Mc/s. is negligibly small. Thus the length of the centre rod must be exactly $20\frac{3}{8}$". In order to make convenient connection on to the oscillator or transmitter at one end and the load or aerial feeder at the other, each end of the centre rod is supported by a co-axial connector. The exact type is not very important, but that used by the author is the Cannon connector type JS.1.PF, for which plugs suitable for two common sizes of co-axial cable are available. These plugs and sockets are supplied by *Films and Equipment Ltd.*, of 138 Wardour Street, W.1. It is desirable that if any other type of connector is used it should be short and of low capacity. The capacity of the Cannon connector is sufficient to produce errors up to several per cent. and there is room for some improvement here. Since the external diameter of the Cannon socket is only $\frac{7}{16}$" it became necessary to fit the ends of the outer brass tube with a brass plug drilled with a $\frac{3}{16}$" hole into which the connector fits. A 4BA set screw in a tapped hole in the plug serves to secure the connector. This is illustrated in Fig. 5A.

The problem of securing the inner rod to the connector without adding appreciably to the length, and at the same time allowing the diodes to be connected at the very ends of the quarter wave rod, was solved as indicated in this same drawing. The end of the rod was drilled and tapped to take a $\frac{1}{2}$" 6BA screw, from which the head has been sawn. This screw is first soldered into the end of the socket, which is then inserted into the hole in the plug. The rod has already been pushed into the tube with its Trolitul discs in position. By rotating the socket the 6BA screw is entered into the threaded hole in the end of the rod. The socket at the other end is then similarly fitted. The overall length of the outer tube is made equal to $22\frac{7}{16}$", which enables the sockets to screw home snugly, with their flanges butting against the ends of the tube. The set screw at each end is then screwed home to clamp the socket in position.

A $\frac{1}{4}$" hole is drilled through the wall of the outer tube exactly at its centre and two others at $10\frac{3}{16}$" from the centre. A small hole (say Morse drill No. 53) is drilled through the rod exactly at its centre and also through the 6BA screws just at the point where they emerge from the end of the rod. This requires some care, and is best done before the parts are assembled together. Three short lengths of brass wire are filed to a gentle taper at one end and one is gently tapped into each of the three holes so that they extend through the holes in the wall of the outer tube, and thus serve as connections to the rod for the three diodes.

Each diode is mounted in a valve holder, preferably of the moulded polythene type, which is screwed to the brass tube so that the anode tag bears against the brass wire peg to which it is soldered. The valve holder tag should be cut as short as conveniently possible. The by-pass condensers are soldered between the cathode tag and the brass tube.

The inductances used to tune out the valve capacitance are made of 7 turns of 18 S.W.G., $\frac{1}{2}$" internal diameter and $\frac{1}{2}$" long. One end is soldered on to the anode tag of the valve holder and the other to the brass tube. Fig. 5A should make the whole construction clear.

## Adjustment and Calibration

It is important that all resistors should be of the high stability type (either *Welwyn* or *Erie* Type 100) to ± 1 per cent. tolerance. The voltage reading obtained in position V of the switch should then be accurate. It can, however, be checked at 50 c/s. against an A.C. voltmeter reading up to 50 V. For

this check the coils should be disconnected from the diodes and any convenient A.C. supply between about 25 and 50 V. connected between the inner and outer conductors of the co-axial line. In order to make the diode act as a peak voltmeter at 50 c/s., as it does at R.F., it will be necessary to connect a 4 μF condenser temporarily across the 500 μμF by-pass condenser. Under these conditions the reading of the 0·5 mA. meter multiplied by 100 should be the same as the applied voltage, as checked on the A.C. voltmeter. If there is any appreciable difference the value of the 82,000 ohms resistor can be altered slightly to make the meter read correctly. This will not upset the other functions of the circuit.

## Calibration of Potentiometer

The potentiometer should then be fitted with a knob and pointer, and a disc of white card or thick paper mounted underneath to form a scale. Having secured the knob and pointer firmly to the shaft, two marks should be made on the scale, at the extremities of the pointer. This will enable the scale to be replaced in its correct position again, should either the potentiometer or the scale itself need to be moved after calibration.

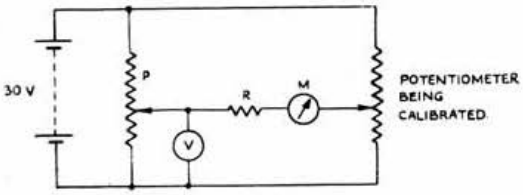



Fig. 6.

Circuit for calibrating the potentiometer. For values see text.

There are several ways in which the scale can be calibrated. Probably the best is to use two calibrated resistance boxes to form a bridge circuit, but these are not generally available to amateurs. Another satisfactory way involves only a D.C. voltmeter reading up to 30 volts and another potentiometer of any value between about 5,000 and 50,000 ohms. These should be rigged up by the side of the impedance meter so that the potentiometer being calibrated can be connected conveniently into the circuit shown in Fig. 6. M is the 0·5 mA. meter and R any resistor of about 20,000 ohms. V is the voltmeter. First connect the voltmeter across the calibrated potentiometer and adjust the battery tap until it reads exactly 30 volts. (A variable resistance, in series with the battery, may assist in this connection.) Now transfer the voltmeter to the position shown in Fig. 6. Adjust the potentiometer P to bring the voltmeter to a reading of 29 volts. Next adjust the calibrated potentiometer until the milliammeter reads exactly zero, and mark the scale 2·9. Now reduce P till V reads 28 and mark the scale 2·8. Proceed right down to zero in this way. It will be helpful to mark the main divisions of 3·0, 2·0 and 1·0 in larger figures than the remainder. Care should be taken to ensure that the end of the potentiometer shown at the top in Fig. 6 (and which should be calibrated as 3·0) is the end which becomes connected to the cathode of V3. The potentiometer can now be wired back into the circuit of the impedance meter.

A useful check on the circuit may now be made if desired. Connect one end of the line to a 3·5 Mc/s. or 1·7 Mc/s. transmitter and adjust the output coupling until a reading of half scale or more is obtained on the meter with the switch in position *V*. Now switch first to *a* and then to *b*, balancing the meter to zero by means of the potentiometer in each case. The balance position should be 1·0 in each case, since at these low frequencies there will be no appreciable change in voltage along 20″ of line. It is assumed of course that the small coils have been left disconnected, as for the first test.

## Trimming the Inductance Coils

The only work remaining to be done is to trim the coils L, which until this point have been left disconnected from the diodes. To do this a length of co-axial cable is used to connect the V3 end of the line to the output circuit of a 145 Mc/s. transmitter. With the far end of the line left open circuit, the coupling to the transmitter is increased until the meter reads nearly full scale with the switch in position *V*. The coil is now connected to the anode tag of the valve holder of V1 but the tag is unsoldered from the peg on the inner rod of the line. With a thin piece of insulating material, such as a piece of Trolitul or polythene, the anode tag is pressed on to the peg. A small change in meter reading may be seen. Squeeze up the turns of the coil slightly and try again, noting the change in reading. If the change is less, squeeze the turns closer still, but if the change is greater, or if it is in the opposite direction, pull out the turns a little. It should be possible to find an adjustment of the coil such that there is no appreciable change in meter reading whether the diode and its associated coil are connected to the line or not. When this point has been found solder the anode tag on to the peg leaving the coil also connected.

The coil of V2 can similarly be adjusted by observing the change on the meter when V2 and its coil are tapped on and off the line.

To adjust the coil of V3, connect the transmitter to the opposite end of the line, *i.e.* the end marked "Trans" in Fig. 1B; temporarily transfer the lead from the potentiometer to the cathode of V3 to the cathode of V1, and tap V3 and its coil on and off as before. Finally restore the cathode circuits of V1 and V3 and the instrument is ready for use.

## Some Modifications and Improvements

If any reader should feel that the calibration process is lengthy and complicated—and indeed it is not—he can avoid it by using the much simpler circuit referred to earlier, in which a single pole, 3-way switch is used to connect the meter in series with a resistance of 132,000 ohms to each cathode in turn. $V_1$, $V_2$ and $V_3$ can then be read separately and directly. But he will be left with the labour of calculating

$$a = \frac{V_1}{V_3} \text{ and } b = \frac{V_2}{V_3}$$

for every measurement he makes. The author has found the balancing arrangement described above, in which the quantities *a* and *b* are read directly from the scale, much quicker in use and quite foolproof.

One possible improvement, which is shown dotted in Fig. 1B, would be to use a push button to short-circuit the 82,000 ohms resistance at will. When a balance has been roughly achieved, the push-button could be operated and a much more sensitive meter condition obtained for the final balance. A switch must not be used for this purpose for if it were left closed, and the three-position switch were placed into position V, the meter might be seriously overloaded.

The device as described is only suitable for use with co-axial circuits, but there is no reason why it should not be used to measure balanced systems provided they are connected to it by means of a suitable "balun" (balanced to unbalanced) transformer. It is hoped to describe such a device at a later date.

The values of *a* and *b*, for which the charts of Figs. 2 and 3 are plotted, cover the range likely to be encountered for co-axial circuits. The results for values outside this range can be calculated from the equation given in the Appendix. It should be noted, however, that the method becomes less accurate as $Z_3$ departs from $R_0$.

(*Continued on page* 19)

# A TWO METRE CONVERTER

## Adapting the R3118 Responsor R.F. Unit

*By J. St. C. T. RUDDOCK, B.A., (G8TS)*

OF the two links, receiving and transmitting, the former must invariably prove the weaker to the enthusiastic amateur embarking for the first time upon operations in the two metre band. With such valves as the 815, 832, and VT501 (TT11) available, the generation of useful R.F. output power in this band should present no difficulties providing due care is taken. An additional factor assisting those who construct 2 metre transmitting equipment is that there are several easily available methods of indicating when maximum R.F. is being obtained from the valve in use. The indicator may be a simple neon glowlamp, an R.F. meter or, if an aerial is in use, a field strength meter.

On the receiving side, the constructor is not so favourably placed, because, unless he has access to laboratory test instruments, he must of necessity depend upon transmissions from other stations to serve as an indication when his equipment is giving optimum performance. One way of partially overcoming this obstacle is to use a piece of ex-Government equipment, the design, performance and condition of which are each known to be up to standard. Unfortunately the chances of obtaining such a piece of gear are remote. However, in his search the writer came across an I.F.F. Mark III Responsor A.M. Type R3118, a set which was designed originally to cover the band 157–187 Mc/s. By slightly modifying the two existing R.F. stages and by replacing the mixer and oscillator valves in the R.F. unit a satisfactory two metre converter has been evolved.

There is a second and smaller version of this set which has been the subject of many advertisements

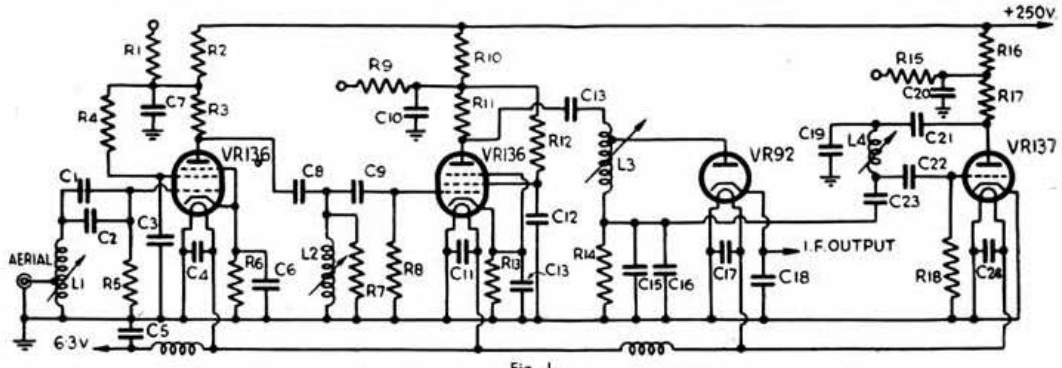



Fig. 1.
Circuit diagram of the R.F. unit as removed from the R3118. Component values:

| | | | | | |
|---|---|---|---|---|---|
| C1, 2, 19, 23 | 3 $\mu\mu$F. | C9 | 2 $\mu\mu$F. | R3, 11 | 6,800 ohms. |
| C8, 14, 18 | 5 $\mu\mu$F. | C15 | 25 $\mu\mu$F. | R4, 12, 14, 18 | 22,000 ohms. |
| C3, 4, 6, 7, 10, 11, 12, 13, 17, 20, 21, 24 | 50 $\mu\mu$F. | C16 | 15 $\mu\mu$F. | R5, 8 | ·1 megohm. |
| | | C22 | 10 $\mu\mu$F. | R6, 13 | 180 ohms. |
| C5 | 100 $\mu\mu$F. | R1, 7, 9, 15 | 4,700 ohms. | R16 | 2,200 ohms. |
| | | R2, 10 | 470 ohms. | R17 | 68,000 ohms. |

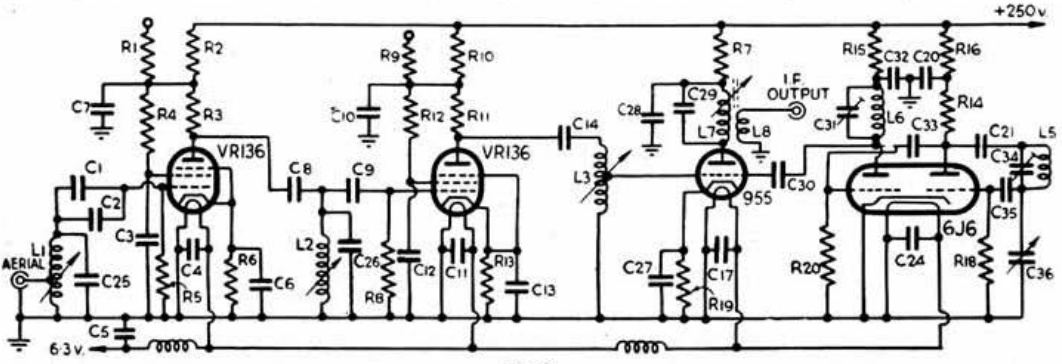



Fig. 2.
Circuit diagram after modification for use in the 144–146 band. V3 and V4 have been replaced by a 955 and a 6J6, respectively. Components additional to those given in Fig. 1 are:–

| | | | |
|---|---|---|---|
| C25 | 1 $\mu\mu$F. | R19 | 3,300 ohms. |
| C26 | 2 $\mu\mu$F. | R20 | ·1 megohm. |
| C27, 29, 32 33, 35 | 50 $\mu\mu$F. | L5 | 6 turns No. 20 S.W.G. enam. on $\frac{3}{8}$ in. diam. ribbed ceramic former. |
| C28 | ·002 $\mu\mu$F. | L6 | 3 turns No. 18 S.W.G. enam. $\frac{3}{8}$ in. diam. 1 in. length. |
| C30 | 1·5 $\mu\mu$F. | L7 | 24 turns No. 36 D.S.C. on $\frac{1}{4}$ in. former with dust iron core. |
| C31 | 3/30 $\mu\mu$F *Philips* air dielectric trimmer. | L8 | 4 turns No. 36 D.S.C. wound over L7. |
| C34 | 25 $\mu\mu$F variable pre-set *Polar* trimmer. | | |
| C36 | 1–5 $\mu\mu$F (one fixed and one moving vane—*Raymart*). | | |

in radio periodicals. In this the R.F. unit is practically identical to that of the R3118 except that there is only one R.F. stage. Readers who already possess this set will be able to carry out the conversion to be described.

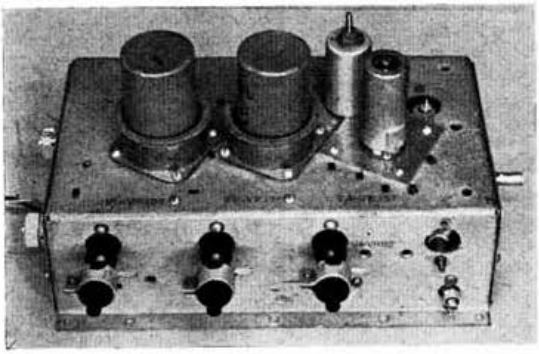


Fig. 3.
Top view of modified converter showing from left to right on top, 1st R.F. valve, 2nd R.F. valve, I.F. output transformer (behind) and 6J6 oscillator valve. On front are slug tuners of R.F. and mixer stages and also pre-set condensers C34. The shaft of the oscillator bandspread condenser C36 can be seen on the right.

## General Details

It is an advantage that the R.F. unit should be easily detachable from the main chassis leaving a 4 Mc/s. bandwidth I.F. chain of five valves and a 300 volt and 6·3 volt L.T. power supply for use on 180–250 volt A.C. mains. Incidentally this strip can be used as the basis of a vision receiver, in fact it is ideally suited for that purpose.

Fig. 1 shows the circuit of the R.F. unit as removed from the main chassis. Four separate slug-tuned inductances are the main tuning controls. Three are retained, and are pre-set, whilst the fourth, the oscillator, is removed. Type EF54 (VR136) valves are used in the R.F. stages. These give a good signal-to-noise ratio and help to maintain stability. The latter point was particularly noticeable when aligning the converter.

Fig. 2 shows the modified circuit diagram in which the diode frequency changer (VR92) and the local oscillator (VR137) have been removed and replaced, the former by a triode (955) and the latter by a 6J6. In order to improve stability one half of the 6J6 is arranged to operate as a Colpitts oscillator from 33·75 to 34·25 Mc/s. and the other half to quadruple into the range 135 to 137 Mc/s. Frequencies in the latter range combine with the radio frequencies to produce an I.F. of 9 Mc/s. which is taken from the I.F. transformer in the plate of the mixer to the communications receiver input. A lower value of I.F. could be used but it is liable to lead to swamping of the R.F. stages by the local oscillator.

## Conversion

The photographs Figs. 3 and 4 illustrate the conversion. The H.T. monitoring wires, which originally connected the tag strip and the resistors (R1 and R9) in the plate circuits of the R.F. and oscillator valves, have been cut away. The power supply leads, comprising H.T.+, Earth and 6·3V., are taken out *via* a grommet. Two concentric *Pye*-type plugs have been added at the opposite end for the aerial and I.F. cables.

The 6J6 is mounted on a $1\frac{3}{4}$" square aluminium or dural plate covering the space left by the VR 137 oscillator valve, whilst the 955 acorn is mounted on pillars in the position previously occupied by the diode.

To ensure good mechanical rigidity, the oscillator coil, L5 (Fig. 2) is wound on a $\frac{5}{8}$ in. o.d. ceramic former. The band spread condenser, C36, is mounted on an aluminium end plate, $\frac{1}{8}$ in. thick which replaces the one employed in the original unit. This addition was made after the photographs were taken.

The 135–137 Mc/s. inductance L6 consists of 3 turns of No. 18 S.W.G. enamelled wire 3/8 in. internal diameter and 1 in. long. The concentric trimmer (C31) associated with this stage is mounted on the inside of the box with a hole in the top of the chassis (seen in Fig. 3) to permit adjustment. The bandset condenser (C34) is positioned on the same side as the slug tuners. Although most of the new wiring affects only the mixer and oscillator stages, extreme care must be exercised in the placing of the small components in order to permit the use of short and direct wiring. Condensers of 1 μμF. and 2 μμF. capacity, respectively, are connected across L1 and L2. The 4700 ohms resistor (R7) originally connected across L2 is removed to decrease the bandwidth of this stage.

## Alignment

To ascertain whether the first half of the 6J6 is oscillating the current through R14 and R16 should be measured. With 250 volts H.T. applied to the anode the current should be aproximately 7 mA.; if the valve is oscillating satisfactorily the current should rise to 9 mA. when the junction of R18 and C35 is touched.

If a receiver covering the 33–36 Mc/s. band is not available an adjustment of C34 should allow the oscillator to be located in the 28–30 Mc/s. band, at the same time permitting a check to be made upon the stability of oscillation. When this has been satisfactorily completed the moving vanes of C34 can be moved further out of mesh for the higher frequency.

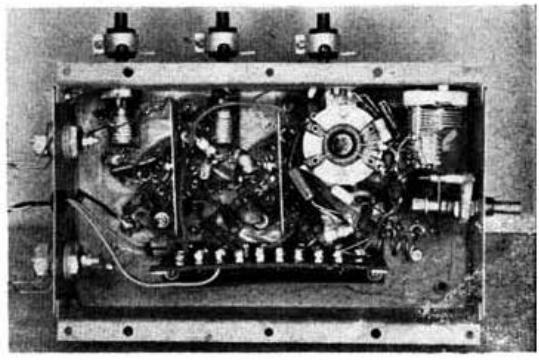


Fig. 4.
Underside view of converted unit showing on right the 955 valve and holder, oscillator coil L5, the bandset condenser C34 and C36 the modified bandspread condenser. L6 and C31 are visible between end of tag strip and C36.

For the tuning of L6 and C31 a grid-dip meter is most useful, but if such an instrument is not on hand this part of the circuit can be adjusted to give maximum injection voltage as determined by an increase of noise, the coil slugs having previously been set to peak the noise from the R.F. and mixer stages. Originally, the setting of the slug tuners in the centre of the 145–146 Mc/s. band was adequate to allow coverage without further readjustment, but when the band was extended to 144–146 Mc/s., it was found desirable to alter the setting of the second and third slugs when tuning this portion of the spectrum.

A cover plate has been added to the underside of

the unit and the whole subsequently mounted on a platform with panel attachment. The use of a good slow-motion drive and dial for the oscillator band-spread condenser is essential to the completion of this converter.

### Performance

Alignment tests and comparisons with other converters have been made using two different types of signal generator. Results have shown that 30 per cent. modulated signals can be detected at a level 95 db below the ·1 volt output of each instrument.

Improvements would probably result from the addition of extra smoothing and stabilising of the two oscillator voltages and from the addition or substitution of an earthed grid triode, such as the 6J4 or CV66 in the first R.F. stage. Readers who effect these modifications may like to pass on to the Editor the results of their experiments.

## *Safety First!*

EVEN a few hundred volts can cause unpleasant physiological effects if carelessly handled. The voltages developed at many modern amateur stations are capable of causing serious injury or death. Reasonable precautions should always be taken.

**Orderliness in layout is the keynote of safety.**

All apparatus and wiring should be placed so that it is impossible to touch points of high D.C. or R.F. potential under normal operating conditions.

The aerial should never be directly connected to the anode coil of the output stage (see note in Licence). Never attempt to change transmitter coils with the power ON.

Use double-pole iron clad switches to ensure complete isolation of all mains transformers. These switches should be clearly marked with ON–OFF positions.

Connect a pilot lamp across the primary of H.T. transformers—preferably of the neon type to reduce the possibility of a burnt out bulb. This lamp should be clearly visible to the operator at all times.

Morse keys connected in H.T. circuits should be of the enclosed insulated type; otherwise employ keying relays. Microphone stands should be earthed.

Insulated extension spindles fitted to transmitter tuning condensers will eliminate danger from exposed grub screws.

High wattage bleeder resistances across power-pack filter condensers will prevent shocks from fully charged condensers.

At least one other person in the house should always know how to operate the main switch in case of emergency.

If it is necessary to touch the transmitter while the power is ON keep one hand behind the back or in a pocket. Never wear earphones while working on the transmitter.

Make sure that all metal work is effectively earthed. Do not rely on gas piping or radiator systems.

**Take your time—develop a safety technique.**

## TECHNICAL ARTICLES WANTED

# DOWN TO EARTH

SOME months ago an article appeared in *QST* under the title "Underground Antennas—Are they fact or fiction?" Rumours, it seemed, were abroad in the United States that wonderful DX results could be achieved by digging up your garden and burying the "sky-wire" beneath four feet of solid earth. Well, we read the article through most carefully but never did decide just whose leg was being pulled. Remembering *QST's* famous "circular band theorem" we reluctantly concluded that, after all, every nation has its own particular brand of humour.

But somehow the question kept coming back to mind, particularly in view of the editorial footnote which stated that in 1925 an American amateur was reported to have been heard in England while using 100 feet of No. 12 insulated wire encased in rubber garden hose buried one foot in the ground. Perhaps, we thought, that new 50 foot mast might be so much waste of money.

There the matter might have rested if one day we had not been idly turning over the pages of an old copy of the *T. & R. Bulletin*. Suddenly, at last, we found what we had long been seeking. On page 8 of the February, 1927 issue was an article "Underground Aerials" by Cyril Targett 6PG which not only gave full details of the construction of such a system but—more important still—gave actual results of the DX worked when the aerial was used with an 8 watt Hartley oscillator.

With redoubled admiration for the remarkable energy of our early pioneers, we read how 6PG had assailed his garden path in no uncertain manner until a trench 2 ft. 6 in. deep, 1 ft. wide and some 60 ft. long stretched before his eyes. In this miniature moat an aerial wire was suspended on a number of little posts, each having a small reel insulator on top through which the wire was threaded. Next a number of pan tiles were placed around the wire and the earth replaced. Incidentally, although it is stated in the article that these tiles were taken from the roof of a stable which had "recently collapsed," it is clear to the writer at least, that an amateur who was capable of digging such a trench was almost certainly capable of engineering the destruction of a neighbour's stable in order to obtain the material necessary to further his experiments. Finally the wire was brought to the surface through a length of rubber hose, sealed at the top with wax.

With this answer to a pirate's prayer, 6PG proceeded to hear all continents, to work a Swedish ship 400 miles south of Madeira and to decide that on 90 metres results were better than with a normal aerial while on 45 metres "range was, *of course*, again greatly increased" (the italics are our own).

So what about it? Who will be the first amateur in 1949 to put his foot to the spade to prove once and for all whether underground aerials are fact or fiction? And, after all, you could always use the trench for a nice row of early potatoes!

J.P.H.

### The Young Idea

A keen group of youngsters are being introduced to Amateur Radio through the medium of G2UX/A operating from the Modern Secondary School at Wymondham, Norfolk. It is thought that there may be other schools, training colleges etc. who would like to arrange fixed schedules during the afternoons (Mondays to Fridays) on either 3·5 or 7 Mc/s.—C.W. or 'phone. Members interested in this scheme are invited to write to Mr. G. Edwards, The Bungalow, Chapel Street, Barford, near Norwich.

# VOLTAGE MEASUREMENT IN SIMPLE DIVIDER NETWORKS

By G. A. BRYAN,* Assoc. Brit. I.R.E. (G8BN)

IT may be necessary to check the voltage drops occurring in a potential divider network but unless a valve or electrostatic voltmeter is available certain practical difficulties arise. With the method to be described, however, the measurement may be successfully carried out using a moving-coil voltmeter of the ordinary "testmeter" type.

Consider the simple divider network (Fig. 1) consisting of a source of E.M.F. of 100 volts connected to two resistors of 20,000 ohms and 80,000 ohms. From inspection it can be seen that the voltage developed across the 80,000 ohm resistor is 80 volts. If now a voltmeter of resistance 200 ohms per volt, with the scale set to read 0–100 volts, is connected across this resistor the indicated voltage will be 44·4 volts. This does not, apparently, bear any sort of relationship to the original 80 volts which existed before the voltmeter was connected in the circuit. Similarly, connection of the voltmeter (with the scale still set to read 0–100 volts) across the 20,000 ohm resistor gives an indicated voltage of only 11·1 volts where previously there existed a P.D. of 20 volts.

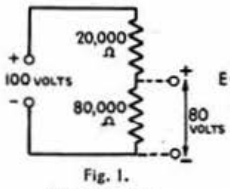



Fig. 1.
Simple Divider.

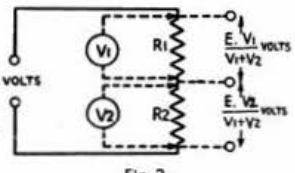



Fig. 2.
The General Case.
V1 and V2 are Voltmeter Readings.

Now the curious fact is this, that although the *actual* indicated voltages are of little practical use, the *ratio* of their readings is of considerable note since it is exactly the same as the *ratio* of the two resistors, *viz.* :

$$44{\cdot}4/11{\cdot}1 = 80{,}000/20{,}000 = 4/1$$

Therefore it becomes possible to calculate the true potential difference across the 80,000 ohm resistor from the two voltmeter readings, *e.g.* :

True P.D. =

$$\frac{\text{V.M. reading across 80,000 ohms} \times \text{supply voltage}}{\text{V.M. reading across 80,000 ohms} + \text{V.M. reading across 20,000 ohms}}$$

$$= \frac{44{\cdot}4 \times 100}{44{\cdot}4 + 11{\cdot}1} = 80 \text{ volts.}$$

In the general case (Fig. 2) consisting of a source of E.M.F. of E volts connected to two resistors $R_1$ and $R_2$ in series and the indicated voltages, obtained by connecting a voltmeter of constant resistance in turn across $R_1$ and $R_2$, are $V_1$ and $V_2$ respectively. Then true P.D. across $R_1$ is $E.V_1/(V_1+V_2)$ volts, and across $R_2$ is $E.V_2/(V_1+V_2)$ volts.

It will be found that any voltmeter will give identical results whether it has a resistance of 2,000 ohms or only 200 ohms per volt. There are, however, three points to which attention must be drawn if errors are to be avoided :—(1) the supply voltage must be known or be measureable and should not be affected by connection of the voltmeter; (2) the resistors must be linear, *i.e.* independent of the current flowing through them; (3) the voltmeter resistance must remain constant for both readings—the "range switch" of a multi-range meter, for example, must not be changed from one position to another in order to obtain a bigger deflection on the scale.

The method described can be extended to valve circuits and a fair estimation made of anode and screen potentials if the limitations imposed in (2) above are borne in mind, since valves are not normally linear elements.

A particular case of interest is the pentode valve operating on the straight portion of the $I_a/V_a$ characteristic. Increase of anode/cathode potential causes very little increase in anode current but it causes a large increase in the D.C. resistance of the valve. If the slight change in anode current with anode/cathode voltage is ignored and an ideal constant current characteristic is postulated for the pentode valve, then it will be found that exactly the same formula is valid for calculating the anode/cathode voltage in spite of the variation in the D.C. resistance of the valve. If connection of the voltmeter causes serious departure from the straight $I_a/V_a$ characteristic, the method fails.

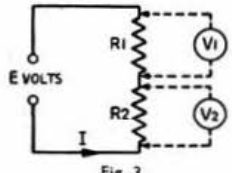



Fig. 3.
Where the voltmeter resistance is Rv in both cases.

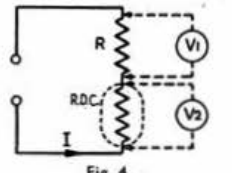



Fig. 4.
The pentode with resistive anode load.

## Appendix

(1) If the voltmeter resistance is Rv in both cases (Fig. 3) :

$$V_1 = \frac{E\,\dfrac{R_1 R_v}{R_1+R_v}}{\dfrac{R_1 R_v}{R_1+R_v}+R_2} = \frac{E R_1 R_v}{R_1 R_v + R_1 R_2 + R_2 R_v}$$

$$V_2 = \frac{E\,\dfrac{R_2 R_v}{R_2+R_v}}{\dfrac{R_2 R_v}{R_2+R_v}+R_1} = \frac{E R_2 R_v}{R_2 R_v + R_1 R_2 + R_1 R_v}$$

$$\text{Hence } \frac{V_1}{V_2} = \frac{E R_1 R_v}{E R_2 R_v} = \frac{R_1}{R_2}$$

(2) The pentode with resistive anode load. If the voltmeter resistance is Rv in both cases and $R_{DC}$ is the undisturbed D.C. resistance of a pentode (Fig. 4), then—

$$E = (R + R_{DC})\, I \ldots\ldots \text{(i)}$$

(*Continued on page* 20)

* *152 Littleover Lane, Derby.*


## Television

THANKS to those correspondents who took up the cudgels for and against our remarks in the May issue. We do not intend to labour the point very much but in fairness to the B.B.C. it should of course be made clear that their frequencies are allocated to them just like everyone else. We would like to think that the present channels for Alexandra Palace were chosen for excellent engineering reasons. We suspect however that 45 Mc/s. at the time was just " something out in the blue " and no one gave any more thought to its being in harmonic relationship with the amateur bands than was given by certain Television set manufacturers whose receivers have I.F.'s on image frequencies within these same amateur bands ! It is understood that the American TV stations have just relinquished Channel 1 which roughly corresponds with the A.P. frequency.

by ARTHUR MILNE* G2MI

## Pirates

We recently worked " G4TQ." He stoutly maintained over the air that he was licensed and even complained of a Birmingham G4TQ pirating his call ! The fact remains that G4TQ of Worthing who gave his correct name and address over the air was not licensed and never has been. The call sign G4TQ, we repeat, has not been issued. It is understood from " a reliable source " that G4TQ has now gone off the air !

## Notes and News

Arthur Dowdell VS7AD, will be home this month. ZD2RGY does QSL. Cards have been received at the Bureau and by many stations direct. Thanks to all who wrote to us on this point and also in regard to the YS position. BRS16304 has cards from YS1AC and YS2AG. G2AVC has one from YS1GM. All came direct.

G2YS says LX1TS asks for QSL *via* SM5YG. The latter admits that the LX is a friend of his. It comes to something when a pirate in a country where licences are issued gets his cards through a licensed station in another country !

'YS gives the " over the air " QTH of ZA1A as Tirana and offers TU2LO as an addition to our list of bad 'uns. BRS16304 has heard VP7NK and VP2LA on 14 Mc/s. 'phone around 06.00–07.00 G.M.T.

G8PL shows what can be achieved with an indoor aerial ; 106 countries confirmed and WAS. He asks for QSL from ZD1LQ and VQ5JTW. A chronic non-QSL'er is ZD2G.

GM8RV has worked FZ2NU who gave his QTH as " on a ship off Puffin Is." He said " QSL *via* R.S.G.B." Funny thing is that these people who try to build up a facade of authenticity never trouble to tell the R.S.G.B. QSL Bureau who they are ! G3DXQ worked VE3BER at 00.08 G.M.T. on June 11 and got 589 on 7 Mc/s. Input 15 watts to a half-wave end fed. The Canadian was using only 40 watts.

Bob Honey ex ST2CH is now home and is operating as G3FKE from Liverpool.

G3IY, one of the lucky owners of a card from YS2AG also says FF8FP QSL's ; QTH Pan American Airways Dakar. Anyone had one from FU8AA ?

G3AAE does not think G3ATV has much to worry about. He still needs another dozen cards for EDX and has not been very active recently.

VQ4ERR who reports working FN8QC on 14150 'phone, gives his QTH as Koilish, Saigon, French Indo China.

A card has been received by G2MI from VS6AJ stating that he has never been on 3·5 Mc/s. so that disposes of the last of the mid-winter " DX on 80 " !

Incidentally there are no ZL6's. The one recently heard on 3·5 Mc/s. is a 'phoney.

We still have a great accumulation of cards for ex ZC6 calls. Will everyone who used a ZC6 call or those knowing the whereabouts of such, please send envelopes to the R.S.G.B. QSL Bureau. Can anyone say which calls were used by American personnel ?

W1ADM wants to get into touch with Lt. Col. J. N. Atkinson who was active before the war with the call VU2FA. He has his W.A.C. and some cards for him. VS2CQ who is G2NR asks everyone to boycott the pirate who has misappropriated his G. call sign.

From G2PT we hear that OZ4G will soon be active as OX4G, and also that GC2BMU is the only amateur on Alderney. Incidentally he is believed to be the only amateur who also holds a commercial licence and operates a commercial station from the same QTH.

ZD2RGY in a letter accompanying his cards to the Bureau says he cannot cope with the flood of listener cards and please don't send any more.

Will AP2D, AP2H and VU2LR please send envelopes to the Bureau ?

VQ4KTF active on 14 Mc/s. is on the look out for old friends in G, especially G2QY and G6ZO. QTH Bill Rawlings, Box 71, Kitale, Kenya. He is in close touch with VQ4NJ exG6NJ. BRS18017 of Coventry gives the following QTH's :— AR8BC S. Chaeb, Rue Adbel, Kadar, Beirut. OX3BD and OX3BF A.P.O. 858, c/o Postmaster, N.Y.C.

ZC6DZ, ZC6GD and ZC6UNJ are all operated by United Nations personnel. BRS11494 gives the QTH of ZC1AR as Cable and Wireless, Amman, Transjordan, and says the present dearth of VK's is due to extensive power cuts in Australia—owing to lack of coal. His early morning vigils have produced VP7NK, HI6EC, VP2LA, CP5FA, HP1AL, and VK1ADS all on 14 Mc/s.

MP4BAC, now on his way home finally worked Wales—GW2FGJ and GW2UL obliging.

G5GK who has his new beam working, 10 over 20, celebrated its inauguration by working AC4RF.

G3BGX recently worked W3MBY who was on single-sideband-suppresed-carrier. He claims this as the first transatlantic amateur QSO using S.S.S.C.

*A. O. Milne, 29 Kechill Gardens, Hayes, Bromley, Kent.

Congrats. to GM3RL on being the first postwar GM. DXCC, and to GM6MD on being number two.

G3BFC is shortly going to Tripoli and hopes to join the MT brigade.

MP4BAD apologises for his bad note but asks our indulgence. He has extremely bad mains and no crystals. Hopes to improve the position shortly.

### North Africa

Here is a complete list (as of June 25) of stations licensed in this area. MD2B, MT2D, MT2E, MT2FU, MD2DH, MD2KP, MT2TT, MD2HN, MD2AC, MD2NA. QSL *via* R.S.G.B. We are very sorry to learn of the death of MC1A.

### National Field Day

From ZL4GA, *via* G8RL comes a list of portables heard. On 7 Mc/s. G2XA/P, G2DJS/P, G3CSR/P, G3EGE/P, G4KK/P, G5YY/P, and G8PB/P.

On 14 Mc/s. G2DJS/P, G2QI/P, G3CSR/P and G5BM/P. Best on 14 Mc/s. was G2QI 579 and on 7 Mc/s. G5YY 569. 'GA wonders why these stations did not provide themselves with receivers!

### High Speed WAC

G6WN recently made WAC on 14 Mc/s. between 19.50 and 22.12 G.M.T. Contacts were VE3IJ, HZ1HZ, CR6AW, CX4CZ, VK5KO and G6CJ. VK5KO was contacted on 3·5 Mc/s. between 21.00 and 21.40 G.M.T. on June 5, 6 and 7. Certainly a feat for midsummer.

**R.S.G.B. QSL Bureau**

*Please do not send any cards or envelopes to the QSL Bureau between July 30 and August 20 inclusive. Even a QSL Manager must take a holiday sometimes!*

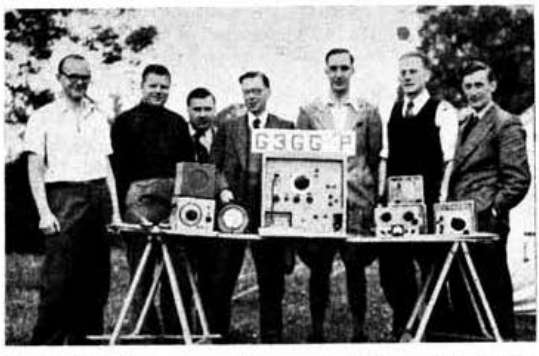
# High Scores in the Sunshine

NATIONAL FIELD DAY, 1949, will long remain a pleasant memory for the 200 or so teams who participated. For the first time in many years the weather was almost uniformly kind; only DL4KW/P in the Taunus Hills, 15 miles N.W. of Frankfurt, reporting practically continuous rain. But on the British stations the sun shone for more hours than even the most optimistic student of meteorology would have dared to forecast.

On the Saturday, the hardened cynics looked at the sun and muttered gloomily of static, but their fears were proved unfounded. Propagation conditions, although possibly unsuitable for a high rate of scoring on 14 Mc/s. were well up to average, as is shown by the KZ5, VE, VK, VO, VQ4, VS2, VS7, VU, W and ZL contacts to be found in the log-sheets which, at the time of writing, are arriving at Headquarters by every post. The Nottingham Group (G6CW/P) worked all continents with a 3-element rotary. On the low frequencies, B.E.R.S.447 in the Suez Canal Zone, heard 27 British portables on 7 Mc/s. and 35 on 3·5 Mc/s.! Remarkable results for 5-watt stations at this time of the year (See page 31 for full list.)

### Towards the 1000 mark

Scores must wait upon the deliberations of the Contests Committee who have the unenviable task of checking the logs, but it is already an open secret that the leading stations are likely to show yet another increase in total points over last year's record figures. Excellent scores have been claimed by Cambridge (G4MW/P, G8PB/P), Cheltenham (G5BK/P, G5BM/P), Coventry (G3FAB/P, G2FTK/P) and East Molesey, Surrey (G6GB/P, G6NB/P) while the average level of scoring shows a very marked increase over previous contests.




Home-built equipment was a feature of the Rugby L.F. Station G3GG/P. Pictured here are (left to right) G3AZT, G3BLB, BRS8711, G8RL, BRS5602, G3GG and G3BDK.

### Widespread Support

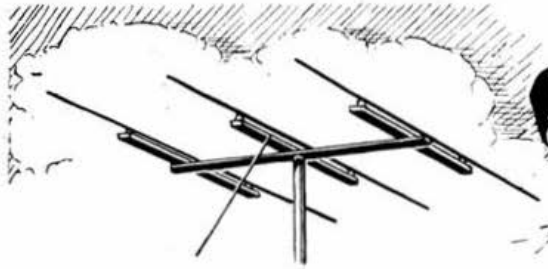
Unfortunately a few Groups were forced to withdraw at the last moment, in some cases due to lack of enthusiasm on the part of local members, but a number of privately operated portables were active. Overseas portables were more plentiful this year and their support was much appreciated. However, several groups do not appear to have realised that all HB1 stations were portable, and were taking part in their own N.F.D. organised by U.S.K.A.

The two low-powered portables on Malta operated under N.F.D. conditions. ZB1AU/P ran 3·2 watts to an 832 P.A. with a 3-element wide-spaced beam on 14 Mc/s. Both stations contacted a few G-portables on 7 Mc/s. At ZB1FK/P it was 80 degrees in the shade and the occasional pause in the middle of CQ calls must be attributed to the series of vicious attacks which were pressed home by a formation of stinging flies; ZB1AY claims to have been bitten almost continuously throughout the Sunday, but upheld the traditions of Malta G.C. by carrying on under fire. More friendly visitors—in the shape of two jackdaws—made themselves at home at G2AJS/P and had to be extracted on several occasions from the P.A. tank coil.

Stations varied enormously, from elaborate colonies of tents and "aerial farms" down to simple one-tent-and-a-tree installations. This wide difference suggests that, another year, it may perhaps prove possible to divide the entries into two or more classes along the lines of the B.E.R.U. Contest in order to encourage the smaller Groups.

Once again N.F.D. showed that to obtain a leading position, it is necessary to make careful and minute preparations. Dummy runs, cross-indexing, D.D.T. sprays, lady cooks, and log-keepers are now an accepted part of any N.F.D. programme. But for those who take the event less seriously, and who perhaps, in the long run, derive the fullest enjoyment from this most social of all amateur activities, June 10–11, 1949, provided 30 hours in the open-air with good company, good fun—and be blowed to the final number of points.

## TECHNICAL ARTICLES WANTED



# AROUND THE V.H.F.'s

## G2WS, G2FKZ and G3BEX set up new British 70 cm. (420 Mc/s.) records

G3BEX having announced his intention of working portable from Devils Dyke, Brighton, Sussex on June 19, G2WS decided to spend the day in Ashdown Forest 3 miles west of Crowborough, Sussex and 720 feet above sea level, whilst G2FKZ arranged to operate from One Tree Hill, Dulwich, in S.E. London. Zero hour was 11.00 B.S.T., and at 11.05 G2WS/P contacted G3BEX/P over what was practically a visual path of 18 miles. After some trouble with modulation at 3BEX, R5 S9 reports were exchanged and both stations turned their beams towards London. At 12.50 a CQ call on M.C.W. from 2WS brought a reply from G2FKZ/P, and a 28 mile contact was established with signals at surprising strength—well over S9 in both directions, in spite of the barrier of the North Downs rising to 800 feet midway between the stations.

*By*

**W. H. Allen,* G2UJ**

Less than an hour later the third, and longest, link was made, 2FKZ working 3BEX at R5 S7 both ways, the distance being 39 miles. This is the furthest recorded distance yet worked on 70 cm. outside the U.S.A. Slight fading was noticed during the contact.

Although several fixed stations were also active in the London area, the only other DX reported was by G3AHB/A who spent the day on the roof of the *E.M.I.* building at Hayes, Middlesex. He subsequently stated that at 17.00 B.S.T. G2WS/P was heard at R5, S5, the distance from Hayes to the Crowborough station being 39 miles.

### The Gear

G2FKZ employed a Type 105 Unit with a CV82, and had a CV90 co-axial line transmitter for comparative tests. Both took an input of 5 watts. The receiver was a modified R.1294 with a CV52 oscillator injecting into a crystal mixer, followed by an EF54 and three EF50 I.F. stages. G3FZL was responsible for the aerial which consisted of 12 half wave elements arranged in 4 bays of 3 elements backed by a wire curtain reflector and fed through a co-axial line balancer and ¼ wave transformer.

A pair of 8012's arranged as a push-pull oscillator, frequency modulated by a 6SN7, comprised the transmitter at G3BEX/P. The receiver was a modified R.1359 superhet. Two aerial arrays were in use; a 24-element (12 driven half-waves and 12 reflectors) on the transmitter, and 16-elements, arranged in a similar manner, feeding the receiver.

At G2WS/P two aerials were available; a dipole in a corner-frame reflector, and a 16-element stacked array, both fed *via* co-axial feeder. The 16-element job proved slightly more efficient. The transmitter was a push-pull oscillator with a pair of earthed-grid CV82 triodes taking 5 watts input, while a two valve

Portable apparatus used by G2WS during the 70 cm. tests from Kings Standing, 3 miles West of Crowborough, Sussex, when G3BEX/P and G2FKZ/P were contacted at distances of 18 and 28 miles respectively.

super regen. with an RL18 detector looked after the receiving side. G2WS, 3FCQ and 2UJ made up the team operating the Crowborough station.

These tests emphasise again the enormous advantage of working from locations clear of local obstacles, and suggest that the range of signals is almost unlimited provided quasi-optical paths are obtainable. It is hoped that further tests on these lines will be conducted during the summer.

### Other 70 cm. News

Tests are being carried out, so far unsuccessfully, between G3APY (Sutton in Ashfield), 3EDZ (Loughborough) and 3EMY, LN, 5JU and 8JI in Birmingham. Skeds. are run every Wednesday as follows:—

20.15—20.25 B.S.T. All Birmingham stations call.

20.30—20.40 B.S.T. 3APY and 3EDZ call Birmingham.

Contact is maintained throughout between 5JU and 3APY on 2 metres.

All the above have changed to horizontal polarisation to conform with the system recently adopted in the London area, and signals between the Birmingham stations appear, in most instances, to be louder than before. Yagi aerials are employed by nearly all operators, 3EMY having his backed by a corner reflector, while 3LN has a 24-element array in addition to a 5-element Yagi. 8JI will be pleased to co-operate almost any evening with anyone requiring test transmissions.

The greatest difficulty at present is the lack of activity at distances less than 40/50 miles, but as 5JU and 8JI are both in good V.H.F. locations nearly 600 ft. a.s.l., they at least stand a fair chance of "breaking out."

Apropos this, we learn from G2FKZ that he intends operating from a site near Wantage, Berks., for a week during August in an attempt to work both Birmingham and London.

**W. H. Allen, M.B.E., 32 Earls Road, Tunbridge Wells, Kent.*

Apart from 70 cm. activity, 8JI would be pleased to hear from anyone in his area interested in the 12 cm. band. He has an oscillator, with a "lighthouse" 2C40, a receiver, and a calibrated wavemeter, and acknowledges the assistance which he has received from G2AUS of Sanderstead.

## Two Metre Activity

As very few reports have come to hand regarding activity on this band, it will be necessary to draw to a large extent upon personal observations. Conditions have generally been good with, naturally, some days better than others. The erection of a somewhat hastily constructed four-element stacked array at 2UJ has resulted in greatly improved signal strength to the few stations that can be raised from this location, but has added no new stations except on the receiving side. Here the benefit has been most marked, and a number of stations which could not be heard before are now received regularly, although repeated calls evoke no replies. Among others these have included G2CPL (Lowestoft) S3/4, 2XS (Kings Lynn) S4 and G2XV (Cambridge) S3 'phone, all on June 22, and 2KG (Chelmsford) at strengths up to S8 on several occasions earlier in the month.

As an example of the consistency of signals over long distances on two metres, G2NH (New Malden) has worked 3EHY (Banwell, Som.) more than 70 times since Easter on a series of tests at 14.00 B.S.T. and again during the evening. Only one miss was attributable to poor conditions over a period of 40 days, with an average signal of S5 both ways. 2NH has also had better than 98 per cent. success for 6 weeks on a daily sked with 2CPL.

GW2ADZ, late of Oswestry, and now operating from Llanymynech, Montgomeryshire, is again active and apparently getting out well despite what looked like an unfavourable situation. No direct news has been received from him, but it is understood that he has worked G5BM (Cheltenham) and 3BLP (Selsdon).

G2CPL is looking for new stations, and is on at 18.30 G.M.T. daily, commencing with his sked with 2NH. He sends in an impressive list of contacts, and remarks that the two Birmingham stations, G6SN and 8QY came in on June 6 like locals. He was heard by BRS14077 at Eastbourne at RST559.

From BRS16554 at Ballywalter on the coast of County Down, some 23 miles S.E. of Belfast, comes news of what we think is the first reception of a G station on two metres in Northern Ireland. G3DA (Liverpool) and 5CP (Manchester) have been running skeds with this listening station for some time, and at 19.15 B.S.T. on May 29 G3DA was received at sufficiently good strength for his signal to be passed back by landline. The receiver consisted of a CV66 earthed-grid triode R.F. stage, EA50 mixer, EF50 triode-connected oscillator, and SP61 10 Mc/s. I.F. followed by an R.1155 receiver.

G5MR, late of Bognor, will be operating from Hythe, Kent, by the time these notes appear. His new situation is 175 ft. a.s.l., and clear of obstructions towards the south-west although there is higher ground in all other directions. He will be using a "Bi-square" beam, a crystal controlled receiver with two 6AK5's in the R.F. stages, and a transmitter with an 832A P.A. on a frequency of 145·37Mc/s.

## New British Isles Record

G3BLP worked GM3OL (Dumfries) on June 20 (569 both ways) and again on the evening of the 26th when considerable fading was in evidence 'BLP sends a fine string of G–DX including S9 'phone exchanged with G2IQ (Sheffield) and a contact with G3TN (Portland Bill, Dorset). The latter station caused quite a stir when he appeared on the band on the evening of June 25.

## R.S.G.B. Scientific Observations

With the object of providing further data concerning tropospheric propagation on 145 Mc/s., a series of tests has been arranged to run for a period of approximately 6 months so that a ready check on signal variations with local weather can be obtained. Set out below is a list of transmissions—normally of 5 minutes duration and consisting of test or CQ calls—which are already taking place daily, but offers of co-operation would be appreciated from a few more stations, particularly in the Midlands and the North who are prepared to carry out similar schedules. Observations by stations situated in the transmission paths, if carried out regularly, would also be welcome. Reports and offers of assistance should be sent to Mr. D. W. Heightman G6DH, 234 Burrs Road, Clacton-on-Sea, Essex.

For the convenience of most participants tests are limited to the hours 18.00–19.00 and 21.00–22.00 G.M.T. (Beam directions are indicated after the times):—

*G2NH* (*New Malden*), *G2CPL* (*Lowestoft*), 18.30 NE/SW*.

*G3CGQ* (*Luton*), 18.00 NNW; 18.15 E; 18.35 WSW.

*G3YH* (*Bristol*), 18.00; 18.15 NE; 18.30 E.

*G5BD* (*Mablethorpe*), *G5WP* (*Woking*), 21.30 SSW/NNE*.

*G6DH* (*Clacton*), 21.15 SW; 21.30 NW.

*F8OL* (*Meudon*), 19.30 NNW.

*ON4FG* (*Barnhem*), 18.40 WNW (Dutch stations also call G at this time).

* Two-way schedule previously established.

## Last Look Round

DL2MW, writing from Hanover, says that two F.M. broadcasting stations are at present operating in north Germany. Hanover is on 88·9 Mc/s. and Hamburg 89·6 Mc/s., both with a power of 100 watts, and both normally relay the evening programme between 17.00 and 23.00 B.S.T.

We are indebted to G3VA for the following information regarding Swedish V.H.F. activity as published in the June issue of *QTC*, the official journal of S.S.A. Swedish 2 metre record, SM5MN and SM5YS 205 km. on May 23. 70 cm. record, SM5SD, 5 GQ, 5IQ and 5 ABC. 12 km on May 12. The following list of frequencies might be of interest if really exceptional conditions appear this year:—144·0 Mc/s. OH2OK. 144·16 Mc/s. OH2NY, 2TT, SM5AY, FA, MN, SI, YS, ZO. 144·24 Mc/s. SM5VL. 144·72 Mc/s. SM5AFM, RT, SD. 144·85 Mc/s. SM5VL (portable). 145·32 Mc/s. SM5AXT, FJ. 145·7 Mc/s. SM5AI.

Please send any reports of V.H.F. interest for publication in the August issue by July 23.

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## Impedance and Power Meter—*continued from page* 11.

### Appendix

For values outside the range of the charts of Fig. 2, the values of resistance and reactance can be calculated from the following equations:

$$\frac{R_3}{R_0} = \frac{1}{a}\sqrt{\left\{1 - \left(\frac{a^2 + 1 - 2b^2}{2a}\right)^2\right\}}$$

$$\frac{X_3}{R_0} = \frac{1}{2}\left(\frac{2b^2 - 1}{a^2} - 1\right)$$

It should be noted that if $a$ and $b$ are plotted in terms of $\frac{R_3}{R_0}$ and $\frac{X_3}{R_0}$ as co-ordinates the resulting curves are semi-circles which are easier to plot than the curves of Figs. 2 and 3. It is thought, however, that the latter lend themselves more readily to interpolation by persons unskilled in the use of mathematical charts.

## Amateur Radio Exhibition

THE Council takes pleasure in announcing that the Baron Sandhurst, O.B.E., has consented to open the Third Amateur Radio Exhibition at the Royal Hotel, Woburn Place, London, W.C.1, on Wednesday, November 23, at 2 p.m.

## Bevan Swift Memorial Fund

AS the result of an appeal for donations made at the Old Timers' Dinner the sum of £123 12s. 0d. was raised; this amount together with the sum of £8 17s. 0d. previously donated brought the total up to £132 9s. 0d. It is hoped that the final figure will reach £150.

Members who wish to contribute to the Fund are requested to forward donations to the Society by not later than August 31 next. It is the intention of the Council at its meeting in September to decide the form the Memorial shall take.

## Regional Representation

THE following recommendations, adopted at the Regional Representatives' Conference held recently in Birmingham, have now been accepted by the Council:

1. In future the Council shall put forward the name of a Corporate Member for election in any Region, as a Regional Representative, and the Corporate membership shall then have the power to make similar nominations for election.
2. In future, every nomination submitted on behalf of a Regional, County, Town or Area representative, shall be supported by five Corporate Members resident in the Region, County, Town or Area concerned.

During the coming autumn Corporate Members throughout the United Kingdom will be invited to nominate Regional, County, Town and Area Representatives to serve for a period of two years from January, 1950.

## American Amateur Licence Conditions

THE *Federal Communications Commission* have recently announced a number of proposed changes in the conditions governing the issue of American amateur transmitting licences. The effect of these changes will be to increase considerably the number of different classes of licences in the United States, making it easier for a beginner to obtain a licence but restricting the granting of full privileges to those who have passed an advanced technical examination and a 20 w.p.m. Morse test.

The new classes of licence, if the proposals are adopted, will include:

*Amateur Extra Class* giving full rights, including telephony operation on 3·5 and 14 Mc/s. Qualifications will include an advanced technical examination and a 20 w.p.m. Morse test.

*General Class* giving basically similar privileges to the present Class B and C licences. Qualifications, including a 13 w.p.m. Morse test, will also be similar.

*Technician Class* for operation above 220 Mc/s. The Morse test will be 5 w.p.m.

*Novice Class* permitting crystal-controlled transmission in limited sections of the 3·5, 14 and 28 Mc/s. bands (telegraphy only) and 145 Mc/s. band (telegraphy and telephony), with a maximum power of 75 watts. The Morse test will be 5 w.p.m.

## Electrical Pioneers Featured on new French Postage Stamps

LAST month—on June 13 to be precise—the French Postal authorities issued a special set of five stamps to commemorate the International Telecommunications Conference now being held in Paris. France has always been ready to pay philatelic homage to her scientists as all members who are stamp collectors know, but the present issue has a rather special interest to the Society because one of the stamps—the 50 franc value—portrays General Ferrié. Old timers will recall the famous meeting held in January 1914 when a wireless message of greeting was sent by Ferrié to the then President (Mr. A. A. Campbell Swinton) *via* the Eiffel Tower station in Paris. Special arrangements were made for its reception in the lecture theatre of the Institution of Electrical Engineers, London. As loud-speakers were then unknown, an organ pipe was set up in one corner of the room and operated by a valve relay attached to a syphon recorder. In order to ensure effective reception the Admiralty were requested to refrain from transmitting during the time the message was expected! This they promised to do but alas! the organ had scarcely commenced its task of delivering the message before the high-pitched note of the Admiralty transmitter broke in! In spite of the interruption the audience were able to follow the message completely.

Ferrié, who was a Vice-President of the Society until his death in 1932, conceived the idea of using the Eiffel Tower as an aerial mast. Working under cramped conditions he pursued his experiments almost night and day. One of his greatest successes came in August 1914 when he re-transmitted the official war communiques from his station at the top of the Tower.

Other stamps in the series commemorate Claude Chappe (inventor of the semaphore telegraph system), André-Marie Ampére (inventor of the telegraphic alphabet and pioneer in electro-magnetic experiments) and Emile Baudot whose system of telegraphy (invented in 1877) is still in use. The fifth value is an air stamp depicting the Grand Palais, Paris.

The face value of the set is 200 francs, which at the present rate of exchange is about 4/–.

Has any member formed a collection of stamps depicting the story of radio communication? There should be ample material available for such a collection.

## The Lay Press and N.F.D.

● *Bristol.* "Two ariels (*sic*) had been set up and two transmitter tents pitched."

* * *

● *Exeter.* "None of the transmitters exceeded five kilowatts." (*We hope not!*)

* * *

● *Sunderland.* "There was an *anxious moment* when one of the members dropped the receiver while carrying it up the quarry." (*Department of understatement?*)

* * *

● *Ilford.* "GIRLS' NON-STOP COOKING FOR RADIO AMATEURS. Working 30 hours with hardly a break, including throughout Saturday night by the light of small torches, and for two days under the blazing sun, five girls cooked for 30 hungry amateur radio enthusiasts. One girl explained, 'There was a beautiful moon, which helped us a lot.'"

## Voltage Measurement in Simple Divider Networks—*continued from page 15*

$$V_1 = I\,\frac{R\,R_v}{R+Rv} \ldots\ \text{(ii)} \qquad E = \left(I+\frac{V_2}{R_v}\right)R + V_2 \ldots\ \text{(iii)}$$

Solving equations (ii) and (iii) for $R_v$ and equating gives:

$$\frac{V_2\,R}{E-(V_2+I\,R)} = \frac{V_1\,R}{I\,R-V_1}$$

Insertion of equation (i) to eliminate $I$ and rearrangement yields $V_1 R_{DC} = V_2 R$

whence $$\frac{V_1}{V_2} = \frac{R}{R_{DC}}$$

### Ground Wave Signal Variations

IN an article appearing in the April, 1949, issue of the *Proceedings of the I.R.E.*, F. R. Gracely describes the results of investigations carried out into variations of ground-wave signal intensities of medium wave broadcasting stations. Over comparatively short paths, the signal intensity varied by a ratio of up to 2·7 to 1 while over longer distances variations as high as 20 to 1 were recorded. After plotting these variations against the more commonly observed meteorological factors such as temperature precipitation, humidity, atmospheric pressure and dew point, it was found that the variations appeared to be more closely related to changes in temperature than to any other single meteorological factor. It was noted that the intensities tended to decrease markedly from their peak values when the temperature became high; that the amount of such decrease was approximately proportional to the path length in wavelengths; and that the temperature at which the peak value occurred varied with the frequency. The measurements were carried out in the United States and it would be interesting to discover how far these results would be applicable to the 1·7 Mc/s. band in this country. A check of regular transmissions during daylight might make it possible to determine the optimum temperature for this frequency.

### Microwave Propagation

DURING the period from 1943 to 1946, the Signals Research and Development Establishment carried out a long series of experiments in an attempt to determine the meteorological factors controlling the propagation of microwaves over non-optical paths. To reduce the chances of enemy interception these experiments took place off the West Coast of the British Isles, mainly over Cardigan Bay and the Irish Sea. A number of transmitting and receiving stations were erected and observations made over paths of approximately 60 to 200 miles. With the varying heights of the aerials employed, these distances represented between 1·3 × optical range, and 3·7 × optical range. Wavelengths were 9 cm. and 3 cm. with transmitter outputs of ·3 watt and ·075 watt respectively. Tests were also made on 3·45 metres. Some of the results achieved are described in the March, 1949, issue of the *Proceedings of the I.R.E.*, and should encourage amateur work on the microwaves. They show that ranges considerably in excess of the optical limit are possible on these frequencies, particularly over water. In many cases the propagation appears to be due to the presence of low ducts extending some 20 to 40 feet above sea level.

### Specialists Conference on Radio Research

THE Report of the Proceedings at the British Commonwealth Specialist Conference on Radio Research, held in London during August, 1948 has recently been published by *His Majesty's Stationery Office*, price 4d. The Conference, attended by the executive heads of the Commonwealth research organisations, under the chairmanship of Dr. R. L. Smith-Rose, who is an honorary member of the R.S.G.B., agreed upon 29 recommendations to be brought before the Standing Committee of the British Commonwealth Scientific Official Conference which was first set up in 1946.

The recommendations call for a considerable extension of ionospheric recording stations and fundamental research on the ionosphere. Attention was particularly drawn towards the additional study of the D-layer; assessment of the accuracy of radio propagation forecasts; the effect of meteorological conditions on propagation in the troposphere, including cloud detection; the investigation of (*a*) atmospheric and (*b*) solar and cosmic radio noise; and the study of meteors by radio methods. The Conference also recommended that additional standard frequency transmissions should be made from the United Kingdom and, if possible, from Australia and South Africa.

### New B.B.C. Station at Norwich

TECHNICAL details of the new 5 kW. B.B.C. transmitter at Postwick Grange, near Norwich provide an interesting sidelight upon modern broadcast station technique. Two crystal oscillators, one for service and one for standby, include temperature controlled ovens and maintain an accuracy of one part in ten million—equivalent to a watch with an accuracy of 3 seconds over a period of a year. As a further check, a daily comparison is made with the B.B.C.'s standard of frequency which is constant to within two parts in a hundred million.

High-efficiency Class B modulation is used with heavy negative feedback in the audio stages. In order to allow the components to be conveniently placed, from a circuit standpoint, the final and penultimate R.F. stages incorporate remotely controlled motor-driven tuning. The modulator and P.A. stages are fed with 9,000 volts from six hot-cathode mercury-vapour rectifiers and the entire station consumes approximately 50 kilowatts.

The aerial system, which is directional, consists of two 125-foot tubular steel masts, spaced one quarter-wavelength (240 ft.) apart. The base of each mast is insulated and only the easterly mast is energised. The westerly mast acts as a parasitic reflector so that the range of the station is increased towards the east. The electrical lengths of the masts are increased slightly by means of parallel wires stretched between them, part of which act as capacity tops.

The station, which came into service on June 19, last, operates on a frequency of 1,013 kc/s. (296 metres).

# The R.S.G.B. QSL Bureau

NEARLY 25 years ago the Radio Society of Great Britain established a QSL Bureau for the benefit of its members. The purpose of the Bureau then—as now—was to facilitate the exchange of QSL cards between the operators of Amateur Radio stations who quickly realised that the sending of all cards to one centre resulted in a considerable saving of time and money. Until the Bureau came into existence amateurs were compelled to send each card separately. They were also faced with the problem of obtaining the full postal address of each station to whom they wished to send a card.

This article gives information on the R.S.G.B. QSL Bureau and the few simple rules to be observed by all members who wish to make use of this service.

Soon after the R.S.G.B. QSL Bureau came into existence other Amateur Radio organisations recognised the value of providing QSL facilities for their members, with the result that it was not very long before they were also in a position to accept and despatch cards in bulk. The R.S.G.B. QSL Bureau remains however the largest, and probably the fastest-operating Bureau in the world and its services are available *free of charge to all members.*

So great has become the volume of cards dealt with at the Bureau that the G.P.O. makes a special collection three times a week. As a consequence of this arrangement it is seldom that a particular card remains on hand for more than a few days.

## How the Bureau Operates

For convenience, cards for distribution *via* the Bureau should be despatched to the QSL Manager in packets of 2 or 3 dozen although there is no limit to the number which may be sent at any one time.

When the cards arrive at the Bureau those destined for abroad are sorted into countries, tied into bundles and despatched in bulk to the appropriate overseas QSL Bureaux, most of which are operated by Member Societies of the International Amateur Radio Union.

Cards for despatch to stations within the United Kingdom are sorted into one of the following 18 groups :

| | | |
|---|---|---|
| G2AA–G2ZZ | G2AAA/G2CZZ | All GC calls |
| G3AA–G3ZZ | G2DAA–G2HZZ | All GD calls |
| G4AA–G4ZZ | G3AAA–G3AZZ | All GI calls |
| G5AA–G5ZZ | G3BAA–G3BZZ | All GM calls |
| G6AA–G6ZZ | G3CAA–G3DZZ | All GW calls |
| G8AA–G8ZZ | G3EAA–G3GZZ | BRS & A reports |

Each of these groups is in the charge of a sub-manager whose task it is to associate the cards which reach him with the envelopes which he holds in file.

When cards are sent for distribution it is common practice to include a supply of stamped self-addressed envelopes, for the return of incoming cards.

As the majority of the work involved in running the Bureau is contributed voluntarily, members should endeavour to lighten the load by noting—and observing—the few simple rules.

## When sending cards through the Bureau

(1) Print the call-sign of the person to whom the card is addressed clearly and in large letters so that it may be seen at a glance.

(2) Sort United Kingdom cards into the groups listed above, United States cards into call areas (*viz.* W1, W2, etc.), and all other cards into countries. The packets so sorted should not be tied separately or spaced with paper markers, etc.

(3) Pack all cards the same way up.

(4) Weigh all packets carefully before despatch in order to ensure that adequate postage is prepaid.

(5) Pack the cards securely in stout envelopes ; the use of flimsy envelopes may result in cards breaking loose in transit.

(6) Choose QSL cards which do not exceed normal postcard dimensions, *viz.* $5\frac{1}{2}'' \times 3\frac{1}{2}''$. Large cards invariably have to be folded while small cards are difficult to handle.

## To Collect Cards

(1) Maintain at the Bureau an adequate supply of stamped (2½d.) self-addressed envelopes approximately $8'' \times 5''$ in size and of strong material.

(2) Print your call sign, BRS, or A number in the TOP LEFT HAND CORNER of each envelope.

Envelopes are normally returned when 3 or more cards are waiting ; those who wish to collect cards at less frequent intervals should mark the envelope " Wait 6," etc.

## General Notes

(1) Licensed United Kingdom amateurs who are non-members of the R.S.G.B. may send to the QSL Manager stamped addressed envelopes for the collection of their cards, but they may not forward cards for distribution.

(2) Cards for amateurs who have neglected to send envelopes are retained for some months; then, if reminder notices are ignored they are destroyed. Amateurs who do not wish to collect cards should notify the Bureau accordingly.

(3) Amateurs resident abroad, whether or not members of the R.S.G.B., may send cards direct to the Bureau provided the cards are addressed to stations in the United Kingdom and that no QSL Bureau facilities for sending cards in bulk are available in their country.

(4) The facilities of the R.S.G.B. QSL Bureau are available both to transmitting and receiving members of the Society. Associate members who wish to use the Bureau should apply to *Headquarters* for an identity (A) number. Listeners are reminded, however, that their reports should contain sufficient information to be of genuine value to the transmitting amateurs concerned. Reception reports relating to short-wave broadcasting stations cannot be accepted.

All QSL cards, envelopes, or correspondence relating to the R.S.G.B. QSL Bureau should be sent to the QSL Manager :

**Mr. A. O. Milne, G2MI,**
**29 Kechill Gardens,**
**Hayes, Bromley,**
**Kent**

**not** to R.S.G.B. Headquarters.

The R.S.G.B. QSL Bureau is available as a FREE Service to all members. Help the Bureau by observing these Rules. Retain this article for future reference.


## In a Big Way

DEAR SIR,—Mr. J. N. Walker's letter in the June BULLETIN makes very fine reading indeed and certainly is a most ambitious project. If however the Society has an " ample reserve of funds lying dormant," is that a good and sufficient reason for spending it, and for increasing the subscription ?

The question of acquiring a large house with several acres of ground, adequately furnished for the Secretarial, technical and general staff is a tallish order. It raises problems of structural alteration, maintenance, upkeep, provision of staff, who will live in it, and who would decide this ? The providing of accommodation for small parties doesn't rest at that, staff and catering problems arise, the booking of visits, probably months ahead, also comes into it, together with the problem of who shall be accommodated and who shall be refused.

Further, is it proposed to " uproot " the Headquarters staff from their homes and tear them from their families, and to compensate them by subsidising their income and giving travel facilities ? Or is it the intention to present them with unfurnished houses or accommodation just like that ? It would certainly set an example to the employers of many folk who have been so uprooted, who cannot find unfurnished accommodation to put their families into and who would be content with a small house and a smaller acreage.

It was only a short time back that the Council turned down a proposal for a Benevolent Scheme, which would have benefited many people in time of need, but surely this grandiose scheme is Benevolence in time of plenty. It is suggested that before supporting any idea of this nature members should consider very carefully all the pros and cons.

It is difficult to see the need for an increase in subscription if there is so much money in reserve, and further to see why because there is an ample reserve it should be spent on such a scheme. It would be less of a reproach and a greater benefit to the ham fraternity to have ploughed it back into the movement rather than use this reserve to incur further liabilities.

If you ask me to consider what I personally get for my subscription I'll tell you. I get the use of the QSL Bureau (provided I provide the stamps and envelopes) and the BULLETIN, which is sometimes interesting.

The " ham " spirit atmosphere doesn't depend on large houses ; it depends on the heart of the amateur himself. Not in high-sounding phrases or resounding addresses but in the simpler things we do for each other. We know ourselves where it does exist and there we go to find it, and most of our fellow amateurs are content with a sweet, but smallish, garden.

Yours faithfully,
R. R. THOMPSON (G8WI).

Woodbridge, Suffolk.

DEAR SIR,—In opposing one of the views expressed by G5JU in his letter, may I compliment him on a constructional approach to the problems facing the Society ?

His assertion that there is no good reason why H.Q. should be in London is, however, a glaring example of wrong thinking with regard to the paramount object of the Society in this post-war world. Recent events, including QRM on 7120 kc/s., should show all members that the H.Q. of the R.S.G.B. should be in the capital where the most efficient and dogged defence of our pursuits can be maintained. I should like to see a big brass plate with " R.S.G.B." thereon, right opposite the entrance to the Houses of Parliament.

I shall probably be accused of " Parochial Pride " but I am more concerned with the future of Amateur Radio than with the doubtful privilege of being a Londoner.

To-day, the biggest threat to the Society is from the complacency and " Parish Pump " politics of its members.

Let us not forget that a forceful, strong and united R.S.G.B. is our only assurance that we survive.

Yours faithfully,
CHARLES W. HENDERSON (BRS18223).

Chingford, London, E.4.

DEAR SIR,—I have long wondered what all this increased subscription talk is about and must thank G5JU for his entertaining explanation so aptly headed " In a Big Way."

He suggests our subscription be raised firstly because fifteen bob has no prestige value ; it simply means that any Tom, Dick or Harry can become an R.S.G.B. member, which is just too terrible !

Secondly, he would like a nice Country Club, in the Midlands where he lives, so that he and his fellows can put their feet up, ask friends to dinner, and possibly run GB1RS as a sideshow. This to be paid for by the " mugs " who don't live in the Midlands !

I have little doubt his letter was written with tongue very much in cheek ; if so he is a ham after my own heart.

Do the " Increased Subscription Movement " ever mention that, as the Society now has four times its pre-war membership, its income is that much greater. Also that administrative costs do not go up in proportion. I certainly have not heard them.

In my opinion, members as a whole would place the useful functions of the Society under main heads, in this order :—

(1) QSL Bureau.
(2) Guarding the interests of amateurs with the Authorities and assisting in international amateur organisation.
(3) Publication of a more ambitious BULL., when paper is available (advertising revenue will increase with a better BULL.).
(4) Specialised publications where called for. (Presumably profit-making.)

Other objectives would be well down the list and not such as to warrant an increased sub.

Ambitious headquarters can be of little interest to the majority no matter where situated.

Monitoring of the bands is a good idea but obviously could not be covered from one venue. My guess is that more honest benefit would accrue to the general membership by " dispersal " of activity than by any other single improvement. This method has been adopted by other Societies resulting in much increased provincial activity, membership and interest—to the general strengthening of the Society as a whole.

The Convention at Belle-Vue is a move in the right direction, but it must be held elsewhere another time.

I often wonder whether it is generally realised that almost every active amateur just has to become a member, for the QSL Bureau alone. It just is not fair to blackmail him by calling for an increased subscription which does not result in further tangible benefits which he can readily enjoy.

What we get now is worth fifteen bob, but no more.

Yours faithfully
B. L. STEPHENSON (G2ZF).

Bramhall, Cheshire.

DEAR SIR,—May I add my small quota of opinion in support of the excellent letter published in the BULLETIN over the call sign of G5JU.

It has been a constant surprise to me that the Society has not before now, put forward the suggestion to its members, that the annual subscription should be increased. The fact that our present subscription is still the same as pre-war whilst it is obvious to everyone that expenditure has gone up by leaps and bounds, is enough in my opinion to more than prove to the vast majority of the membership that no expansion of the Society's service to its members can be looked for until some increase in the annual subscription is made.

Mr. Walker has given a very clear outline of the advances we would all like to see come about in our lifetime and I for one am perfectly willing that the subscription should be increased so that these improvements can be fulfilled.

I realise, as do many others, an increase will probably bring with it a number of resignations. These resignations will however be mainly limited to members who have hitherto paid only lip-service to the Society and whose principles as far as Amateur Radio are concerned, are of the lightest possible character. I believe that at the moment, the Society contains too many of this type of member and if in increasing the rate of subscription, they are to some extent, weeded out, then it will have done great service to the Society. The membership is top-heavy with " card-holders " but the main bulk of the membership will I feel sure, respond favourably to any suggestion for what is in my opinion, an overdue necessity, that is, an increase in subscriptions that will eventually enable the Society to expand in the way it must do if it is to survive.

Yours faithfully,
L. PARKER (G5LP).

Wellingborough, Northants.

DEAR SIR,—I was very interested by Mr. Walker's letter on increased development of the Society. On the choice of an alternative site for the Headquarters, however, I would like to raise two points :

(1) London is still the centre of the railway system of this country.
(2) If the site outside Coventry is chosen my subscription will be reduced to 15/–, which is a much more important consideration.

Yours faithfully,
J. B. ROSCOE (G4QK).

South Croydon

DEAR SIR,—May a BRS man write in wholehearted support of G5JU on the question of the possibility of increasing the subscription. The Society is doing a great deal for all " hams," but a lot more could be done if the subscription were raised to (say) one guinea. What about it, gentlemen !

Yours faithfully,
P. J. WALKER (BRS16079).

Bristol, Glos.

# EX-GOVERNMENT STOCK DISPOSAL!

## ★ ELECTROLYTIC CONDENSER PARCEL

Contains one each following values. All Brand New.

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|---|---|
| 8 × 8 × 8 μF. | 400 V. working |
| 16 μF. | 450 V. working |
| 32 μF. | 350 V. working |
| 25 μF. | 25 V. working |
| 1,000 μF. | 15 V. working |

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These splendid Meters, although listed at £16 6s. each and Brand New from the manufacturers, are now offered to you at an astounding price representing a saving, for keen buyers, of nearly 50%, and this is without doubt the best bargain of its class in the United Kingdom.

Specification as follows:—
D.C. mV., 0-100. D.C. V., 0-1, 10, 100, 500, 1,000. D.C. Current, 0-5, 10, 50, 100, 500 mA. A.C. V., 0-10, 100, 500, 1,000. Wattage Output up to 4 watts. Resistance, ·2 ohms to 20 megohms in four ranges, without external batteries. Capacity, ·0001 to 1 μF., two ranges. A master rotary switch controls all ranges. The movement is sapphire jewelled, and anti-parallax is incorporated on the large scale. Attractively finished in black bakelite case with carrying handle. Size 8" × 6" × 3". Brand New in box.

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A total output purchase from a manufacturer enables us to offer you the following cut prices in BRAND NEW AND GUARANTEED Transformers. These are Not Government surplus.

Input A.C. Mains 50/60 cycles, tapped 210, 220, 230 V.
Both sub-chassis mounting and semi-shrouded.

Output : 250.0.250 V., 5 V. 2 A., 6·3 V. 3 A. ... ... ... ... ... 15/- each
Output : 350.0.350 V., 5 V. 2 A., 6·3 V. 4 A. ... ... ... ... ... 20/- each

**These Transformers are definitely the best value offered in the Home Trade**

## Compact Control Unit . . . Type 108

This excellent unit contains some very nice spares including two meters, one 5 mA. and the other 20 or 40 V., both moving coil 2½" flush mounting. In addition there are two switches, and two potentiometers, the whole encased in grey metal container with a three-pin 5 A. standard mains plug attached to each. The unit has a perforated metal back to cool the nichrome resistor incorporated internally. **WORTH 25/- OUR PRICE 10/- NEW**

## Sensational SPEAKER offer!

One 3½" P.M. } All brand new
One 5½" P.M. } and
One 8" P.M. } Famous Makers

**THREE FOR 32/6**

## ★ GRAND METER PARCEL

All Moving Coil Rejects. One each of the following:—·5A. R.F., 1A. R.F., 5 mA. and 200 mA. These are all with faults, e.g., loose glass, open circuit, or need internal cleaning. These could easily be passed into our workshops for speedy overhaul, and made good, but we offer you the job and so save yourself a pound note.

**PARCEL OF FOUR 10/6**

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These are definitely 75% off list. 200 parcels to offer only.
One each type. 6Y6, 6SL7, 6K7, 6G6, 6SH7, 71A, 6AG5, 6H6, 12A6, 12SG7, 12J5, 713A, 7193, 9006, 955, 6L5, 7V7, 3Q5.

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DEAR SIR,—I cannot too strongly support G5JU on all points. The Society can only hope to prosper if its income is raised above pre-war to a greater extent than its expenditure. The incomes of most members have risen appreciably since 1939. How many cut down smoking when the price went up? Save two cigarettes *per week* and you can afford a 25/- subscription.

We *do* need a real Headquarters, and the suggested break from the "Londonisation" straight-jacket would be welcome to the majority of members. We need a QSL bureau run as a paid service. It isn't fair for a dozen "decent types" to devote time to sorting our wall paper—how many would be willing to do it? (Incidentally, *must* we have a card from every ham in the Call Book? Can't we save some work and expense here?)

I hope G5JU gets all his wishes. I for one will support him, at least up to twenty five bob a year.

Yours faithfully,
H. S. CHADWICK (G8ON).

Worksop, Notts.

## The Clapp Oscillator

DEAR SIR,—Mr. Dunn (G3PL), in his article on Clapp oscillators in the June issue, rightly points out that isolation of the tuned circuit from changes of valve capacity may be achieved by the use of a small series condenser, but referring to Fig. 5, the caption is incorrect and may prove misleading to anyone considering the use of such a circuit.

With this arrangement the isolation is so complete that varying C1 produces very little change to the resonant frequency. Taking the values given in Fig. 5, with the coil self capacity of 5 $\mu\mu$F., varying C1 from 100 $\mu\mu$F. to zero results in a change of tuning capacity from 9·958 $\mu\mu$F. to 9·95 $\mu\mu$F. This would result in a change of frequency from about 3·500 Mc/s. to 3·501 Mc/s., a change of about 1 kc/s. Thus, as claimed, this circuit is a "crystal substitute," and is mainly suitable for spot frequencies.

The alternative is to vary the inductance if a suitable component of good design is available, as the 3·5 Mc/s. band may be covered with a reduction of about 15% in L.

If a variable capacity is used, a compromise must be made and the value of C increased to obtain good coverage. It then becomes practical to use a variable condenser for C as shown in Fig. 4 of the article, care being taken to design for the minimum practical value for this series condenser.

Yours faithfully
J. J. PAYNE, A.M.I.E.E. (G3DVM).

Haslemere, Surrey.

DEAR SIR,—I should like to thank Mr. Payne for pointing out a regrettable error, and I agree with most of his subsequent remarks. It was not intended however that the exact values given in Fig. 5 should be used as a constructional blue-print, since the most important single factor, Cs, is unknown. Extreme values were chosen, purposely, as a guide to experiment.

In a practical case, C is likely to be appreciably greater than 5 $\mu\mu$F., depending on the valve gain amongst other things. With a value of L of 40 $\mu$H., C of 50 $\mu\mu$F., and the other values as given, a frequency shift of 25 kc/s. at 3·5 Mc/s. is obtainable, which would be sufficient for C.W. operation on 14, 21 and 28 Mc/s. There is no reason why C1 should not be increased and the centre-tapping capacitators reduced in value to give greater bandspread. It should be noted that wider frequency coverage can only be obtained by reducing the isolating property of the circuit.

There seems to be no particular benefit in varying C for tuning purposes, although it is customary. It leads to variation of the amplitude of oscillation especially towards the low capacity values of C and may lead to instability when the impedance step-down becomes too great, or even complete cessation of oscillations.

Variable inductors appear to be seldom good enough for use as tuning elements in this circuit, but the difficulties are entirely mechanical. A variable condenser is smaller, simpler and less troublesome as a rule.

Incidentally, in calculating frequency coverage with this type of circuit it is necessary to work to six significant figures at least, in order to obtain a reasonably accurate result.

Yours faithfully,
A. G. DUNN (G3PL).

Hull, Yorks.

## Band Planning

DEAR SIR,—It is good to see that this subject has been carefully studied, but I criticise the part of the R.S.G.B. Plan that concerns the 28 Mc/s. band. As there is much more R/T than C.W. used in this band, I think the allocation of 200 kc/s. for telegraphy is too great. In my view it should be sufficient to assign the first 100 kc/s. of the band exclusively to C.W. with the next 50 kc/s. (28·1 to 28·15 Mc/s.) overlapping between R/T and C.W.

"Voluntary enforcement" of the plan will not, in my view, be easy because far too many users of the band have beams and crystals designed to permit R/T operation between 28·15 and 28·2 Mc/s. and will be loath to change. In my own case the beam is adjusted for a frequency of 28·16 Mc/s. and crystal control on 28·14 Mc/s. is used for C.W., with 28·16 and 28·18 Mc/s. for R/T.

Is it too late for further consideration of this point?

Yours faithfully,
C. COLLINS (VQ4SC-G(W)8SC.)

Nairobi, Kenya.



## OUR FRONT COVER

THIS month's photograph shows a 2 metre converter (top left) using a Mazda 6F12 as an R.F. Amplifier. This valve has an upper frequency limit in the region of 250 Mc/s. and although it was primarily designed for use in wideband R.F. amplifiers, as in Television, Radar, F.M., etc., it has numerous applications in the amateur field. It may successfully be employed as a mixer, local oscillator, buffer amplifier, or even as a low power crystal oscillator, and as an audio power amplifier it gives an output of 0·8 watts. Examples of its practical use are to be found in the R.S.G.B. publication *"VHF Technique."*

# HEADQUARTERS CALLING

**COUNCIL, 1949**

*President:*
VICTOR M. DESMOND, G5VM.

*Executive Vice-President:* W. A. Scarr, M.A., G2WS. *Immediate Past President:* S. K. Lewer, B.Sc., G6LJ.
*Hon. Treasurer:* A. J. H. Watson, F.S.A.A., G2YD. *Hon. Secretary:* J. W. Mathews, G6LL.
*Hon. Editor:* Arthur O. Milne, G2MI.
*Members:* W. H. Allen, M.B.E., G2UJ, A. P. G. Amos, G3AGM, I. D. Auchterlonie, G6OM, F. Charman, B.E.M., G6CJ., D. N. Corfield, D.L.C. (Hons.), A.M.I.E.E., G5CD, P. A. Thorogood, G4KD. *Co-opted Member:* W. N. Craig, B.Sc., G6JJ.

*General Secretary*: John Clarricoats, G6CL.

## May Council Meeting

*Resume of the Minutes of a Meeting of the Council of the Society, held at New Ruskin House, on Monday, May 9, 1949.*

*Present.*—The President (Mr. V. M. Desmond) in the Chair, Messrs. W. H. Allen, A. P. G. Amos, I. D. Auchterlonie, F. Charman, D. N. Corfield, S. K. Lewer, J. W. Mathews, A. O. Milne, W. A. Scarr, P. A. Thorogood, A. J. H. Watson, and John Clarricoats (General Secretary).

*Cardiff Group.*

The Cardiff T.R. (Mr. J. Evans) reported that certain local members had protested against the decision of the Council to exclude stations, other than those resident in England, from competing for the Braaten Trophy. It was agreed to inform the Cardiff T.R. that the General Secretary would be glad to deal with questions concerning the Braaten Trophy at the forthcoming Porthcawl O.R.M. A detailed explanation had previously been sent to Mr. Banner, GW3ZV and Mr. Hamer, GW8BW who had lodged the original protests (see Resume of March Council Meeting Minutes).

The Cardiff T.R. also reported that certain local members had expressed the view that each prefix zone should have a representative on Council and that one member had suggested that a Welsh Radio Society might be possible. The Glamorgan C. R. (Mr. C. Parsons, GW8NP) had opposed this "nationalistic" policy likening it to present international affairs. Mr. Banner had criticised the financial administration of the R.S.G.B.

The Cardiff T.R. stated that he had informed the meeting that he considered it was ridiculous to suggest major changes in R.S.G.B. policy while local meetings were supported by only about 25 members out of a total membership of 120.

It was agreed to thank the Cardiff T.R. for the efficient manner in which he is performing his duties.

*Third Party Traffic.*

The East London D.R. (Mr. W. H. Matthews) reported that members in his District have on occasions been considerably embarrassed by receiving requests from U.S.A. amateurs and others to accept third party traffic. It was agreed to write to the A.R.R.L. and ask for a statement to be published in QST to the effect that U.K. amateurs are not permitted to handle third party traffic.

*Aerial Masts and Supports.*

The Slough T.R. (Mr. F. J. T. Tuckfield) reported that at a recent meeting it was resolved " to request the Council to take in hand the question of the erection of towers, masts and other supporting structures on an amateur's premises, with a view to the removal of the restriction which is placed on such erections by the operation of the Town & Country Planning Act, 1947, which it is understood makes no provision for such structures."

The Secretary was instructed to discuss the matter with one of the Society's legal advisers and to authorise the latter to seek the advice of Counsel if, in his opinion, that course seems desirable.

*Membership.*

Resolved—

(*a*) to elect, 80 Corporate Members, 9 Associates and 3 Junior Associates. (Total elected 92).

(*b*) to grant Corporate Membership to 5 Associates who had applied for transfer.

*Festival of Britain, 1951.*

It was reported that preliminary discussions had taken place between representatives of the Society and the Council of Industrial Design in connection with the suggestion that the Society should be given facilities to operate an amateur station within the Exhibition grounds.

*Amateur Radio Exhibition.*

It was reported that 20 concerns had reserved space at the forthcoming Amateur Radio Exhibition to be held in London.

Resolved—

(*a*) that Mr. H. Freeman be appointed Exhibition Manager.

(*b*) that the hire charges for stands be the same as for the 1948 Exhibition.

(*c*) to organise a Complimentary Luncheon to Exhibitors prior to the official opening.

*Geneva Conference.*

Mr. Scarr (Chairman of the G.P.O. Liaison Committee) reported that the U.K. Government intends to support a proposal at the Geneva Conference that a band 200 kc/s. wide be assigned to amateurs somewhere between 1715 and 2000 kc/s.

Mr. Scarr also reported that the French and Swedish I.A.R.U. Societies had written to advise the Society that they had been informed that efforts would probably be made at the Conference to reduce materially, in Region 1 the width of the band between 3·5 and 3·8 Mc/s. which is at present allocated to amateurs on a shared basis. Mr. Scarr stated that the G.P.O. had advised the Committee that it is the intention of the U.K. Government to press for the whole band to remain assigned to amateurs on a shared basis.

*Increased Power on V.H.F. Bands.*

Mr. Scarr reported that the G.P.O. had agreed to give early consideration to a proposal made by his Committee that the maximum power to be used on the V.H.F. bands shall be increased from 25 to 150 watts.

*72 Mc/s. Band.*

Mr. Scarr reported that the G.P.O. had agreed to give early consideration to a proposal made by his Committee that a band around 72 Mc/s. should be assigned to U.K. amateurs.

*Channel Islands Representation.*

Mr. Lewer (Chairman of the Membership Committee) reported that his Committee agrees with views expressed by C. I. members that the Islands should not become part of the U.K. scheme of representation. The status of the C.I. Representative is similar to that of a U.K. County Representative. Mr. Lewer suggested that the general question of C.I. representation could be usefully discussed at a C.I. Convention if such is arranged.

*Membership.*

Mr. Lewer reported that from July 1 to November 1, 1948, 934 members failed to renew their subscriptions. In the same period 757 new members were elected, representing a nett loss of 177. An analysis had shown that 4 per cent. of the overdue members were elected in 1940 or earlier, 15 per cent. during the war and 81 per cent. after the war. Of the total overdue, 810 were Corporate Members and 124 Associates. The Membership Committee does not regard this as an unhealthy condition and accepts the view that many of those who were elected in the post-war period probably lacked the kind of interest that would have led to continued membership.

*Finance.*

Resolved—

to accept and adopt the Cash Account for the months of March and April, 1949.

The meeting terminated at 8.30 p.m.

## Representation

The following are additions or alterations to the list of Representatives published in the February, 1948, and subsequent issues :—

### Town Representatives

Region 1.
*Lancashire East—*
*Bolton* ... ... C. Gore, BRS17251, 8 Daffodil Road, Farnworth.

Region 7.
*London North—*
*Hendon* ... ... A. W. W. Timme, G3CWW, 11 Cheyne Walk, Hendon Central, N.W.4.

*Watford* ... ... I. J. Wood, G3CHP, Reydon, Coldharbour Lane, Bushey.

Region 9.
*Cornwall—*
*Hayle District* ... R. J. Gilbert, G2CQB, Home View, St. Erth.

### Changes of Address

Region 3.
*Oswestry* ... ... G. H. Banner, G3AHX, Woodstock Ardmillan Avenue.

*Stourbridge* ... ... W. A. Higgins, G8GF, 28 Kingsley Road, Kingswinford, Nr. Brierley Hill, Staffs.

Region 8.
*Eastbourne* ... ... R. F. Nugent, G2FJS, Field House, Windmill Hill, Nr. Hailsham.

### Vacancy

Mr. A. A. Adams, G5AD, has resigned as East Lancashire County Representative. Nominations in writing for his successor should reach the General Secretary by not later than July 31, 1949.



## National Physical Laboratory

E. C. Bullard, M.A., Ph.D., F.R.S., Professor of Physics in the University of Toronto, has recently been appointed Director of the National Physical Laboratory. During the war, Professor Bullard joined the Admiralty where he was concerned with the de-gaussing of ships as a protection against the magnetic mine. In 1944 he became Assistant Director of Naval Operational Research. Professor Bullard is expected to succeed Sir Charles Darwin, K.B.E., M.C., Sc.D., F.R.S., the present Director, in January, 1950.

## Slow Morse Transmissions

There are no changes this month from the list of Slow Morse Transmissions as published on page 312 of the June, 1949, issue of the R.S.G.B. BULLETIN. Further volunteers to cover outlying districts are invited to write to Mr. C. H. L. Edwards, G8TL, 10 Chepstow Crescent, Newbury Park, Ilford, Essex.

G3AEX searches for a weak signal on the H.R.O. at G4AU/P, H.F. Station for the Bromley and Beckenham Group.

# The First 420 Mc/s. Tests

THE problem confronting the Contests Committee in its task of organising a 420 Mc/s. event this year will be clear to all members familiar with the present state of activity on this new U.H.F. allocation. Scattered throughout the country there are isolated groups of members experimenting on the band, mostly with simple equipment, and achieving ranges of anything from a few to some 30 odd miles. Contacts have usually resulted only from carefully pre-arranged schedules and an interchange of operating frequencies. Under such circumstances, a contest run along normal lines would obviously stand little chance of success.

The situation can, perhaps, best be compared with that which existed in the very early days of Amateur Radio when the first enterprising pioneers began to probe the then unknown regions of " 100 metres and below." In those days the germ of future contests was to be found in the famous International Tests, run on simple lines, with little of the complexity which has become necessary in recent years. The success of those tests has long passed into Amateur Radio history.

This handsome and distinctive trophy presented to the Society by Mr. Arthur Watts will be awarded annually to the winner of the 420 Mc/s. Tests.

It was with such thoughts in mind that the Committee drew up its plans for the Society's first U.H.F. contest. To be known as " The 420 Mc/s. Tests," the event will have few fixed rules, other than the general time limit of from 1100 B.S.T. to 2300 B.S.T. on August 21, 1949, and the provision that all entries must be from fully paid-up Corporate members and accompanied by the Declaration set out below. Any type of operation —fixed or portable—or mode of transmission may be used, providing that the entrant adheres to the terms of his (or her) licence.

The entries will be required to include details of stations heard and worked (with distances), and general observations on the band. A full description of all equipment used should be included and this information and any other evidence submitted of work carried out will be taken into consideration when judging the event. The contestant submitting the best entry in the opinion of the judges will be recommended to Council for the award of the Arthur Watts Trophy.

In order to facilitate co-operation between stations, members who intend to take part in the tests are invited to notify Headquarters, *not later than July* 25, 1949, of their proposed location and call-sign, so that a list of stations may be published in the August BULLETIN.

It is anticipated that most stations will be using horizontal polarisation.

The 420 Mc/s. band offers unlimited scope for the development of new equipment. In future years, will *you* be able to say : " I took part in the first 420 Mc/s. Tests ? "

## Entries

Entries headed " R.S.G.B. 420 Mc/s. Tests " must be addressed to the Hon. Secretary, R.S.G.B. Contests Committee, New Ruskin House, Little Russell Street, London, W.C.1, postmarked not later than September 5, 1949, and contain the following declaration :

*I declare that my station was operated strictly in accordance with the rules and spirit of the Tests, and I agree that the ruling of the President of the R.S.G.B. shall be final in all cases of dispute.*

*Date*..... *Signature*.....

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- **EDDYSTONE.**—"640" Receiver, **£27 10s.** "S" meter, **5 gns.** Semi-automatic Morse key, **£3 17s. 6d.** Modulation percentage indicator, **£8 15s.** Absorption wavemeter, 1·5 to 160 Mc/s., with calibration charts, **£5 17s. 6d.** 145 Mc/s. tuning assembly, **17/6**. Transmitter ceramic coil formers, 5" x 2⅜" diam. with 26 grooves for up to 12 S.W.G. wire, **7/-**; 5-pin sub-base, **6/9**; 5-way socket base, **6/9**. Miniature ribbed 4-pin formers, 1⅝" x ⅞" diam., **1/9**; 4-pin base for same, **1/9**. Eddystone catalogue, **7d.** post free; 145 Mc/s. Guide, **1/7** post free; 640 Manual, **1/7** post free; Short Wave Manual No. 6, **1/2** post free.

- **RAYMART.**—Transmitter condensers, single: NC15 15 pF. ·09", **4/6**; VC20 20 pF. ·058", **4/3**; TC40 40 pF. ·05", **5/3**; TX100S 100 pF. ·08", **45/-**; TX100DS 100 pF. ·15", **55/-**; TX50DS 50 pF. ·15", **45/-**. Split-stator: 80 + 80 pF. ·07", **25/-**, 100 + 100 pF. 15", **65/-**. Ceramic valveholders, British: 4 and 5-pin, **1/-**; 7-pin, **1/6**; Mazda octal, **1/6**; B9G (EF50 type), **2/-**. U.S.A. types: 4, 5 and 7-pin, **1/3**; Octal, **1/6**; Acorn, **2/6**.

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# BOOK REVIEWS

TVI—Its Causes and Cures. Edited by Lawrence LeKashman. Radio Magazines, Inc. New York; 3s. 6d. through R.S.G.B. (delivery 4 weeks).

* * *

Introduction to Television.—A. Fowell. Chapman and Hall; 9s. 6d.

* * *

Pulses and Transients in Communication Circuits.—Colin Cherry. Chapman and Hall; 32s.

* * *

These three books all deal with subjects related to television, although their outlooks are as diverse as are their prices. To the readers of this journal the first, on TVI, is undoubtedly of the greatest immediate interest. It contains an excellent summary of the present position in the U.S.A. Two introductory chapters define the nature of the problem and include a very large number of diagrams and photographs of received television pictures suffering from various degrees and types of interference. The interference due to amateur transmitters is then examined closely, its causes and the operation of receivers under conditions of interference are analysed. Several chapters follow which deal with harmonic reduction by means of traps and filters and adequate screening. The final chapter gives constructional details of a transmitter (250 watts) for 80, 40, 20, 15 and 10 metre bands which purports to be as free of TVI as it is possible to make it. It is interesting to note that no methods of eliminating this trouble appear to have been developed in U.S.A. which are new to us, although the details may vary somewhat. It should be noted also that since "negative" modulation is used by all American television stations, certain of the technical arguments advanced when discussing receivers are not valid for this country where "positive" modulation has been standardised. This is very noticeable in the examples of car ignition interference which are illustrated. Furthermore, with no less than thirteen separate television channels in use the chance of a transmitter harmonic falling within one appears immensely greater than in this country where it is unlikely that anyone will be faced with more than two channels to avoid in any one part of the country.

The book is compiled from articles by different authors, culled from *CQ* and *QST*, and for this reason perhaps, lacks a certain amount of continuity, but it can be warmly recommended to the seeker after knowledge in this difficult but interesting field.

* * *

In Mr. Folwell's book we have a most readable elementary account of the functioning of the present day television receiver. For the amateur who wishes to extend his radio knowledge to the art of television reception it should prove very valuable. It is entirely non-mathematical, but nevertheless succeeds in clearly explaining the basic principles of the system in use in this country, and the operation of television receivers from aerial to cathode ray tube. Anyone who understands how a sound receiver works will be able to understand his television set when he has read this book—which he will enjoy.

* * *

In the third and last book in this group Mr. Cherry deals with an abstruse branch of communication engineering in a style notable for its clarity and logical development. The subject is one for advanced workers only, but for which an understanding is essential for any serious work in the fields of radar and television. In view of this, the author has kept the mathematical treatment as straightforward as possible, and deals with the subject from the graphical or waveform aspect. The communication engineer who is not primarily interested in pulse systems may find the chapter on asymmetric sideband channels very useful.

Although expensive, this work is indispensable to the engineer who, with limited mathematical equipment must tackle the difficult problems involved in this subject. H.A.M.C.

# Silent Keys

It is with deep regret that we record the death of Mr. William "Mac" Gammon, VE3ZM, who was electrocuted whilst working another VE3 station on 3·5 Mc/s. The H.T. supply of 1250 volts became accidentally connected *via* the monitor to the headphones which Mac was wearing; the circuit was completed through the microphone stand.

Formerly VE3BFK, Mr. Gammon was a member of the Instructional Staff at the Ontario Agricultural College and was President of the Guelph Radio Club. He was well-known for his outstanding telephony signals on 28 Mc/s. and recently qualified for the British Empire Radio Transmission Award.

* * *

With regret we also record the passing of Mr. L. E. W. Johnson, G3BXK, of Colchester, Essex. Mr. Johnson had been a member since 1947.

## Coventry Amateur Radio Society

Mr. T. R. Theakston (2DBK), whose series of articles "Mathematics for the Radio Amateur" was a feature of war-time issues of the Bulletin, was one of the recent speakers at the regular meetings of C.A.R.S. Mr. J. N. Walker (G5JU) is to give a talk "V.H.F. Technique" on July 18. VK3WH (G3FHA) and VS2BP are at present visiting Coventry. Close contact is maintained by the members through the medium of the monthly publication "Calling all C.A.R.S."

## Harrogate Radio Society

The society operates a very efficient transmitter under call G3EDJ/A. An application for a club licence has been lodged with the authorities and members hope to obtain a 'phone permit without waiting the usual twelve months. The Vice-chairman Mr. F. F. Dalby is now home again after a long spell in hospital. Mr. A. B. Ward has resigned as Chairman owing to pressure of private affairs and has been succeeded by the former Secretary, Mr. A. Wilson. The new Secretary is Mr. J. W. Swan (G3EDJ), c/o 6 Promenade Square, Harrogate.

## Pontefract and District Amateur Radio Club

This recently formed society is making good headway and includes among its members G2FQH, G3ESP and G8KN. The Chairman, G2HBH, with the assistance of other enthusiasts operated a portable station during N.F.D., and raised HB on 1½ watts. In all about 60 contacts were made on 7 Mc/s. A full programme of meetings has been arranged and visits to places of interest are being organised. The Secretary is Mr. Charles Gould (G2FQH), 51 Pontefract Road, Ferrybridge. Dates of future meetings will be announced in Forthcoming Events.

## Torbay Amateur Radio Society

Amateurs visiting Torquay and district during the summer months are cordially invited to attend the monthly meetings of the T.A.R.S. held every third Saturday at the Y.M.C.A., Castle Road, Torquay (7.30 p.m.). Recent activities have included a visit to the B.B.C. transmitter at Start Point. The R.S.G.B. films were shown at the June meeting. Details from the Hon. Secretary, Mr. K. J. Grimes, G3AVF, 3 Clarendon Park, Tor Vale, Torquay.

## Around the Trade

To meet the ever-increasing need for scientific research the *General Electric Co. Ltd.* has acquired the lease of a building known during the war for security reasons as "Depot RL." This building, which stands in the Wembley Exhibition Grounds, was originally the British Government Pavilion of the 1926 Wembley Exhibition. After lying derelict for several years, the imposing ferro-concrete structure was taken over during the war to form part of a "shadow" organisation concerned with the development of radar valves and a great deal of the research on "Fido" was carried out here. The laboratory has now been equipped with its own workshops, canteen, design office, sub-station, etc., and is to be known as "Extension XL."

* * *

*Philips Electrical Ltd.* have recently published a booklet containing hints on the erection of television aerials. Advice is given on the various types of aerials now available and methods of installation. The suitability of feeder cables is also discussed. The booklet emphasises that care in the provision of an effective aerial will pay handsome dividends in picture quality. "Television Aerials" may be obtained by any Philips Appointed Dealer on application to *Philips Electrical Ltd.* (Radio Department), Century House, Shaftesbury Avenue, London, W.C.2.

* * *

The new 36-page illustrated catalogue issued by *Premier Radio Company*, Jubilee Works, 167 Lower Clapton Road, London, E.5 (price 3d.), gives details of an extensive range of components for short-wave and broadcast equipment.

## Portable Stations Heard during N.F.D.

*L. A. J. Deadman, BERS447*, Fayid, Suez Canal Zone, Egypt. June 11–12, 1949.

Receiver—*Eddystone* 640. Aerial 15ft. high.

3·5 *Mc/s.*: G2ATJ, 3AZ, CSX, DDI, EVR, GG, NT, G4FV, KF, MM, G5BK, HC, JM, NH, PP, G6BQ, CW, KT, LV, PR, RB, SS, G8HI, KU, MU, NF, TD, GM3ALB, EHH, 4PW, GW4CK, IX, NZ, DL4KW, EI6U.

7 *Mc/s.*: G2AJ, CN, FTK, FXB, HGR, LR, G3ABH, ACC, BW, DPZ, SJ, G4AU, GD, G5BM, PP, TO, WA, YY, G6NU, G8AL, RC, TS, GM2FHH, DL4KW.

## New Book

International World Radio Station List. Compiled by Bernard B. Babani and published by Bernards (Publishers), Ltd., price 1/6.

A useful list of the power, frequency and wavelength of some 3,000 long, medium and short-wave broadcasting stations. The new European wavelengths, allotted under the Copenhagen Plan, due to come into effect in March, 1950, are also given.

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COLLINS T.C.S. transmitter and receiver coverage 1·5–12 Mc/s. Complete station with 230 volts 50 cycle mains power unit all connecting cables and remote control unit with speaker. Press to talk microphone and original makers spares almost new £47 10s.—Box 806, PARRS, 121 Kingsway, London, W.C.2. [806

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H.R.O. Minus power pack, in very good condition with the following coils: 100–200 kc/s., 180–430 kc/s., ·48–·96 Mc/s., 3·5–7·3 Mc/s., 7–14·4 Mc/s., 14–30 Mc/s., £25.—Box 782, PARRS, 121 Kingsway, London, W.C.2. [782

LARGE stock of transmitters, communication receivers, condensers, valves and other components. Alignment and repair of amateur equipment.—P. C. A. WIRELESS WORKSHOP, The Arches, Cambridge Grove, W.6. [796

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SELLING UP.—35 watt transmitter for 7 and 14 Mc/s. Eddystone rack-mounting chassis. 500V power pack. Meters, coils and valves. £7 or offer.—NIBLOCK, 25 Milner Road, Thornton Heath, Surrey. LIV 1090. [801

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