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BULLETIN

A JOURNAL FOR

RADIO EXPERIMENTERS

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THE T. & R. BULLETIN

OFFICIAL JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

DEVOTED TO THE SCIENCE AND ADVANCEMENT OF AMATEUR RADIO

Hon. Editor: JAMES W. MATHEWS. Secretary-Editor: JOHN CLARRICOATS

Advertisement Manager: HORACE FREEMAN

Vol. XVI. No. 11 MAY, 1941

CONTENTS

PEACE AIMS

EVERY now and then someone bobs up in Parliament or elsewhere and asks the question, "What are our war aims?" Occasionally the tune changes, and the question becomes, "What are our peace aims?"

We have only a very vague idea of what is meant by peace aims and war aims but we *do* know that before *any* aim can materialise we've got to win the war—if we don't, well aims won't help us very much.

National aims and personal aims are very much alike, that's why we draw swords against those who persist in the Council of the R.S.G.B. stating its peace aims in detail. As citizens, we are concerned to-day in one supreme task, the winning of the war, as quickly as possible. In our quieter moments, no doubt, we visualise the time when we shall again set up the old gear (assuming it still works) and "get cracking"; which, boiled down, means that our private aim is to get our call signs restored as soon as possible. There are myriads of side issues, such as frequency allocations, power to be authorised, morse examinations, technical qualifications, grades of licence, message handling, procedure, and what not, but each and all are secondary to the main issue, the early restoration of licence facilities.

It is no part of our present duty to refer, even in general terms, to Council's aspirations for the future, but for the benefit of those who are in doubt on the point, we give an assurance that every bright idea, every sensible suggestion aimed at improving amateur radio conditions after the war, will receive the careful attention of those elected by the membership to represent the Society.

We have made no attempt to check the point accurately, but from our own personal knowledge of the members serving on Council to-day, it is safe to say that their collective amateur experience far exceeds 100 years, ranging from our President's exceptional knowledge of frequency measurement and its problems to our Past President's long experience of International Conferences. Every single amateur interest is understood and appreciated. Month by month they meet to discuss the present and future welfare of the Society (keeping ever before them the knowledge that their first duty is to serve the membership to the best of their ability) and to take such actions as they deem to be necessary. That they are doing so, well and truly, none will be able to deny when the time for recognition arrives.

Let us, therefore, face facts—the Council has one definite aim for the future—to get our licences restored without delay, and on the most advantageous terms. All other matters are of secondary importance, but none will be neglected.

J. C.

AN EFFICIENT RECEIVING INSTALLATION

By A. W. Birt, G3NR

Introduction

At the outbreak of hostilities the writer, having seen his transmitting gear removed by the G.P.O., and realising that some time might elapse before its return, decided to devote his attentions to improving that oft-neglected part of an amateur station—the receiver installation.

In the past, mains, or battery operated T.R.F. receivers had been constructed for work on various frequencies between 1 Mc. and 60 Mc., but, although satisfactory results had been obtained, they fell short of modern requirements.

Outline of Plan

After some deliberation it was planned to design and construct a medium-wave direction finding receiver, a short wave superhet (incorporating a double crystal band pass filter and audio output) and an associated power supply. Additionally, to gain experience, it was decided to attempt to produce the crystal resonators at home rather than purchase them ready made. This necessitated the design and construction of a polariscope, cutting wheel and grinding lap. A description of these items will it is hoped be given in a further article.

The D.F. Unit

This is essentially a superhet convertor arranged to cover the medium-wave broadcast band and the 600 metres shipping band. The arrangement, which is shown in Fig. 1, consists of a balanced frame aerial feeding the input grids of two 6J7 pentodes (V_1 and V_2) in push-pull. They in turn drive an X41 frequency changer (V_3) which has, in its anode circuit, an I.F. transformer tuned to 465 kc. This circuit has a low impedance output (A—B) which is matched to another I.F. transformer contained in the short wave superhet convertor, to be described later in this article. It should be mentioned here that the D.F. unit and the convertor share the same I.F. amplifier.

Construction

The box containing the D.F. gear measures 6 in. × 6 in. × 9 in. high and is constructed of that "rare" metal, aluminium! A duralumin chassis is

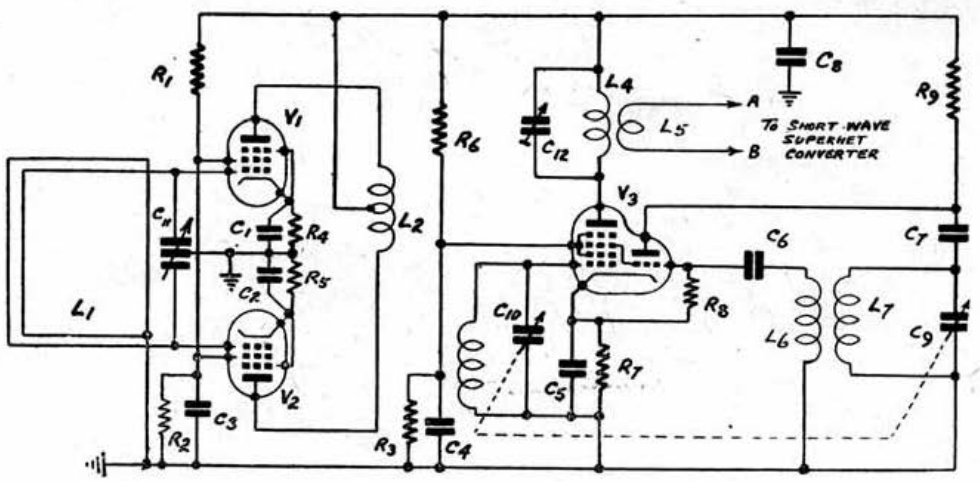


Fig. 1.
Circuit Diagram of D.F. Convertor

Resistances

R1	750,000 1 watt, Erie.
R2	50,000 1 watt, Erie.
R3	20,000 1 watt, Erie.
R4, 5	1,000 1 watt, Erie.
R6	40,000 1 watt, Erie.
R7	300 1 watt, Erie.
R8	50,000 ½ watt, Erie.
R9	50,000–100,000 1 watt, Erie.

Valves

V1, 2	6J7, Tungsram.
V3	X41, Osram.

Condensers

C1, 2, 4	·01 μF 451, T.C.C.
C3, 5	·1 μF 341, T.C.C.
C6	·0002 μF M, T.C.C.
C7	·002 μF M, T.C.C.
C8	2 μF 65, T.C.C.
C9, 10	Twin ganged ·00035 μF.
C11	Twin ganged ·0005 μF.
C12	Mica trimmer, 50 μμF.

Coil Data

See separate table in text.

employed as a base for the valves and other components, the inductances being assembled on the under side. The lid of the box is also of duralumin, because this has to support the full weight of the frame aerial, together with its rotating mechanism. The frame is made of 1 in. × 1 in. oak to form a square measuring 16 in. × 16 in.; paxolin strips being used for aerial insulation. For the bands intended to be covered it was found that a winding comprising 24 spaced turns of No. 38 S.W.G. D.S.C. wire was satisfactory.

The frame rotating mechanism consists of an old variable condenser with its vanes removed, leaving only the framework, spindle and ball bearings. The whole was then mounted inside a 3-in. diameter aluminium coil cover, with the spindle projecting vertically through the top of the cover. A suitable clamp for holding the aerial framework was mounted on the spindle, after which the bearings and cover were fitted to the lid of the box by means of lugs.

The frame aerial is centre-tapped to the metal rotating mechanism (which is at earth potential), whilst two ends pass, *via* suitable flex leads, through holes in the top of the bearing cover, to the tuning condenser C_{11} and the grids of the push-pull pentodes.

A compass scale is attached to the top of the lid, and a pointer fitted to the spindle of the rotating mechanism. The latter sweeps round the scale as the frame is rotated.

Checking Bearings

For checking bearings the writer favours the method of lining up both compass scale and frame aerial against the direction of known British stations. The more usual method is to utilise a magnetic compass, but this is liable to give false readings due to the presence of unnoticed magnetic substances in the vicinity of the receiver.

Circuit Features

A full circuit description of the unit seems unnecessary, as the coupling between the push-pull

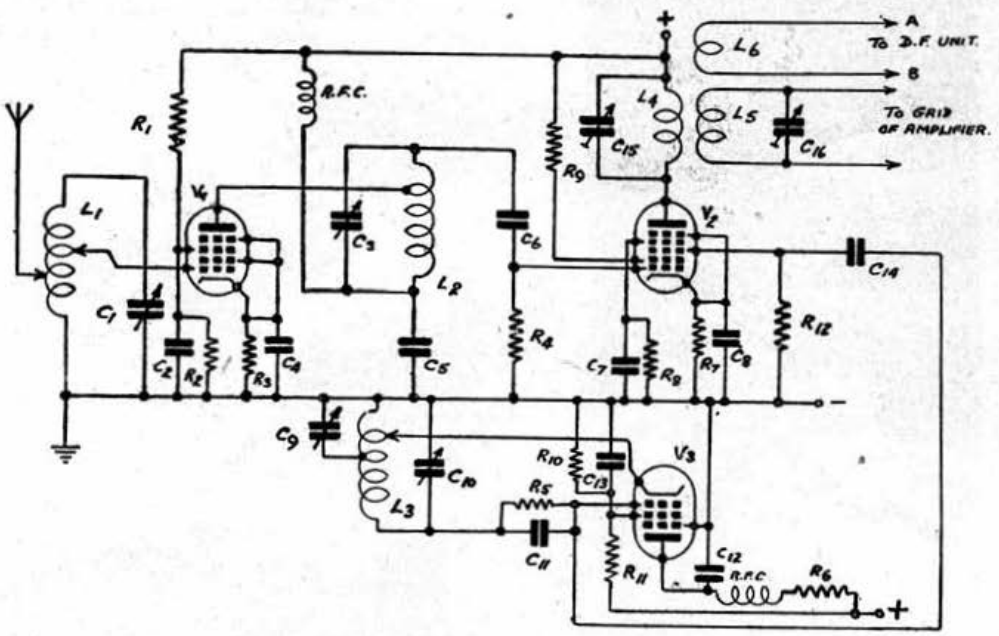


Fig. 2.
Circuit Diagram of Short Wave Convertor.

Resistances

R1, 6, 9	75,000 1 watt, Erie.
R2	20,000 1 watt, Erie.
R3	300 1 watt, Erie.
R4	1 meg. ½ watt, Erie.
R5	30,000 1 watt, Erie.
R7	400 1 watt, Erie.
R8, 10	50,000 1 watt, Erie.
R11	100,000 1 watt, Erie.
R12	50,000 ½ watt, Erie.

Miscellaneous

R.F.C.	1010 Eddystone.
L4, 5	2,500 μH wave wound.
L6	5 turns

Condensers

C1, 3	50 μμF Apex, Webbs.
C2	·01 μF 451, T.C.C.
C4, 5, 7, 8, 13	·1 μF 341, T.C.C.
C6, 14	50 μμF ceramic disc, Dubilier.
C9, 10	180 μμF scientific, Eddystone.
C11	100 μμF ceramic disc, Dubilier.
C12	·001 μF M, T.C.C.
C15, 16	50 μμF mica (trimmers).

Valves

V1	EF8, Tungsram.
V2	6L7, Tungsram.
V3	6J7, Tungsram.

R.F. stage and the frequency changer (including the oscillator circuit) follows normal superhet practice. As a matter of interest, however, the I.F. transformer used in the anode circuit of the F.C. valve was constructed so that the D.F. unit could be operated at a distance remote from the I.F. amplifier. To achieve this result a normal 465 kc. I.F. transformer was stripped of its secondary, and this was replaced by a five-turn winding suitably insulated from the original primary by mica sheet. Five turns appeared to be the optimum number required for maximum transfer of energy into a 72-ohm feeder line.

A similar five-turn coil is used to terminate the other end of the line, and this is wound directly over the secondary of the first I.F. coupling coil of the short wave convertor. In effect this secondary winding is the grid coil of the first I.F. amplifier.

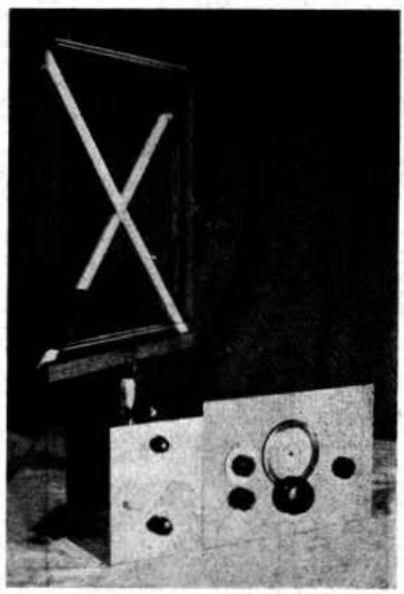


Fig. 3.
General view of Direction Finder, and Short-wave Convertor.

Short Wave Superhet Convertor

In the design of this unit the chief ambitions were to provide good weak signal response, coupled with good frequency stability in the oscillator. To attain these ends the writer was prepared to forgo the mechanical advantage of using a one-knob tuning control and a single switch for band changing. There were, however, good reasons for departing from commercial practice in these respects, even if the first-mentioned condition presented a few difficulties. The frequency stability problem was overcome after a few hours' experiment.

Construction and Circuit Details

The chassis is made of heavy gauge duralumin, and measures 13 in. long × 8 in. wide. At the back left is mounted the box which houses the oscillator section. This box, which is fitted with a hinge lid, measures 6 in. × 6 in. × 5 in. wide and is made of stout brass. The R.F. amplifier is mounted in front of the oscillator box, the grid coil of which is tuned by a single section 50 $\mu\mu$F condenser (C_1 of Fig. 2). The tuning control of this circuit is the lower left-hand knob, shown in Fig. 3. The R.F. valve (an EF8) is mounted horizontally, with its grid cap directly beneath the grid coil holder, a layout which provides a short variable grid tap at any point along the coil. This enables a compromise to be obtained between sensitivity and selectivity, a point taken advantage of by the writer when operating and adjusting the convertor.

A 6L7 frequency changer (V_2) is coupled to the R.F. stage by means of a single tuned circuit, whilst a variable tapping is provided from the anode of the EF8. As the full high tension is applied to this coupling circuit, the grid of the F.C. valve is isolated by means of a 50 $\mu\mu$F ceramic condenser (C_6) and a 1 megohm grid leak (R_4). This type of coupling, whilst somewhat antiquated, operates very well; additionally it is easy to adjust. Although the R.F. amplifier and detector are, in effect, across the inductance of the coupling circuit, the "Q" does not appear to have been reduced to any great extent as the selectivity remains good up to 30 Mc.

The I.F. transformer, connected to the anode of the F.C. valve as previously mentioned, is shared with the medium-wave D.F. convertor. This transformer is normal in every way except for the fact that a five-turn coil has been wound over the secondary to provide the low impedance winding, which is fed by a 72-ohm line from the D.F. convertor. This provides a step-up effect for feeding the grid of the first I.F. amplifier.

The oscillator, which utilises a 6J7 pentode (V_3), is incorporated in a cathode tap circuit. Band setting is carried out by means of a 150 $\mu\mu$F variable (C_{10}), whilst another condenser (C_9) of similar size provides electrical band spreading. The latter is tapped at the point on each oscillator coil which will provide the correct degree of frequency change relative to the full movement of the dial indicator.

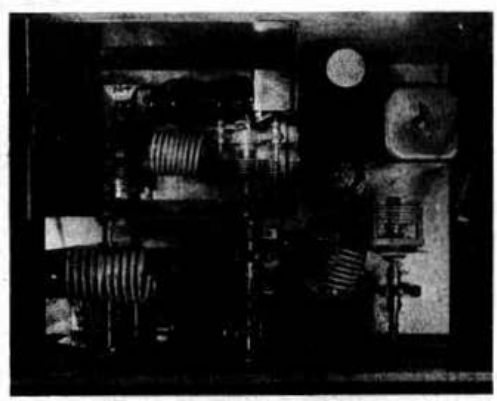


Fig. 4.
Plan view of Short-wave Convertor.
Note large inductances for 28 Mc. operation.

The dials associated with the band-set and band-spread condenser are shown in Fig. 3, being the upper left and centre knobs respectively.

Frequency Stability Experiments

Some interesting experiments were carried out in connection with frequency stability, especially in regard to the effect of varying the screen potential in relation to that applied to the anode.

It was noticed that for certain differences in screen and anode voltages the common supply to both electrodes could be varied considerably, with very little change of oscillator frequency. The final figures chosen for the particular pentode in use were 95 volts on the anode, and 80 volts on the screen. The latter value may appear a little high in relation to the anode voltage, but as they were selected after careful experiment they were permanently adopted without further question.

Wiring

All wiring was carried out with rigid heavy gauge copper wire, whilst the variable condensers were anchored to the chassis and oscillator box by means of extra supports in an effort to minimise mechanical movement and vibration.

Coils

With the exception of the coils used to cover the frequencies between 1 Mc. and 7 Mc. (which are wound on formers), all coils are self-supporting. These latter, which extend the range up to 120 Mc. consist of silver-plated $\frac{1}{16}$ in. bore copper tube approximately $1\frac{1}{2}$ in. diameter. Coils for the R.F. amplifier and frequency changer are designed to have a high LC ratio in their respective circuits (such as the amateur bands) when used with 50 $\mu\mu$F tuning condensers.

Ganging has not been attempted in any of the signal frequency circuits. The tuning system adopted (which dispenses with padding and trimming condensers) keeps the LC ratio high, consequently the circuit impedance will be higher than when a low LC ratio is employed. This means in effect that the induced voltage across the circuit and applied to the grid is correspondingly higher than when a low LC ratio is used.

As mentioned earlier, the receiver was designed to improve weak signal response. With this aim in view it was decided not to include any form of regeneration either in the R.F. convertor or in the I.F. amplifier. The writer holds the view that if a superhet receiver is incapable of bringing in weak signals *without* regeneration then there must be something wrong with the design!

It is hoped later on to give a description of the gear used to produce the quartz resonators necessary for the I.F. crystal band pass filter. In addition the instruments required for this work will be described.

COIL DATA FOR SHORT-WAVE CONVERTOR.

Coil	Frequency Range Mc.				Coil Turns				Inductance Tappings							
									Grid				Band Spread			
L_1	1	1·7	3·5	7	80	55	30	15	—	—	15	7	—	—	—	—
L_2	1	1·7	3·5	7	80	55	30	15	—	—	—	—	—	—	—	—
L_3	1	1·7	3·5	7	75	60	25	13	—	—	—	—	10	10	6	3
L_1	14	28	56	112	12	10	4	2	3	3	1	—	—	—	—	—
L_2	14	28	56	112	10	7	4	2	—	—	—	—	—	—	—	—
L_3	14	28	56	112	9	7	4	4	—	—	—	—	2	1	$\frac{1}{2}$	$\frac{1}{2}$

NOTES

(1) *All tappings are made from the "cold" end of the inductance.*
(2) *Oscillator cathode tapped $\frac{1}{4}$ number of turns along each oscillator inductance.*
(3) 1–7 *Mc. coils are close wound on Eddystone type* 935 *formers, using No.* 28 *enamelled S.W.G. wire.*
(4) 14–112 *Mc. coils are silver plated $\frac{1}{16}$ in. bore copper tubing, self-supporting, and wound to a length of $1\frac{1}{2}$ in.*
(5) 14–28 *Mc. coils are wound $1\frac{1}{2}$ in. diameter.*
(6) 56–112 *Mc. coils are wound $\frac{5}{8}$ in. diameter.*
(7) *Oscillator section is operated on second harmonic of* 56 *Mc. for* 112 *Mc. reception.*

COIL DATA FOR D.F. CONVERTOR.

Coil	Winding Data
L_1	Frame aerial (see text).
L_2	200 turns C.T. on $\frac{3}{8}$-in. paxolin former. Coupled to F.C. grid coil.
L_3	180 turns bunch wound on $\frac{3}{8}$-in. paxolin former.
L_4	2,500 μH wave wound.
L_5	Five turns.
L_{6-7}	160 turns wave wound on $\frac{3}{8}$-in. former.

GM2IA a Bride

Congratulations and best wishes are extended to Miss Dorothy Burns, GM2IA of Duns, Berwickshire, upon her recent marriage to Mr. James Greig. Miss Burns, who is a town councillor of Duns and a county councillor of Berwickshire, held a full amateur licence for many years prior to the war. She is a member of the Scottish Flying Club, and has been an R.S.G.B. member since 1928. Ingang!

CONSTRUCTING A SEMI-AUTOMATIC MORSE KEY

By H. G. NEWLAND, G5ND

IN response to a recent request in this Journal for details of a semi-automatic key, the writer proposes to describe a design which he developed prior to the war.

The important factor to bear in mind when constructing a mechanical key of the " bug " type is that the utmost care should be taken in shaping and finishing the integral parts. If this is not done the completed article cannot be expected to perform efficiently, or to compare favourably with its commercial counterpart. The slightest inaccuracy in lining up the parts will throw the key out of balance, and will, as a consequence, make positive adjustment and operation impossible.

As the writer is now away from home, he has been compelled to depend upon memory for the exact mechanical details but, providing consideration is given to the lay-out, any minor inaccuracies can be corrected in the lining-up process.

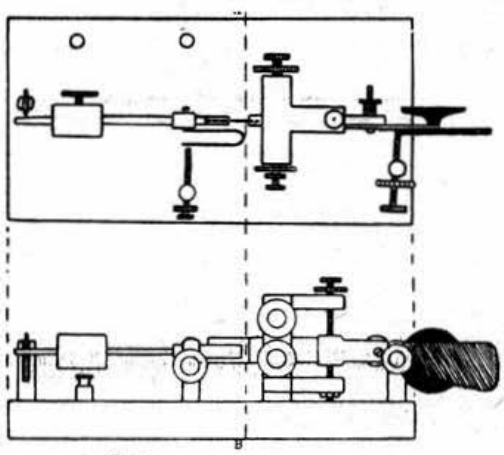


Fig. 1

Plan and side view of the semi-automatic morse key designed by the author.

Fig. 1, which shows the plan and side elevation, should be examined in conjunction with Fig. 4c, which depicts a cross section of the bridge.

General Features

The base, which consists of a solid piece of brass, or gun-metal, requires to be drilled in accordance with the information given in Fig. 2. All holes must clear, with ease, a 2BA screw.

Fig. 3a gives the relevant details of the dot and dash operating arms as well as dimensions for the spring, knob and handle.

The weight used to adjust the speed of the dots is made from $\frac{1}{2}$-in. solid brass rod $\frac{1}{2}$ in. in length, drilled to take a piece of $3\frac{1}{2}$ in. × $\frac{1}{8}$ in. brass rod. This hole should provide a good sliding fit. This brass weight is also drilled and tapped to take a 4BA set screw. The latter is made with a large head so that it can easily be fixed in the desired position by hand.

For the dot handle, a piece of $\frac{1}{8}$-in. sheet ebonite measuring $1\frac{1}{2}$ in. × 1 in. is used, whilst a knob from the junk box will provide a suitable dash handle.

Seven insulating washers are also required, and these are assembled in the following positions :—

One on top and one beneath each of the two pillars supporting the movable dot and dash contacts.

One on top and one beneath the base of one terminal.

One beneath the base of the other terminal, in order to bring it level with its neighbour.

For the pendulum spring, a 1-in. length of thin clock spring was used in the original design. For the " U " shaped spring a piece of phosphor bronze strip, measuring $1\frac{1}{2}$ in. × $\frac{3}{16}$ in. should prove satisfactory. A contact is riveted to one end, whilst the other end is soldered to the adjustable carrying piece. The whole is then bent to the required shape. The arrangement is shown in the right-hand corner of Fig. 3a.

Fig. 3b shows the under base connections, short strips of brass being used as indicated. Rubber feet are desirable in order to raise the key above the operating table.

Bridge and Supports

The bridge should be made from a solid brass block but, as this may be difficult to obtain, the original design has been modified slightly, so that it can be constructed from six smaller pieces of the same material.

Fig. 4a gives the dimensions of the three pairs of component parts. The function of the two small spacers, which measure $\frac{1}{2}$ in. × $\frac{3}{8}$ in. × $\frac{1}{4}$ in., is to raise the whole assembly sufficiently to allow for the adjusting screw and locknut to be easily accessible when the bridge is mounted on the base. No method of fixing the parts together is shown, but this can be achieved by means of screws or sweating. Care must, however, be taken to ensure that the six parts are accurately aligned and firmly secured.

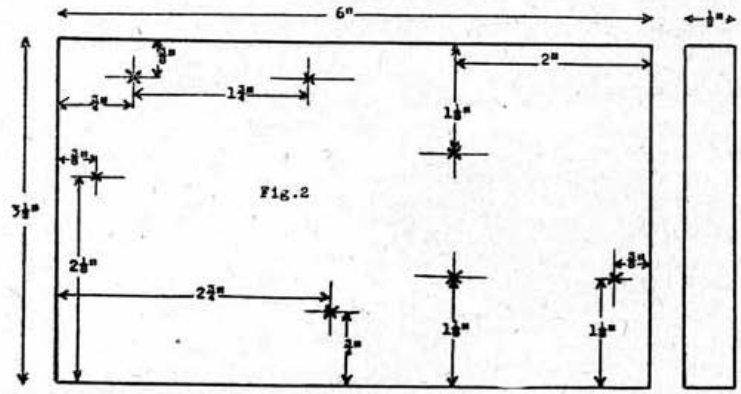
Three lengths of $\frac{3}{8}$-in. brass rod each 1 in. long are used for adjustment and contact supports, as shown in Fig. 4b. Two are drilled and tapped 2BA, $\frac{1}{4}$ in. down from one end, whilst the third is slotted at one end to a depth of $\frac{1}{4}$ in. and a width of $\frac{1}{8}$ in. The tapped holes take the adjusting pins, whilst the slotted portion must clear a washer which forms the stop at the weight end of the piece of $\frac{1}{8}$-in. rod referred to earlier. The washer (illustrated in Fig. 4b) is riveted to the slot by means of an $\frac{1}{8}$-in. rivet, so that it can revolve easily. The other end of each of the three supports is drilled, and tapped 2BA to allow for fixing through the base.

The two adjusting pins (shown at the bottom of Fig. 4b) are made from 2BA screwed rod, cut in lengths of $1\frac{1}{4}$ in., a round knurled terminal locknut being riveted and then sweated to one end of each. A further locknut is required for each adjusting pin so that the adjustment can be fixed.

In the case of the pin on top of the bridge, it is preferable to make this from screwed steel rod in order to minimise wear. This also applies to the set pin and locknut at the bottom end of the " T " piece which forms the lower bearing.

Contacts

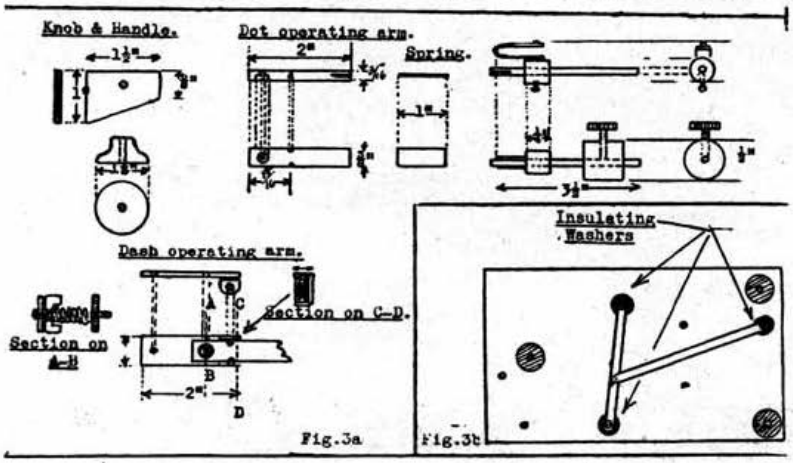
Four contact points are required, three with screwed stubs and the other suitable for riveting to the dot contact spring. The contacts, which should be of tungsten, can be obtained from firms specialising in magneto spares.

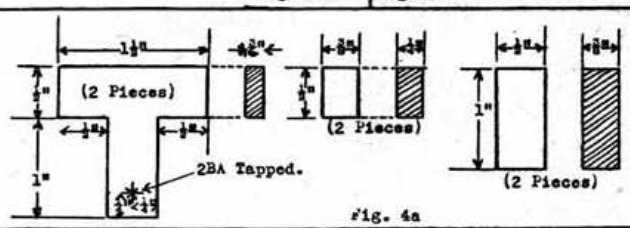


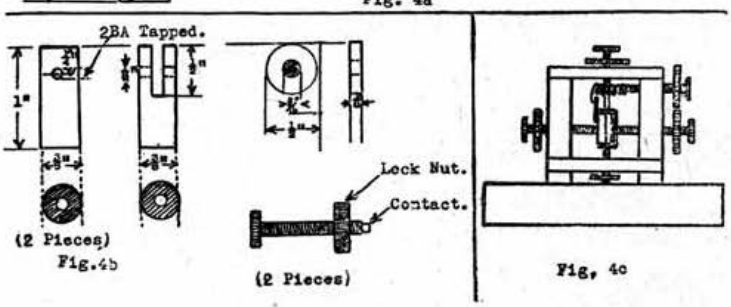
Conclusion

The drawings should enable any mechanically-minded reader to follow the description fairly well, but should any difficulty arise the writer will be glad to give further advice. It is realised that the raw material situation may present difficulties, but as the average amateur has a reputation for " scrounging," this should not cause abandonment of mechanical construction.

One last word of advice, don't begin to " swing a bug " until you have learnt to send morse properly on a straight key, and always use a monitor to ensure correct sending.







Component Parts for a Semi-Automatic Morse Key.

Fig. 2.—Scale drawing of base.

Fig. 3a.—Details of operating arm.

Fig. 3b.—Under side of base showing wiring.

Fig. 4a.—Bridge details.

Fig. 4b.—Adjustment and contact supports.

Fig. 4c.—Front elevation of bridge at A—B of Fig. 1.

MATHEMATICS FOR THE RADIO AMATEUR

By T. R. THEAKSTON, B.Sc. (2DBK).

PART VII.—LOGARITHMS—THEIR USE. THE SLIDE RULE.

IT was seen in Part VI that a logarithm is an index. In fact, common logs, those normally used, are indices of powers of 10. Thus, in saying that log $1\cdot234 = 0\cdot0913$, we are expressing in another form the fact that $1\cdot234 = 10^{0\cdot0913}$.

Therefore, in using logs we merely follow the laws of indices as laid down in Part V. These laws, which it should be remembered are true for any numbers, whether positive or negative, integral or fractional, are summarised on p. 284 of the March issue of this Journal.

The method of using logs will be clear after a careful study of the examples in each of the following sections. The first example, in each case, is detailed and worked out from theoretical first principles. This shows the derivation of the law for calculation with the aid of logs. The second example, in each section, shows the practical application of the law, without any recourse to theory, and is a model solution for the type of calculation. It should be noted that using 4-figure logs the 4th significant figure of the result may not be correct.

Multiplication

(1) Multiply $6\cdot39$ by $14\cdot72$.

$$\begin{aligned}\log\ 6\cdot39 &= 0\cdot8055, \textit{ i.e. } 6\cdot39 = 10^{0\cdot8055}\\ \log\ 14\cdot72 &= 1\cdot1679, \textit{ i.e. } 14\cdot72 = 10^{1\cdot1679}\\ \therefore\ 6\cdot39 \times 14\cdot72 &= 10^{0\cdot8055} \times 10^{1\cdot1679}\\ &= 10^{(0\cdot8055\ +\ 1\cdot1679)}\\ &= 10^{1\cdot9734}\end{aligned}$$

Now from table of antilogs we can find what number has a log $= 1\cdot9734$. It is found to be $94\cdot06$.

$$\begin{aligned}\textit{i.e. } 10^{1\cdot9734} &= 94\cdot06\\ \therefore\ 6\cdot39 \times 14\cdot72 &= \mathbf{94\cdot06.}\end{aligned}$$

Hence :—*To multiply two numbers, find their logs and add them. This gives the log of the product required, which is then found from antilog tables.*

(2) Multiply $179\cdot8$ by $0\cdot0483$.

$$\begin{aligned}\log\ 179\cdot8 &= 2\cdot2548\\ \log\ 0\cdot0483 &= \bar{2}\cdot6839\\ \text{Add : log (product)} &= 0\cdot9387\\ \therefore\ 179\cdot8 \times 0\cdot0483 &= \text{antilog } 0\cdot9387\\ &= \mathbf{8\cdot684.}\end{aligned}$$

Division

(1) Divide $8\cdot493$ by $3\cdot733$.

$$\begin{aligned}\log\ 8\cdot493 &= 0\cdot9291, \textit{ i.e. } 8\cdot493 = 10^{0\cdot9291}\\ \log\ 3\cdot733 &= 0\cdot5720, \textit{ i.e. } 3\cdot733 = 10^{0\cdot5720}\\ \therefore\ 8\cdot493 \div 3\cdot733 &= 10^{0\cdot9291} \div 10^{0\cdot5720}\\ &= 10^{(0\cdot9291\ -\ 0\cdot5720)}\\ &= 10^{0\cdot3571}\end{aligned}$$

From antilog table, antilog $0\cdot3571 = 2\cdot276$

$$\begin{aligned}\textit{i.e. } 10^{0\cdot3571} &= 2\cdot276\\ \therefore\ 8\cdot493 \div 3\cdot733 &= 10^{0\cdot3571}\\ &= \mathbf{2\cdot276.}\end{aligned}$$

Hence :—*To divide two numbers, subtract the log of the divisor from the log of the dividend. This gives the log of the quotient, which is found from the antilog tables.*

(2) $0\cdot0728 \div 0\cdot1598$.

$$\begin{aligned}\log\ 0\cdot0728 &= \bar{2}\cdot8621\\ \log\ 0\cdot1598 &= \bar{1}\cdot2036\\ \text{Subtract : log (quotient)} &= \bar{1}\cdot6585\\ \therefore\ 0\cdot0728 \div 0\cdot1598 &= \text{antilog } \bar{1}\cdot6585\\ &= \mathbf{0\cdot4555.}\end{aligned}$$

Involution

(1) Evaluate $(6\cdot753)^3$.

$$\begin{aligned}\log\ 6\cdot753 &= 0\cdot8295, \textit{ i.e. } 6\cdot753 = 10^{0\cdot8295}\\ \therefore\ (6\cdot753)^3 &= (10^{0\cdot8295})^3\\ &= 10^{(0\cdot8295 \times 3)}\\ &= 10^{2\cdot4885}\end{aligned}$$

from tables, antilog $2\cdot4885 = 308\cdot0$

$$\begin{aligned}\textit{i.e. } 10^{2\cdot4885} &= 308\cdot0\\ \therefore\ (6\cdot753)^3 &= 10^{2\cdot4885} = \mathbf{308\cdot0.}\end{aligned}$$

Hence :—*To obtain a power of a number, multiply the log of the number by the index of the power required. This gives the log of the required power, which is then found from antilog tables.*

(2) Evaluate $(0\cdot352)^5$.

$$\begin{aligned}\log\ 0\cdot352 &= \bar{1}\cdot5465\\ \text{Multiply by 5, for 5th power} &\qquad 5\\ \text{Product : log } (0\cdot352)^5 &= \bar{3}\cdot7325\\ \therefore\ (0\cdot352)^5 &= \text{antilog } \bar{3}\cdot7325\\ &= \mathbf{0\cdot005401.}\end{aligned}$$

Evolution

(1) Find the cube root of 842.

$$\begin{aligned}\text{Required } \sqrt[3]{842} &= (842)^{\frac{1}{3}}\\ \log\ 842 &= 2\cdot9253, \textit{ i.e. } 842 = 10^{2\cdot9253}\\ \therefore\ (842)^{\frac{1}{3}} &= (10^{2\cdot9253})^{\frac{1}{3}}\\ &= 10^{\frac{2\cdot9253}{3}}\\ &= 10^{0\cdot9751}\end{aligned}$$

from tables, antilog $0\cdot9751 = 9\cdot443$

$$\begin{aligned}\textit{i.e. } 10^{0\cdot9751} &= 9\cdot443\\ \therefore\ \sqrt[3]{842} = 10^{0\cdot9751} &= \mathbf{9\cdot443.}\end{aligned}$$

Hence :—*To find the root of a number, divide the log of the number by the index of the root required. This gives the log of the root, which is then found from antilog tables.*

(2) Evaluate $\dfrac{1}{\sqrt{0\cdot651}}$

$$\frac{1}{\sqrt{0\cdot651}} = \frac{1}{(0\cdot651)^{\frac{1}{2}}} = (0\cdot651)^{-\frac{1}{2}}$$

$$\log\ 0\cdot651 = \bar{1}\cdot8136$$

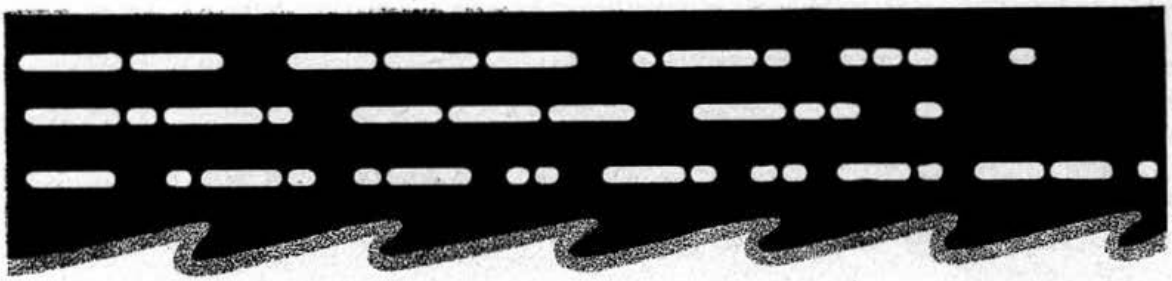
(Multiply by $-\frac{1}{2}$, *i.e.* divide by -2)

$$\frac{\log\ 0\cdot651}{-2} = \frac{\bar{1}\cdot8136}{-2} = \frac{-1\ +\ 0\cdot8136}{-2}$$

(Make characteristic exactly divisible by 2)

$$\begin{aligned}\frac{\log\ 0\cdot651}{-2} &= \frac{-2\ +\ 1\cdot8136}{-2}\\ &= +1\ -\ 0\cdot9068\end{aligned}$$

(Give in form with positive mantissa, before referring to antilog table.)



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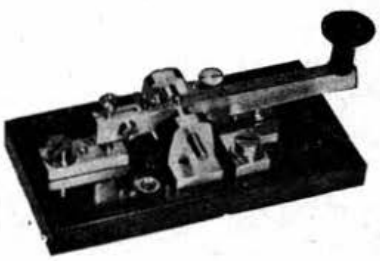

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$$\log 0\cdot651 = 1 - 0\cdot9068$$
$$= 0\cdot0932$$
$$\therefore \frac{1}{\sqrt{0\cdot651}} = \text{antilog } 0\cdot0932$$
$$= \mathbf{1\cdot240.}$$

Note :—The division by -2 could be avoided by treating the question as follows :—

$$\log \frac{1}{\sqrt{0\cdot651}} = \log 1 - \log \sqrt{0\cdot651}$$
$$= \log 1 - \frac{\log 0\cdot651}{2}$$
$$= \text{etc.}$$

Summary of the Laws

1. $\text{Log } (A \times B) = \log A + \log B$; $\text{Log } (14\cdot9 \times 3\cdot7) = \log 14\cdot9 + \log 3\cdot7$.
2. $\text{Log } (A \div B) = \log A - \log B$; $\text{Log } (\cdot073 \div 16\cdot94) = \log \cdot073 - \log 16\cdot94$.
3. $\text{Log } (A)^B = B \times \log A$; $\text{Log } (3\cdot48)^2 = 2 \times \log 3\cdot48$.
4. $\text{Log } \sqrt[B]{A} = \frac{\log A}{B}$; $\text{Log } \sqrt[3]{13\cdot92} = \frac{\log 13\cdot92}{3}$

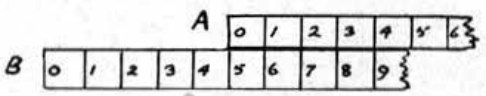


Fig. 5.
Using two ordinary scales for adding or subtracting.

Detailed Example :—

In conclusion, an example bringing in each of the above operations will be worked out.

Question :—What is the resonant frequency, in kilocycles, of an oscillatory circuit of capacity 180 $\mu\mu$F. and inductance 55 μH ?

$$f = \frac{10^6}{2\pi\sqrt{LC}} \qquad \text{(See p. 219, Vol. 16.)}$$
$$= \frac{10^6}{6\cdot283 \times \sqrt{180 \times 55}}$$
$$\therefore \log (f) = \log \frac{10^6}{6\cdot283 \times \sqrt{9900}}$$
$$= \log (10^6) - \log (6\cdot283 \times \sqrt{9900})$$
$$= 6 \times \log 10 - (\log 6\cdot283 + \log \sqrt{9900})$$
$$= 6 \times \log 10 - \left(\log 6\cdot283 + \frac{\log 9900}{2}\right)$$
$$= 6 \times 1\cdot0000 - \left(0\cdot7982 + \frac{3\cdot9956}{2}\right)$$
$$= 6\cdot0000 - (0\cdot7982 + 1\cdot9978)$$
$$= 6\cdot0000 - 2\cdot7960$$
$$= 3\cdot2040$$
$$\therefore f = \text{antilog } 3\cdot2040$$
$$= \mathbf{1600 \text{ kc.}}$$

Note :—On method : for arithmetical work generally.

In evaluating examples of a complex nature as above, the reader is strongly urged to set them out in similar form to that used, and proceed step by step, simplifying further with each step. With increased proficiency several intermediate steps will be omitted naturally. Individual parts of a complex problem should, however, never be taken out and calculated separately. Not only is orderly setting down (and that is a very great thing in all calculating work) made impossible by doing so, but there is the real chance of error when part-answers are collected together. Some may be omitted or transcribed incorrectly.

The Slide Rule

The slide rule is a mechanical device for performing arithmetical calculations in a simple manner. In the space at our disposal it is manifestly impossible to do more than give an outline of the theory and use of the rule. Slide rules vary greatly according to the use to which they are to be put. Different types are made for ordinary numerical computation, for trigonometrical work, for engineering and electrical calculations, or for navigational problems. In each case, however, the principle of action is the same, and it is this basic principle which can be considered here. For each individual type of slide rule there is always an accompanying booklet of instructions. Study of this, with much practice with simple numbers, will soon render anyone proficient in the use of a special type.

Fundamental Principle

It is easily seen that using the ordinary rules A and B simple addition, or subtraction, can be performed. To add 5 and 3 (see Fig. 5), slide rule A along rule B until the 0 on A is coincident with the 5 on B. The required sum is then on B, below the 3 on A. Conversely, to subtract 3 from 8, the 3 on A is made to coincide with the 8 on B, and the difference required is read off on B, below the 0 of A.

From the study of logs it will be clear that, by using logs in calculations, one replaces the processes

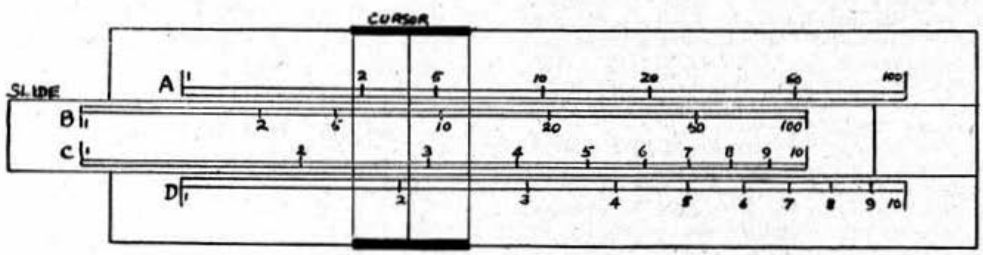


Fig. 6.
A simple representation of the Slide Rule.

of multiplication and division by addition and subtraction respectively. If then the two scales, instead of being divided into equal parts, had unequal divisions proportional to the logarithms of the numbers on the scale, the sliding of one scale along the other would perform addition as before. But, the scales being logarithmic, the addition would give the product of the numbers. In a similar way, subtraction using scales divided in logarithmic proportions, would give, in the difference, a quotient.

Construction

Essentially the slide rule consists of a fixed frame or scale containing a central groove in which a narrower rule slides. At least two calibrated and decimally divided scales are on the main stock, immediately above and below the central groove. These scales are usually 10 inches long, and referred to as A and D scales respectively. Scale A is numbered from 1 to 100, and D from 1 to 10.

The sliding rule also has two scales, B on the upper edge and C on the lower one. B, sliding along A on stock, is marked out exactly as A; and C, which slides along D, is marked out like D.

Without attempting to make any accurate representation of the divisions on the various scales, the disposition of these scales is shown in Fig. 6.

Calibration

The scales are calibrated, not in equal divisions, but logarithmically. Log 2 = 0·3010; log 3 = 0·4771; log 4 = 0·6021, etc., and log 10 = 1. Hence, Scale C, 10 inches long, and calibrated from 1 (on the left) to 10, has not the graduations marked 2, 3, 4, etc., respectively 1 in., 2 in., 3 in., etc., from the beginning. Instead, dividing the 10 inches proportional to the logs of the numbers 1 to 10, the calibration 2 is 3·01 in. from the figure 1 at the beginning of the scale; 3 is 4·77 in., 4 is 6·021 in., etc.

Use

Multiplication and division are effected by using scales C and D (or A and B with less accuracy), just as numbers are added or subtracted using two ordinary rules.

Squares and square roots are found by using Scales A and D, for the square roots of numbers in A are directly opposite in D. Conversely, the squares of numbers in D are directly opposite in A. To help one in reading across from one scale to another which is not contiguous, as for finding squares with A and D, there is a small frame, or cursor, with a hair line across it perpendicular to the length of the scales. This cursor slides along the rule and the line is used to project a reading from one scale to another. Thus, moving the cursor so that the line coincides with a number in A, the square root will be below the line, on D. The cursor is also of great value for marking intermediate steps in a continued multiplication.

Cubes and other powers are found by repeated multiplication.

As stated previously, no attempt can be made here to deal fully with the slide rule. It remains for the reader, who visualises the possibility of increased speed in calculations, to study the particular rule he obtains, in the light of the above extremely brief outline.

Problems

(30) Use logs to evaluate:

(*a*) $(4 \cdot 53)^3$; (*b*) $\sqrt[4]{65 \cdot 78}$; (*c*) $\dfrac{0 \cdot 392 \times 18 \cdot 58}{0 \cdot 178}$

(31) What frequency in kilocycles equals a wavelength of 40·52 metres?

(32) What is resonant wavelength for a circuit of 250 μμF. capacity and 30·5 μH. inductance?

(33) What is resonant frequency for a circuit of 45 μμF. capacity and 3·0 μH. inductance?

Suggested Exercises

(1) More practice in using logs could be obtained by making up simple numerical examples, with quantities that can be worked out easily by ordinary methods. The result could then be obtained by using logs. Examples for this speed-and-accuracy practice are simple to construct. For example:

(*a*) $1 \cdot 7 \times 3 \cdot 2 = 5 \cdot 44$.
Verify that $\log 1 \cdot 7 + \log 3 \cdot 2 = \log 5 \cdot 44$.

(*b*) $0 \cdot 8442 \div 0 \cdot 63 = 1 \cdot 34$.
Verify that $\log 0 \cdot 8442 - \log 0 \cdot 63 = \log 1 \cdot 34$.

(*c*) $6^3 = 216$.
Verify that $3 \times \log 6 = \log 216$.

(*d*) $\sqrt{0 \cdot 3364} = 0 \cdot 58$.
Verify that $\dfrac{\log 0 \cdot 3364}{2} = \log 0 \cdot 58$,

and so on, until real proficiency in reading tables, and in the methods of using logs, is obtained.

(2) For those who wish to progress further and increase speed as well as decrease labour in computing numerical solutions, a slide rule should be obtained. For ordinary purposes the type known as a "Log-Log" Rule is ideal. To extend the scope of its use to trigonometrical work, a "Universal" Rule should be used. The accompanying book of instructions should be studied carefully. The method of using the rule will soon be apparent, and then it is, again, only repeated practice that will make the use of the rule automatic. As stated in the suggestion for practice in log work, here again the best and simplest practice is with examples easily verified. Suitable types for the slide rule are such simple ones as:

$4 \times 0 \cdot 7 = 2 \cdot 8$; $1 \cdot 65 \div 0 \cdot 5 = 3 \cdot 3$; $\sqrt{2 \cdot 25} = 1 \cdot 5$; $19^2 = 361$; etc.

Solution to Problems

(22) 2; $\bar{1}$; 1; 4; $\bar{3}$.

(23) 240·8; 0·2408; 24·08; 2408; 0·02408.

(24) 2·5998; 0·9196; $\bar{1}$·8261; 1·1559; $\bar{3}$·8856.

(25) 46·91; 0·1990; 3770; 1·169; 0·02500.

(26). (*a*) 5·1; 3·1; $\bar{3}$·1; $\bar{1}$·1.

(*b*) 1·5; $\bar{5}$·5; $\bar{1}$·5; 5·5.

(*c*) 6·8; $\bar{2}$·8; $\bar{5}$·5; $\bar{1}$·4; $\bar{2}$·5.

(*d*) 1·04; $\bar{1}$·04; $\bar{1}$·85; $\bar{1}$·56; $\bar{3}$·8.

(27) 0·7724.

(28) $\bar{4}$·9358.

(29) $\bar{1}$·57842.

(*To be continued next month.*)

A FIELD OPERATOR'S 'VADE MECUM'

PART III.

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

Here is a further selection of useful hints for the radio amateur, who finds himself called upon to carry out prompt repairs " in the field." In preparing these articles, for the special benefit of those on active service, the author is aware of the almost complete absence of published information dealing with improvised methods of correcting circuit and component defects.

25. *A variable resistor or potentiometer (for example, an h.f. or l.f. gain control) has developed a poor contact on the most used portion of its track. There will be considerable delay in obtaining a replacement from the stores, and you fear the resistor may break down completely in the meantime. What steps could you take to avert this—apart from not using the control?*

In the case of a variable resistor, the connection to one end of the track should be removed. and taken to the opposite end. For a potentiometer, the outer connections should be reversed. The moving contact will now work chiefly over the opposite end of the scale, so reducing travel on the worn portion of the track.

26. *What further steps should you take?*

The effect of the change will be to reverse the positions of maximum and minimum gain. Therefore, these markings on the panel should be changed, using a soft pencil, for erasing when a new control can be fitted. In addition, a label should be attached to the equipment stating what change has been made, and the reason for it. It is inexcusable to leave equipment for the next operator in such a condition that with the control at ' max. gain ' there is complete silence, so that only after fruitless testing does he discover that signals roar in with the control at ' min. gain.'

27. *The tone control of your family broadcast receiver consists of a variable resistor in series with a condenser, and worked off the same shaft as the on-off switch. The control is generally set to the ' brilliant ' response setting, which involves tuning the knob through about 200° to the maximum setting. How would you avoid this rotation each time the set is switched on or off?*

As wired by the makers, the resistor will be at a minimum when the set is just switched on, and will increase as the knob is rotated. If the connection to one end of the resistor track is removed and taken to the other end of the track, then the full value of the resistor will be in circuit when the set is just switched on, which is the condition required. The operation of the tone control is unaffected, apart from the reversal of the ' brilliant ' and ' mellow ' settings.

28. *Fig. 1 shows a portion of the coil box of a communications receiver. You have located a fault in coil A. How would you repair this, remembering that the coil box will be crowded with the coil-switch, trimming, padding and blocking condensers?*

If the break is near the outer surface of the coil, only a comparatively few turns may have to be unwound, and it will not be necessary to remove the coil from the box. Unsolder the coil connections, and apply a simple continuity test, using a dry cell and voltmeter in series. Connect one lead to one end of the coil, and the other to a pin. Lightly press the pin through the insulation of the wire at various points down the side of the coil, and so determine at what depth approximately the break has occurred. Now if the break is more than about two layers from the outer surface, it will be almost impossible to unwind (and still harder to rewind the coil) without removing it from the box. Removal of the whole former will entail freeing the mounting brackets, which are often riveted and inaccessible without moving padders and trimmers. Also it will involve unsoldering the connections of the second coil on the former. Therefore, in the field, it will generally be much quicker to cut through the coil-former with a sharp knife, or a short length of hacksaw blade, along the lines BB, so that coil A by itself may be lifted clear. After rewinding, the coil may be replaced and the coil-former secured in position with a band of adhesive tape. Slight adjustment of the trimmer and padder in the repaired circuit may be necessary.

29. *Would you normally attempt to re-align the tuned circuits of a receiver in the field, using only actual signals, there being no auxiliary test gear available?*

Unless the tuning appears unduly flat or double-humped, or the calibration has deteriorated, it would probably be best to leave matters alone. Re-alignment on signals is possible, though rather hard, and while the performance at a given frequency may perhaps readily be improved, it is usually found that the sensitivity or calibration at another point of the tuning range has been considerably impaired. The operator should have had plenty of practical experience in alignment of multi-circuit equipment during training, and where test equipment is not available, the temptation to interfere with trimmers and padders should be resisted unless the need is obvious. In any case, always make a pencil mark to show the setting of trimmers and padders before any adjustment is tried, so that should one get into difficulties, they can be reset at their former values till proper servicing equipment is available.

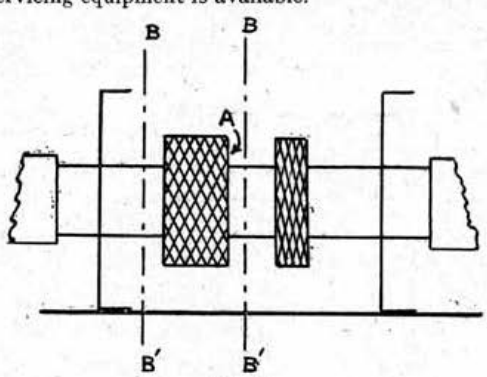


Fig. 1.

The answer to question 28 explains how to repair a fault in the coil marked " A."

30. *The somewhat crude method of testing for continuity by means of a voltmeter and a pin lightly pressed through the insulation of a wire can presumably be employed in many cases?*

Yes, and it is especially useful in tracing wiring behind switch-boards, in bunched lengths, and so on. The hole made by the pin in the covering of the wire is so small that it closes by itself. Great caution must obviously be used when tracing wiring which may have fairly high voltages on it. The pin should be well insulated in a wooden holder, and the operator should concentrate on the test, taking all precaution against accident either to himself or to equipment.

31. *Suppose you were able to have only one instrument for fault finding. Which would you select?*

I would take a moving coil milliammeter, reading about 0/5 milliamps, with an actual scale length of some 2½ inches. By itself, the anode and screen currents of almost all battery valves (except those of the output type) may be measured. With the addition of simple shunts which can be made by the operator, the current ranges may be extended as required. The addition of series resistances, which may be of the ordinary 1-watt type, will permit the measurement of voltages ranging from a fraction of 1 volt to 500 volts or more. The writer prefers a 0/5 mA instrument to a 0/1 mA model, as the latter will require to be used with a shunt more often than the 0/5 model, which will be found to cover a very useful range.

32. *How would you prepare shunts for the milliammeter, without knowing its internal resistance, and without any wire resistance tables at hand?*

Suppose it is required to measure currents up to 50 mA, using the 5 mA instrument. One-tenth of the total current must pass through the instrument. Connect it in a circuit where the current is near the full scale reading, say 4·8 mA. When the instrument is shunted, it must read one-tenth of 4·8mA. Obtain some fine wire (about gauge 36 DCC for example, if copper is employed) and wind it round a suitable former, such as a ¼" diameter rod. Connect the beginning of the shunt to one terminal of the milliammeter, and from time to time scrape clear a very small portion of the wire and touch it against the remaining terminal of the instrument. With only a few turns on the shunt, the milliammeter reading will drop from 4·8 to perhaps 0·1 mA. When more turns are added, the reading will drop from 4·8 mA to perhaps 0·3 mA. When the reading drops to 0·48 mA, the shunt is of the correct value. Winding is stopped, the wire cut, and both ends of the shunt soldered to strong leading-out wires or strips to fit the terminals of the instrument. It will be seen that this method does not even require a second instrument in order to prepare the shunts. When, however, the current to be measured is very considerably greater than the full scale reading of the instrument, the method is not practical; for instance, a shunt to read a current of 1 ampere on a 0/5 mA instrument could not be made without the assistance of an ammeter.

33. *For measuring voltages by means of the 0/5 mA instrument, what series resistors would you use?*

The ordinary carbon 1-watt types are generally quite accurate enough for test purposes, their resistance being often well within 3 per cent. of their marked values, though the manufacturers may only guarantee a figure of 10 per cent. A selection of six ranges should prove ample. For instance, a resistor of 100,000 ohms will permit voltages up to 500 to be read, being very suitable for mains receivers, speech amplifiers, etc. For battery equipment, a resistor of 25,000 ohms will cover voltages up to 125. A 4,000 ohm resistor will read up to 20 volts, convenient for checking 12 volt car batteries, etc. If a full scale reading of only about 0·5 volts or less is required, then allowance may have to be made for the resistance of the milliammeter, but above this range, the effect will be entirely negligible.

34. *The outfit described will measure on D.C. only. Would not the addition of a compact rectifier of the metal oxide type increase its usefulness considerably?*

This would certainly increase the usefulness but the alternating current range, and probably the lower alternating voltage range will require a separate scale to the uniformly divided D.C. scale. While A.C. measurements are of great importance in the design of equipment, probably about 95 per cent. of faults in already constructed equipment can be located by means of voltage, current, and resistance tests with a D.C. instrument.

35. *You desire to measure the total current taken by a valve in some equipment. No provision has been made for the insertion of a milliammeter in the wiring. How would you proceed without disturbing the wiring?*

As the total current is specified, this will necessitate connecting the milliammeter in the cathode circuit of the valve. In the case of directly heated valves, the currents passing through each electrode will have to be measured separately. A few turns of thin paper should be wrapped round the cathode pin of the valve, so that when the valve is inserted into its socket, the cathode pin will be insulated from the contact on the socket. A milliammeter connected between the cathode pin and the contact will show the current passing.

An alternative method in the case of indirectly heated valves, where bias is obtained by means of a resistor in the cathode lead, is to measure the voltage across the resistor, and divide by the value of the resistor in ohms. It is safer to check the actual value of the resistor rather than rely on the colour code, in case through overload, etc., the figure may have altered appreciably. This method fails, however, in circuits where a suppressor grid or a positively driven control grid is returned not to chassis, but direct to the cathode contact of the valve socket. In such cases, the current due to these electrodes will not pass through the cathode bias resistor, and attempts to measure the total current by measuring the voltage drop will give too low a figure. The method of insulating the cathode pin will always give the total current, while in addition it is more direct and accurate than the bias voltage method.

36. *Suppose that when measuring the current, instability results, with consequent variation of the current from its normal value. How would you avoid this?*

The instability can be stopped by shorting either the input or output circuit. In the case of tuned circuits, the coil and *not* the condenser should be shorted, unless one is familiar with the circuit. The reason for this is that in many cases, a blocking condenser is inserted between the " earthy " ends of the coil and tuning condenser, so as to permit the application of bias or anode voltage to the valve *via*

the coil. Shorting the condenser would thus also short the bias or anode voltage, while shorting the coil is clearly perfectly in order, except in the rare cases where the coil is split. In cases where the condenser may be shorted, a strip of silver paper between fixed and moving vanes is a quick and convenient device.

Tests for A.C. and D.C.

The two queries at the end of Part II have produced quite a number of helpful letters and sketches. G2IT, 3CJ, 5CX, 5VT, 2ARW, 2DVA and BRS4063 have all described the simple method of telling whether a lamp is working off an A.C. or D.C. supply by waving a pencil under the lamp and noting the appearance. The following would seem to be a fair summary of their descriptions. Stand under the lamp. Choose a thin, reflecting rod, such as a pencil, or the blade of a pocket screwdriver, and move it to and fro in quite a slow oscillation, while looking down past it, preferably on to a dark background. If the lamp is working off A.C., the movement of the pencil will have a number of flickering images or striations behind it, giving an appearance somewhat as shown in the sketch. On a D.C. supply (or if the pencil is moved excessively fast on an A.C. supply) no separate images or striations will be observed, but merely a blur.

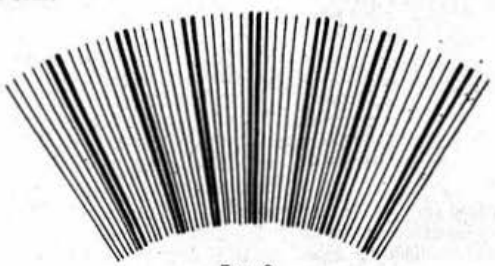


Fig. 2.
Appearance of a moving pencil illuminated by an A.C. supply. Note multiple images.

Correspondents point out that best results are obtained with a low current lamp, as the thin filament will heat and cool to a greater extent each half cycle than the thicker filament of a high current type. In fact, best results of all are obtained with non-filament lamps, such as neon tubes, or vapour discharge lamps, in each of which types the effect is strongly pronounced.

Similarly, a thin reflecting rod viewed against a dark background is more satisfactory than a thicker, matt object, such as one's finger, at any rate, when first trying the test.

One point the writer was doubtful about was whether the test would fail in the case of a D.C. supply having a very pronounced commutator ripple, such as one might possibly find in the case of a small camp supplied by a portable generator having comparatively slow speed and few commutator segments. 2ARW has been able to make a further test on such a rough D.C. supply, and has found that the ripple amplitude was too small to give any tendency towards an A.C. indication. Similarly, D.C. obtained from a grid controlled mercury arc would probably prove satisfactory, and it is only in cases such as A.C., where the current passes through zero each half cycle, that the image effect is noticeable.

Emergency Fluxes

In answer to the query about an emergency flux for remaking a broken joint, correspondents agree that soaps, oils, waxes, etc., can mostly be pressed into service. G2IT sends specimen joints made with yellow household soap (Sunlight) and tinman's solder, showing that the solder has flowed very freely into the joint. BRS4063 suggests borax, pure lubricating oil, sal ammoniac (used in bell-ringing Leclanche cells) and even as a last resort, spittle! G5VT suggests tallow, or, where a violin is around, rosin will be available. (The writer believes that rosin is not the same as resin). Probably any substance can be used which is not too rapid in charring or boiling away and will cover the joint till the solder has flowed, but correspondents point out that such emergency fluxes will probably cause corrosion in time.

Sulphate on Accumulator Plates

In regard to the answer to Question 18, dealing with sulphate on the plates of an accumulator which read: "I would remember that the sulphate has been formed from the active material of the plates; that it is useless, and cannot be reconverted to active form . . ." G8JV points out that this is misleading, as the formation of sulphate is part of the normal discharge action of a cell. At one time the idea was held that sulphate after standing became no longer reconvertible to active material, and 8JV mentions that while the complete chemical and physical changes in a cell are still not fully understood, this idea is now generally held to be a myth. Consequently it should always be possible to reconvert the sulphate to active material by a prolonged charge. It is necessary to reduce the charging rate to a very low value, or premature gassing will result from the decreased active area of the plates, but 8JV finds that in practice the treatment is satisfactory and the plates regain their former healthy colour. The writer has always found that the removal of any appreciable deposit of sulphate is a task of doubtful result, possibly because he has not persevered sufficiently with the prolonged charge. If anyone can supply figures showing what degree of improvement in capacity of the cell after treatment can be expected, such details would be very welcome.

EXPERIMENTAL SECTION

IN the March issue there were included a few general rules to be observed when designing a stable oscillator for use as a Signal Generator. One such rule stressed the necessity for avoiding strong oscillations; the following notes are intended to amplify the rule and to explain why strong oscillations are harmful to stability.

When a valve circuit oscillates, the amplitude of the oscillation builds up theoretically to an infinitely large value, but in practice there are certain limiting factors. These factors are filament emission, valve characteristics and circuit resistance. The voltages applied to the electrodes also affect results. In a " straight " receiver the amplitude of the oscillations is usually controlled, but in oscillators employed in transmitters and signal generators this control is not usually included, with the result that the oscillation builds up until the valve works over the whole of its grid volts-anode current characteristic. This characteristic is not linear at its extremities; consequently when the valve operates at either end, rectification occurs, resulting in distortion and

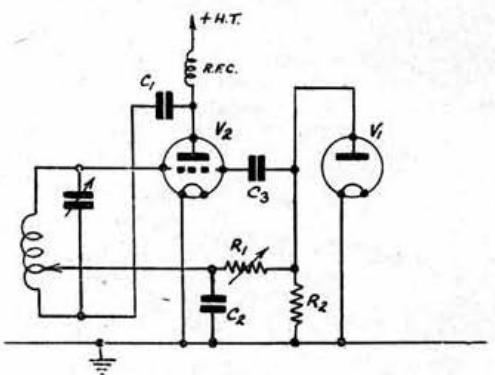


Fig. 1.

R1	20,000 ohms, variable.	C1, C3	·001 μF.
R2	0·5 megohms.	C2	·0001 μF.

(For frequencies below 14 Mc.)

instability. It is necessary, therefore, to limit the operation of the valve to the straight portion of its characteristic curve, which can be achieved by applying A.V.C. principles.

Fig. 1 shows the basic circuit of this arrangement, which is applicable to audio as well as to radio frequencies. The automatic control is effected through the rectification (by means of a diode) of part of the oscillation, the D.C. voltage so obtained being applied to the grid of the oscillator valve. Hence, any rise in the amplitude of the oscillations results in an increased negative bias, which counteracts the effect; a state of equilibrium is thus achieved. In Fig. 1 V_2 is the oscillator and V_1 the diode. The filter R_1C_2 is used to remove the R.F. component from the rectified output. It is important that the time constant of the filter be correct, for if it is too large motor-boating results, whereas if too small the control fails. A variable resistance enables the correct value to be found by experiment.

A complete generator incorporating automatic control is shown in Fig. 2, the amplitude of the R.F. signal being controlled by R_1 and the modulation percentage by R_2. Almost any tetrode will function as an R.F. oscillator and no external feedback is required for the oscillator since the valve is operated as a dynatron. In Fig. 2 V_1 is the R.F. oscillator, V_3 the modulator, and V_2 the R.F.

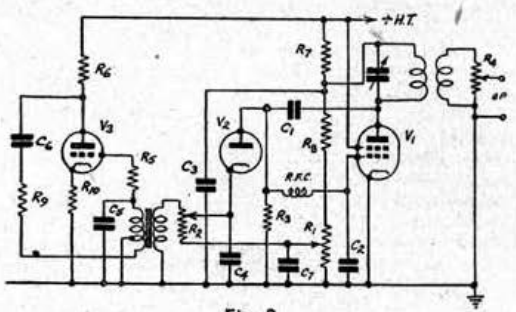


Fig. 2.

C1, C2	·0001 μF.	R3	1 megohm.
C3	4 μF.	R4	200 ohms, H.F. Screened.
C4	·001 μF.		
C5	·01 μF.	R5, R7, R9	5,000 ohms.
C6	·1 μF.	R6	50,000 ohms.
C7	2 μF.	R8	2,000 ohms.
R1	2,500 ohms variable.	R10	1,000 ohms.
		V1	AC/S2 (Mazda)
R2	100,000 ohms variable.	V2	6H6
		V3	6C5

control diode. If necessary, the automatic control may be fitted to the audio oscillator as well as to the R.F. oscillator; the circuit principles are exactly the same in either case. The distortion in such a circuit is very small, as the valve is operating at its optimum point all the time. In practice, the output from the oscillator coil should be taken through some form of amplifier so that the load has no effect on the stability of the oscillator. This point will be discussed next month. G5HF.

Cosmic Notes

Magnetic Conditions: January 18 to February 14 inclusive, fairly quiet with mild storms on January 18, 23, 24, 25 and February 6, 7.

Ionosphere Storms; January 22 to February 18 inclusive, mild storm February 3 and moderate storm February 13–14, otherwise undisturbed conditions.

Critical Frequencies and virtual heights, at Washington, average for weeks ending, midnight F, midday E and F2 respectively:—January 28, 2·9 Mc. 290 km.; 3·05 Mc. 120 km.; 8·8 Mc. 260 km. February 4, 2·96 Mc. 320 km.; 4·12 Mc. 120 km.; 9·01 Mc. 246 km. February 11, 3·57 Mc. 287 km.; 3·1 Mc. 123 km.; 7·67 Mc. 259 km. February 18, 3·3 Mc. 300 km.; 3·09 Mc. 125 km.; 7·46 Mc. 277 km.

(It is regretted that data for the above did not arrive in time for publication in the April issue.)

G6DH.

KHAKI AND BLUE

Items for inclusion in this exclusive feature should reach the Secretary-Editor not later than the first day of the month preceding date of publication.

The many friends of Alan Mears, G8SM, will be sorry to learn that he has been discharged from the R. Signals due to ill-health. Alan has now assumed his pre-war office as Hon. Treasurer of the Thames Valley Amateur Radio Transmitters Society, and hopes to revive meetings soon. He sends special greetings to the GI's who entertained him so royally whilst in Belfast.

* * *

We learn from W./O. A. E. Lambourne, G5AO, that a very large number of amateurs are attached to the Technical Wing of a well-known R.A.F. station in Middlesex. Included are F./Lt. H. C. Page, G6PA, F./Lt. Goudie, G8VC, F./Sgt. Gilhespy, G6GS, F./Sgt. Browning, G8TK, F./Sgt. Ranft, G5RF, F./Sgt. Fleet, GW8JY, F./Sgt. Barnard, G8AC, Sgt. Murphy, G2MY, Cpl. Barnes, G3JO, Cpl. Guy, G8TH, Cpl. Budd, 2BKD.

G5AO believes this " outfit " is about the only one in the service that has kept together so many hams for such a long period. Any claimants ? A.E.L. sends 73 to all old friends wherever they may be.

* * *

L.A.C. Alimundo, G4HK, would like to hear from G6KS of Liverpool, and 6SO of Scarborough. Letters should be sent *via* his home at 6, Devonshire Road, Heaton Moor, Stockport.

* * *

Congrats. to Cpl. David George, G2UA, R.A.F., whose marriage to Miss Joyce Ashman took place recently. In sending greetings to all old friends in the Croydon and Medway areas, he asks us to record for their benefit that his new home address is 39, Albert Road, Epsom.

* * *

Congrats. also to Jimmy Watson, G6CT, who has been granted a commission as P/O in the Signals Branch of the R.A.F., after serving for 18 months in the ranks. He sends 73 to all old friends.

* * *

C. W. Plimmer, BRS2786, a Telegraphist aboard H.M.S. *Chantala*, laments the fact that he has not heard from, or contacted any amateur, since the beginning of the war. He would particularly like to hear from members stationed in VS7.

* * *

Friends of W. H. G. Metcalfe, VU2EU, will be glad to learn that he is now a Sergeant in the R. Signals, located at Abbottabad, N.W. Frontier. He would appreciate a line from any member who has the time to write. Letters should be sent *via* G6CL.

* * *

Those who have worked ZC6RL will be interested to know that Capt. Rodney Lyall, R. Signals, is fit and well. His last letter reached us from the Middle East. He met SU1SG and 1DM " early on " in the war but has seen no hams for many months.

* * *

" Top-band " enthusiasts will join us in offering congratulations to M. J. Heavyside, G2QM of Bradford who has been granted a commission as Sub./Lt. in the R.N.V.(W)R., after serving as a Leading Telegraphist since the outbreak of hostilities. He laments the absence of news from Bradford.

Among recent arrivals at Marne Lines is Cadet Derek Scott-Job, G4BA, who tells us he has met Monty Campbell, G8MK, and that his room-mate is Fred Saxon, Jnr., son of VE3SG. The latter is now a member of the Society. As there are several members on Cadet Courses at the camp referred to, we suggest an attempt be made to hold a Ham Gathering. G4BA is on Course 28 (No. 3 Coy.), and G8MK on Course 32 (No. 4 Coy.).

* * *

A.C.2 S. Mackay, 2FTN, whose home address is 472, Great Northern Road, Woodside, Aberdeen, is anxious to contact Robert Sangster, VE3FB, R.C.A.F. (110 A Co-operation Squadron). Can anyone help ?

* * *

Friends of R./O. Ronald Strickland, 2CBQ, of Sheffield, will be glad to learn that he escaped safely when his ship was torpedoed and sunk in the Western Ocean last February. Ronald has just been home on " shipwreck " leave.

" 'ell of a lot of D's old man,"
" Yes, just put 'em up in case Jerry invades ! ! ! "

Writing from " somewhere at sea " A.C.2 D. W. Surman, BRS4045, tells us that A.C.2 W. Parker, G3GD, was with him aboard ship. He also met GW3QB and 2BGZ on the way out. From what we can gather they spent most of the journey mixing 6L6's with lemonade ! Surman sends special greetings to G4PX, and all old friends in Birmingham. His address is U.S.O.V., c/o A.P.O. 415.

* * *

The " DX Brigade " will be interested to hear that Maj. Atkinson, VU2FA, has recently been promoted to the rank of lieutenant-colonel. His fine phone signal on 14 Mc. will be remembered by many G's.

* * *

Friends of R. Newsham, G3HK, may like to know that he is employed at an R.A.F. aerodrome in Westmorland as a W.E.M. (civilian branch). Letters should be sent c/o his home address, 44 Regent Street, Nelson, Lancs.

* * *

Writing from The Rock, Rowland Beardow, G3FT, reports having met G2RQ and GM3TD, both of whom are in the C.S.W.S. A recent arrival was J. Haw, BERS454, who during his stay contacted BERS481 as well as G3FT.

Local meetings have been suspended *pro tem*, but it is hoped to restart them soon.

* * *

Sq./Ldr. Ken Jowers, G5ZJ, has left England for what he calls a " real DX trip." He has been put in command of a new formation which comprises many of those who were with him in France last year. Ken sends 73 to G2AI, 5UM and all in District 12 who remember him. His address is A.P.O. 890, c/o G.P.O., London.

* * *

From W./O. Ted Laker, G6LK, comes the news that he too will soon be leaving for abroad. He anticipates a Cook's Tour *via* ZB1, with possibly a look-in at VS6 and SU. Good luck, Ted, and happy landings !

Another

Ham Gathering

will be held at

THE COUNTY HOTEL SALISBURY

on

Saturday, May 31st, 1941

At 3 p.m.

All intending to be present are asked to advise F/Lt. J. N. Walker, G5JU, South Lodge, Churchfields Road, Salisbury, by May 28th.

INCLUSIVE CHARGE 2/-

Cpl. A. M. Boyce, 2CMR (No. 3 S.S.), reports having met F./O. R. L. Markham, G6MK, who is an M./O. at the school. G4GG, has been posted. VE2VY and VP6MK, have also vanished.

* * *

Major R. E. Trebilcock, M.C., well known to many " G " phone stations as VK3TL, has been appointed to command a volunteer defence corps in Northern Victoria. He hopes to go abroad on active service again shortly.

Ham Activity in Wiltshire

Another meeting of Society members and friends took place in Salisbury on April 19, when an attendance of 24 was recorded. A goodly percentage of those present at the previous meeting attended, whilst many fresh faces were noted, including " Dud " Charman, G6CJ. Disappointment was expressed at the absence of " Clarry," due to transport difficulties.

The meeting was again of an informal character. VE3AWN, lately of Southern Ontario, gave a short talk on amateur radio in his home district, mentioning that the initial licence covered the use of 500 watts input !

G2YN then raised the subject of the future of amateur radio and gave his views. An interesting discussion followed, several speakers agreeing that such qualifications as sound technical knowledge and good operating ability were essential, whilst a probationary period on C.W. before the employment of telephony would be good policy.

A further meeting will be held at the same time and place on Saturday, May 31. Tentative arrangements have been made for a film display and it is hoped that all members and friends, civilian and Service, will endeavour to attend. J. N. W.

Ham Coincidence

Glancing through the March BULLETIN, A.C.2 D. F. Sullivan, 2FCJ (who is stationed somewhere in South Wales) recognised a photograph reproduced therein as being of someone he had noticed previously in the town. A couple of evenings later, whilst taking supper in a café, he saw the person concerned walk in with a friend. After completing his meal he decided to make contact.

The visitors turned out to be VE1ER and VE4OS ! As a result of the meeting the miniature hamfest recorded in District 15 notes took place.

A Card comes Home

From " somewhere in the South Atlantic " comes a QSL card of greetings signed by F./Lt. S. W. P. Henton, G5VU, P./O. G. Mason, G5BR, P. Medcalf, 2FXU, P. T. Beer, G3AX, K. E. Phillips, BRS.3763, B. Radcliffe, G2ZY, H. Larter, G3AB, and W. Martin, G4LY. Greetings were also included from F./Lt. R. Bloxam, G6LS, who met the party at an earlier port of call.

The card was one of G6CL's own QSL's handed to G5VU whilst on embarkation leave in January !

73.

G2AI to G2MI, 5QF, 6LL, 6OT and 8TY.

* * *

G2RC to G2GZ, 2JB, 2JK, 2WV, 3TA, 3ZJ, 4AU, 6QN, 6WY, 2FRM, ZD4AB, SU5KW.

* * *

G2SO ("Sunnybank," Woodside, Leigh-on-Sea), to G2OB, 3BS, GW, XV, 4LV, 5IV, 6UT, GI5TK, VU7BR, and the "Southend Gang."

* * *

G2VA (R.N.), to G2IG, 5FN, 5MM, 6NU, 6QC, 6RQ, 6SR and Medway and Sheerness members.

* * *

G2WQ (Manchester), to G2OA, 5OZ, 6TT, 6ZU VK2YC, ZL2OQ.

* * *

G3LP (R.A.F.), to G3HB, 3IY, 3JO, 3KX, 3ZL, 3SB, 3WW, 3YZ, 6CI, 2ATB.

* * *

G3LR (R.A.F.), to G2HW, 2PB, 2TU, 3LS, 3VV, 4GM, 4KT, 4MU, ZD2H and all the Blackburn group.

* * *

G3PL to G2PC, 3ZL, 5MN, 5WG, 2BRY, 2FGQ, 2FQJ, 2HAD, 2HJZ, BRS1948 and all 1·7 and 7 Mc. friends.

* * *

G3YY to G2AO, 2KU, 2MV, GW3VL, G3XX, 4JH, 5LU, 6FU, 6LK, 6YI, 2ACU, 2CIA, and all members of "PZK" in this country.

* * *

G8ST (Bangalore, India), to G2NJ, 2PL, 2XV, 5BQ, 5DQ, 5OQ, 5OV, 5RL, 6FL, 6LJ, 6WA and 8JS.

G8UO (13 Chandos Street, Keighley, Yorks), to G2VO, 3KB, 3MD, 30A, 3WP, 4LV, 4MC, 8RW, 8SJ, EI5L, W8FHB and W8TVM.

* * *

2BKO (R.A.F.) to G2HW, 2OI, 4HK, 2DRR and other members of the Manchester section.

* * *

2DHV (R.C. of S.), to G2OA, 2WS, 2XT, 2YZ, 6SN, 6SY, 8RK, 2BBB, 2BZK, 2DBA, 2DXP, 2FPA.

* * *

2FTN (R.A.F.), to G3WP, GM3RL, 5UT, 8SV, 2CMR, 2FXS and 2FZU.

* * *

BRS193 to G2IM, 2MV, 2XA, 2ZC, 3RC, 3WH, 6KU, GM3OM, 2BIL, 2CJC, 2FYF, BRS3503, and all members of D.D.A.R.S.

* * *

BRS2999 (Wigthorpe, Worksop, Notts), to G2MN, 2XS, 3RW, 5QO, 6MN, 8ON, 2BIC, 2FAO, 2HFK, BRS3468, 3766, 3821, and all old Yarmouth friends.

* * *

BRS3003 (122 St. Andrew's Road, Coulsdon, Surrey), to G2FI, G2VZ, G3YY, G4AA, G4NI, G5LA, G5XH, G8IG, 2DDD, VE2EE, VK6WZ and VU2EU.

* * *

BRS3376 (R.E.), to G2LS, 3KG, 3OJ, 5CS, 6XM, GI6TB, 2HFL.

* * *

BERS195 to G2YL, 3GH, 3IH, 3YY, 5PY, 6WY, 6YL, GM6MD, ST6KR, VQ8AF, VU7FY, W9DXX.

ON ACTIVE SERVICE

TWENTIETH LIST

WE publish below our twentieth list of radio amateurs on active service. Additional details and corrections should be advised to Headquarters as early as possible. The present list contains information received up to May 1, 1941.

Rank and Name	Regiment or Branch	Pre-war Call or B.R.S.
Sgt. R. Adams... ...	R.A. ...	GM4GO
Pte. D. Allanson ...	R.A.O.C. ...	4136
A.C.2 N. G. V. Anslow	R.A.F. ...	G4GD
A.C.1 N. W. Austin ...	,, ...	2FQR
Dvr. L. G. Bacon ...	R.A. ...	2DUP
Sig. A. P. Birt ...	R.C. of S. ...	4147
Gr. E. J. Bradford ...	London Scottish.	4139
A.C.2 H. Clarke ...	R.A.F. ...	G3LR
A.C.2 O. S. Couldwell...	,, ...	4152
L.A.C. M. East ...	,, ...	4155
F./Lt. H. Edge ...	,, ...	G6GD
Sig. G. C. Fox	R.C. of S. ...	4166
L.A.C. C. C. E. Frearson	R.A.F. ...	4160
L.A.C. D. Gill	,, ...	4176
A.C.2 H. J. Grayson ...	,, ...	3620
L.A.C. B. Greenfield ...	,, ...	4126
Major R. M. Hall ...	BurmaRifles	XZ2EM
A.C.2 P. Harrison ...	R.A.F. ...	3468
Cpl. Henshaw	,, ...	4159
Capt. L. R. James ...	R.C. of S. ...	G2LJ
L.A.C. W. E. Lister ...	R.A.F. ...	4141
Cadet A. W. Lumkin ...	O.C.T.U. ...	4130
Capt. R. Lyall ...	R.C. of S. ...	ZC6RL
Sig. J. McNab	R.C. of S. ...	2CQI
L.A.C. G. B. Ottaway...	R.A.F. ...	4161
L.A.C. K. Pattinson ...	,, ...	4158
L.A.C. D. H. Prior ...	,, ...	3764
A.C.2 D. E. Pritchard...	,, ...	4144
A.C.2 W. F. Ralph ...	,, ...	4154
Cpl. G. W. Reeves ...	,, ...	4168
Cpl. F. E. Robinson ...	,, ...	4134
2nd Lt. H. L. Ross ...	R.C. of S. ...	4146
Cadet F. S. Saxon ...	O.C.T.U. ...	4156
Cadet I. W. K. Smith...	,, ...	2BPW
A.C.2 W. R. Smith ...	R.A.F. ...	G3KP
A./Cpl. D. A. Squire ...	,, ...	1729
A.C.2 G. I. Steel ...	,, ...	2BXF
Sig. F. Sutton	R.C. of S. ...	2DJV
Tel. S. C. H. Taylor ...	R.N.V.(W.)R.	4140
Pte. H. Tee	R.A.P.C. ...	G8UA
Tel. A. Trevena ...	R.N. ...	4128
L./Bdr. J. D. L. Veil ...	R.C. ...	BERS 491
A.C.1 B. R. Walsby ...	R.A.F. ...	4148
Lt. R. B. Wannop ...	R.N.V.R. ...	2861
A.C.2 F. E. Ward ...	R.A.F. ...	4178
Gnr. R. Wilkes ...	R.A.O.C. ...	4143

DIT, DIT, DAH, DAH, DIT, DIT

No. 1

Compiled by J. N. ROE, G2VV

(1) In what year did the word "electricity" first appear, and where?

(2) QTR? means?

(3) Do sound waves travel at the same speed in fresh water and sea water?

(4) What is the full meaning of the abbreviation S.H.M.?

(5) Who was the Director-General of the B.B.C. in 1928?

(6) On what date did the first amateur radio communication between England and New Zealand take place, and what were the call signs of the two stations concerned?

(7) What is the full meaning of S.I.C.?

(8) What is an areometer?

(9) QUA? means?

(10) Give the full meaning of (*a*) S.W.G., (*b*) B.W.G.

(*Solutions on p.* 388.)

RADIO RIDDLE-ME-REES

No. 4

Prepared by J. IRWIN, G4FD.

My 1st is in Wavelength—we find it in Metres.
,, 2nd ,, ,, Bassoon—despised by the tweeters!
,, 3rd ,, ,, Appleton—the second layer up.
,, 4th ,, ,, Tubular but not Mica nor Cup.
,, 5th ,, ,, Raymart but not in Eddystone.
,, 6th ,, ,, Heising the modulation well known.
,, last ,, ,, Grid which De Forest inserted
And my whole is a waverange most amateurs deserted.

No. 5

My 1st is in Heater and also in Cathode.
,, 2nd ,, ,, Morse, Key, Buzzer and Code.
,, 3rd ,, ,, Rectifier and also Westector.
,, 4th ,, ,, Phase, Angle and Vector.
,, 5th ,, ,, Franklin—oscillator quite stable.
,, 6th ,, ,, Dipole—fed by twin cable.
,, 7th ,, ,, Data but not found in Charts.
,, 8th ,, ,, Crystal—a "Y" cut from Quartz.
,, 9th ,, ,, Windom with single wire feeder.
,, 10th ,, ,, Resistor and also in Bleeder.
,, last ,, ,, QSO—ours, postponed for a while
And my whole once filled 40 with QRM vile.

(*Solutions on p.* 388)

HAM HOSPITALITY

WITH the approach of summer, we have decided to publish a consolidated list of all members who have intimated their desire to extend hospitality to those living or serving away from home. Corrections or modifications should be advised to Headquarters.

It is suggested that those taking advantage of the hospitality offered, should communicate by telephone or letter prior to making a visit.

London, N.—W. V. Champion (G8CY), 12 Bedford Road, Tottenham, N.15 (Phone: Amhurst 2066).
London, S.W.—H. D. Cullen (G5KH), 164 West Hill, Putney, S.W.15 (Phone: Putney 0645).
London, W.—Dr. C. G. Lemon (G2GL), 57 Rowan Road, Brook Green, Hammersmith, W.6.
Alton, Hants.—J. Goodlad (G5LT), The Doreys, Medstead.
Bangor, N.I.—I. G. Campbell (2DDI), 106 Seacliffe Road, or "Bon Marche," Main Street.
Barnsley.—G. D. Dixon (2DQL), 19 Woodstock Road.
Beeston, Notts.—J. G. Treece (G3QD), 95 High Road (Phone: Beeston 54481).
Belfast.—F. A. Robb (GI6TK), 60 Victoria Avenue, Sydenham. J. N. Smith (GI5QX), 19 Hawthornden Drive, Belmont (Phone: Belfast 633323).
Bristol.—R. A. Bartlett (G6RB), 31 Kings Drive, Bishopston (Phone: Bristol 46960).
Birmingham.—T. Martin (G2LB), 3 Gladys Road, South Yardley. G. A. Swinnerton (G6AS), 23 Hawthorn Croft, Quinton (Phone: Woodgate 2315).
Lowestoft.—L. Firmin (G5QO), 2 Hall Park Villas, Oulton Road (Phone: Oulton Broad 168).
Luton.—A. G. Tearle (G3KG), 26 Farley Avenue.
Manchester.—Dr. H. N. Walls (G2DH), 6 Pine Grove, Prestwich (Phone: Prestwich 3045). P. Harrad (G8UN), 117 Heywood Road, Prestwich (Phone: Prestwich 2518). C. Turner (G8NL), 4 Moreton Avenue, Whitefield (Phone: Whitefield 2599).
March, Cambs.—R. F. G. Thurlow (G3WW), Cotswold House, St. Peter's Road (Phone: 2128).
Melton Mowbray, Leics.—S. Clark (G8CZ), 125 Thorpe Road.
Middlesbrough.—G. A. Kenyon (G3YK), 32 Emerson Avenue (Phone: Linthorpe 8557).
Minehead, Som.—C. Bryant (G3SB), Beaconwood Hotel (Phone: 32).
Morley, Yorks.—H. Beaumont (G5YV), 8 Ashfield Avenue.
Northampton.—R. R. Waite (G3PZ), 61 Broadway.
Northfleet, Kent.—V. H. S. Curling (G6VC), 66 Burch Road (Phone: Gravesend 4601).
Northwich, Ches.—J. Buckley (BRS1965), 16 Wallerscote Road, Owley Wood (Phone: Weaversham 24).
Nottingham.—A. G. Clipstone (G8DZ), 14 Epperstone Road, West Bridgford.
North Waltham, Hants.—Miss C. C. Hall (G8LY), North Waltham Rectory (Phone: Dummer 56).
Norwich.—R. C. Horsnell (G2YI), 51 Blackwell Avenue, Sprowston (Phone: 2088).
Oadby, Leics.—G. E. Cockroft (G4FO), Tudor Drive (Phone: 403).

IF YOU ARE ON ACTIVE SERVICE

CUT THIS LIST OUT

IT WILL NOT BE REPEATED FOR SOME MONTHS

Blackpool.—P. Roberts (2COR), 65 Mosson Lane, Norbreck (Phone: Cleverleys 2197).
Bolton.—G. Openshaw (2BTO), 287 Wigan Road, Deane (Phone: Bolton 3143), evenings and week-ends. G. E. Shackle (2DVQ), 32 Bromwich Street, evenings and week-ends only.
Boston, Lincs.—Dr. A. C. Gee (G2UK), 150 Freiston Road (Phone: Boston 3172).
Bournemouth.—J. D. Kay (BRS3789), 24a Watcombe Road, Southbourne. L. J. J. Morgan (2HNO), 45 Parkwood Road, West Southbourne (Phone: Southbourne 1118).
Bradford.—C. A. Sharp (G6KU), 316 Poplar Grove, Great Horton.
Burnham-on-Crouch, Essex.—H. A. Savage (G2SA), 53 Station Road (Phone: 2136).
Bishops Stortford.—T. A. St. Johnston (G6UT), Normandale, New Barn Lane, Little Hallingbury (Phone: Bishops Stortford 785).
Carshalton, Surrey.—S. Kember (G6KM), 71 Shirley Avenue (evenings and week-ends only).
Cheltenham.—L. W. Lewis (G8ML), 117 Fairview Road.
Chelmsford.—R. L. Varney (G5RV), 184 Galleywood Road (Phone: Day, 4401; Night, 3394).
Croydon.—S. E. Janes (2FWA), 72 Kimberley Road (Phone: Thornton Heath 4552).
Chipstead, Surrey.—D. T. Blunden (G8IN), 12 Station Approach.
Edinburgh 9.—J. Wilson (GM6XI), 52 Macdowall Road (Phone: 42153).
Guildford.—P. W. Gammon (G3VB), 68a Woodbridge Road.
Ipswich.—D. Garrard (BRS3665), 135 Hervey Street.
Isle of Man.—H. Punch (G6UR), "Langness," Groudle Road, Onchan.
Kings Lynn.—H. W. Sadler (G2XS), Warren Farm, South Wootton (Phone: Castle Rising 233).
Kinghorn, Fife.—A. W. Lawson (GM2NQ), "Makora."
Kinross, Scotland.—L. Welsh (BRS209), 2 Montgomery Street, or "Advertiser" Office, Kinross (Phone: 2127).
Kinver, Staffs.—H. Littley (G2NV), Radiohm, Bridgnorth Road, Stourton.
Knutsford, Ches.—G. W. Pryor (G3YX), The Lodge, Booth Hall.
Leeds 6.—P. H. Wade (2BPJ), 8 Ancaster Crescent, West Park, Far Headingley (Phone: Leeds 52363).
Leigh-on-Sea, Essex.—M. Geddes (G2SO), Sunnybank, Woodside, Belfairs.
Oxford.—F. A. Jefferies (G8PX), 1 Lovelace Road. W. E. Beck (2AIG), 31 Ridgefield Road (Phone: Oxford 47703, business hours).
Portsmouth.—J. S. K. Stephens (G8WC), 65 Ebery Grove, Copnor.
Poynton, Ches.—C. Lingard (G3IR), Alasdair, Chester Road (Phone: 2087).
Pinner.—H. C. Whitmore (G3FS), 96 Woodford Crescent.
Portsmouth.—R. Holmes (G6RH), 68 Carmarthen Avenue, Cosham.
Salisbury.—J. R. Letts (G8IL), 16 Canadian Avenue.
Scarborough.—E. Mitchell (G5MV), 40 North Marine Road.
St. Margarets-on-Thames.—J. N. Roe (G2VV), 27 Riverdale Gardens) Phone: Popesgrove 4781).
Shefford.—C. J. Ellett (BRS3585), Meppershall (Phone: Shefford 251).
Stockton-on-Tees.—R. J. Bradley (G2FO), 36 Raby Road.
Spalding, Lincs.—W. G. Johnson (G4MS), Pinchbeck Hall (Phone: 186).
Swansea.—R. F. Armstrong (2HDX), 21 Walter Road (Phone: 4765). W. S. Hall (2AOL), 58 Newton Road, Mumbles.
Teignmouth, Devon.—A. R. Drake (2ARA), The Talbot Hotel (Phone: 468).
Thaxted, Essex.—E. L. Wright (G3SI), Mill End House (Phone: 359).
Tonbridge.—F. Barnard (G4FB), 34 Springwell Road.
Wallington, Surrey.—A. B. Willsher (G3IG), 14 Lytton Gardens (Phone: 5672).
Washford, Som.—C. J. Fish (G4OM), County Police Station (Phone: 249).
Whitehead, N.I.—T. Smith (GI5ZY), "Belair," York Avenue (Business premises at corner of Upper North Street and Winetavern Street).
Worksop, Notts.—A. T. Cartlidge (BRS2939), 341 Carlton Road (Phone: 2491). E. R. Martin (G6MN), "Castlemount," (Phone: 2190).
City of Belfast Y.M.C.A. Radio Club.—Club night—Wednesdays (Phone: Belfast 259451).

G8HF de G3XC

W. J. Colclough, G3XC, 70, Shaggy Calf Lane, Slough, Bucks., is anxious to hear from G8HF, late of Plymouth, now somewhere in the B. W. Indies.

THE MONTH "OFF" THE AIR—April, 1941

By A. O. MILNE (G2MI)

Notes and News

PLENTY of DX seems to come in despite the advent of Spring; in proof of this, BRS3789 sends a complete list of calls heard on 14 Mc. during the last two months. We reproduce it here, partly as a record and partly in the hope that it may catch the eye of one or two of the operators concerned. The loudest signal is the first one in each prefix group. K4GTH, EZR, FAB, FCG, FKC, FSP, NY4AD, 4AC, KA7FS, 1AB, AC, AK, AN, CW, ME, ND, RX, 4LH, W5BEK, DEW, HFG, YV1AQ. All the above were using telephony. Here are the C.W. stations: K4GGG, HEB, PY4AP, 5CE, 1CI, 2KT, 5CL, 7VB, BO, VG, LU4DA.

BRS3789 is very interested in K4GTH and would like to have his address. From remarks overheard from this station, it appears that he is a Colonel in the U.S. Army, in which he has served for 26 years, prior to which he spent 5 years with the Navy. He said he would be leaving K4 on April 7 and was moving to W4, where he hoped to start up again in June.

HV1J, heard on 7 Mc. by G2MI, claims to be in the Vatican City, spends much of his time working Germans and always finishes up with "73 PAX"!

G3RB says 3·5 Mc. is still full of W's at an average S7 on the H.R.O. 7 Mc. gave K4GPU, 7200, 579, PY1IB, 7250, 568 and PX1DC, 7047, 589!! The night of April 14/15 was particularly good and produced K5AY, 7175, 589, HR1AT, 7150, 566, W7FLD, 7127 and our old friend U2NE, 7180, 589, besides many east-coast Americans.

G4AB, who seems never to sleep, has heard all W districts on 14 Mc. and the following on 7 Mc.: CM6AV, K7DIU, YV4AC, NY1AB, besides many PY's. Best for the month on this band is W9TNU, S. Dakota. A surprising number of European stations have been heard from 18.00 onwards on 7 Mc.; the DX does not appear until much later, about 02.00. Many D's, U1, U3, U5 and U6 stations have been heard during this early period, also U2NE, U4HW, U7EE, UK8IA and U9ML. He also sends us a few more rarities from the past, just to make our fingers itch! W7ESK/K7, Aleutian Is.; VS4AJ, Sarawak; XZ1GN, Aden; XI2TM, Christmas Is.; I5AA, Sardinia; VS1AO, Cocos Is.; BE1AA, Curaçao; K6MV/KG6, Palmyra Is.; XSU1AA, Cyprus; and ST1AB, Abyssinia. Still no advance on 245 countries yet!

BRS3454 adds K4DSE, K5AP, and W5HSG to the DX band, besides logging many of those already noted. He mentions that PMA, Batavia, on 15·48 metres is still S9+ during their English news period at 13.45 (present time). Another first-rate signal is the Free French "Radio Brazzaville" in French Equatorial Africa, on about 25·08 metres; English news at 20.45 with occasional slight QRM.

G3YY has a 1-V-2 D.C. mains receiver which he has recently fitted with 6K7 R.F. and 6F5 det., with the result that the W's now come in with a bang! He logs a motley crew of very doubtful calls heard on 7 Mc. Here they are—judge for yourselves: EA1S, HB9FC, K4HFS (genuine), LA5A, LA5O, LX5F, LZ3ID, LZ3UX, and a number of OK's who are probably "genuine" Nazis in Slovakia, OK3CD, DC, HV, JK, NR, VZ, SM3AQ, 7PC, TA2F, TF5C, U0–U5 (scores of them), U6ST, U7EE, many U9's and W's, XX5X and YL2AP. He often hears U3DQ calling RIBIK and wonders if this is an aeroplane.

G6QN does his listening on a 2-valve A.C. receiver of his own design, using a MS4B and an AC2PEN with a separate MH4 as heterodyne oscillator, and swears by it for stability. He says, "I frequently copy an hour or two of press and just sit back and forget the receiver." On March 18 K4HDY and W9AOW had 14 Mc. to themselves but an hour later it suddenly woke up and produced S8 signals from K4GPU, GXV, HDY, W6SYS(!), LU7BD, W9DNR, MCN, NZZ, ZNO, W4MR, EFG, GVQ and W9KYK.

Watts and Beams

On March 21 at about 10.30 B.S.T., 14 Mc. was dead but on about 13,800 kc. he found JNP and JNB running "slow slip" with two distinct echoes apiece, so that there were three perfectly clear calls each time. March 23 at 22.15 B.S.T. once again found K4GTH roaring in on 'phone, saying he has, on the average, about 15 contacts a day. 6QN wonders why this station comes in so loud on an empty band. Mainly a question of watts and beams, we think.

K5AY, at 04.00 B.S.T. on April 4, said he used 75 watts to a couple of '10's. "I'd have given him a Californian kilowatt," comments 'QN, "but, knowing what you can get out of one '250, I'm

prepared to believe it." Finally, he produces a "Quisling," to wit LA5O. He must be a "quisling" because of his fondness for D4LEU. He uses a 7-tube superhet and proclaims that he is unlicensed! We'll say he is!

G3WP sends along a magnificent effort, listing, amongst other things, 34 W's on 7 Mc. YU8T, LX5F, XX2A and SX7BR have also been heard but the most interesting bit of piracy is "ZL2AR de U3DQ." The "U" was very dubious about the alleged ZL, and well he might be! "GX7AX" has been heard working UE3KR, but would give no address. He repeated the lettering from the controls of his receiver, this to no one in particular, saying, "NW ZOK? QRK? = to all = QRK? AR GX7AX AR pse K." From the list of controls he repeated, his receiver is evidently a "super skyrider."

G8UO has logged many Germans, including some of the well-known pre-war calls. Here is his list: D4ACF, AJY, AMF, AVF, AWY, AYA, BUF, CEK, CMF, DMC, GXF, HCF, HDF, KAK, MMU, ROL, WCF, WYF, XJF, YMI. Amongst his bag of "phoneys" are SX7BR, SM7PC, LA5O, GX7AX, TF5CT and PX1A, with CT1JU also still very active. Many U's have been coming through on 7 Mc., including UK6AA, 8IL and 9MP.

G8IG has found time to listen on 14 Mc. in between blitzs and gives the following readings from his S meter: KA1AK, S3; 1AN, S5; 1AR, S5; 1CW, S4; 1ME, S6; 1TM, S4; 7FS, S5; 9AA, S3.

Empire News

ZD2H is still going strong at Kano, N. Nigeria, and here is his report for the month: "14 Mc. shows considerable improvement of late, the best DX heard being PY7LD and D4YUM. Both had difficulty in obtaining replies to their CQ's., especially the D. Singularly enough, in mid-February Russians were heard on 7 Mc. for the first time and were logged at, for this part of the world, the unusual time of 16.00 G.M.T. They included UK3AH, UK5KK and U8IL, the last named being 589 at 16.00 on February 15. Both 3·5 Mc. and 7 Mc. continue exceptionally good for W's but nothing doing on 28 Mc. or 1·7 Mc."

Here is a recent photograph of that prolific seeker of unusual DX — Eric Trebilcock, BERS195, with his fiancee. Eric is now stationed at Sabamaua, British New Guinea.

600 Meter DX

As a break from listening on the Amateur bands, BRS1151 has built himself a 1-V-0 for the ship band. He says there is little to be heard during daylight, except for the British coast stations, but at dusk signals roll in from all over the place, including amongst others, Turkey and Russia. His best DX is CFV in Canada and also a three-letter "K," presumably one of the U.S. West Indian islands. Two others which sounded almost too far away to be genuine were PLS and YFB. They are listed as being in the Dutch East Indies, and certainly they were working to Dutch ships so, if they are genuine, this must be something of a record for 500 kc.!

"Conditions vary a great deal," he says, "but GYW at Gibraltar and IAC are both very active. Why don't coast stations QSL?" He has heard one direct S O S, and relays from several others have also been logged.

"Umbrellas, Eggs and Crackers."

This caption is extracted from a recent letter received from G8IG; it rather intrigued us and, being interpreted, means, "Land mines, bombs and incendiaries." It defies translation into our patent synthetic German, which has been such a smash hit in recent issues!! So we give it in English. G6CL reports the arrival of several "Umbrellas" in the locality and tells of the magnificent work done by the local A.T.C. squadron in clearing wreckage and helping generally. In two days, Clarry issued 6,000 sq. yards of roofing felt. He also, of course, prepared the "BULL.," attended to correspondence, interviewed visitors, and a few dozen other things! He also collects stamps. (And don't you dare cut this bit out, Mr. Editor.—G2MI.)

The 28 Mc. Band

JUDGING by conditions on lower frequencies there were several periods of magnetic disturbances during April, and this fact may be partly to blame for the exceptionally poor conditions on 28 Mc. and adjacent frequencies.

Probably ten-metre activity in the Western Hemisphere is slightly less than it was a year ago, but as South Americans were heard on 6 days, and W's on 9 days, during April, 1940, it would not have been surprising if a few signals had been logged this year. However, G2RC, G4MR and BRS3003, all of whom listened fairly regularly, did not log a single amateur, and apart from a few weak unidentified signals the only station reported was LSA2, 27·5 Mc., on April 4, 5, 12, 18, 22 and 24. BRS3003 heard it at S6 at 17.45 G.M.T. on April 24, and, according to G4MR, it was also a fair signal on April 4, but very weak on the other days. G4MR could not hear any of the W broadcast stations on 26 Mc., and reports that the highest frequency signal he heard from North America was WBH, on about 22·8 Mc., on April 5, 17 and 18(?).

N.C.

Good News About Components

We have been advised by *Webbs Radio*, 14 Soho Street, London, W.1, that stocks of the popular Type 964 6-pin coil base for chassis mounting are again available, price 2/– each. In addition, many other items needed for receiver construction are in stock, as a result of *Webbs* taking over the sale distribution of *Eddystone* components.

BRITISH ISLES NOTES AND NEWS

District Notes

Due to prevailing circumstances we would urge all D.R.'s and Scribes to post their notes in time to reach Headquarters by not later than *May* 28.

DISTRICT 1 (North Western)

Blackburn.—A meeting was held on Easter Sunday when about ten members were present. G6WH, who called on the T.R. later in the day, was sorry to have missed a good ragchew, but as he is now employed nearer home he will be able to attend meetings more frequently. 3VV is again on the sick list and it is hoped he will soon be fit again. A visit to 2TM found him busy building a greenhouse, so what with that and his farm he should be able to give a lecture on the value of a good earth! 2FUC, who has been home on 14 days' leave, looks very fit. Will 4JC let the T.R. have his address please? Thanks are accorded to the officials of the O.A.R.S. for their initiative in promoting such a successful meeting at Blackpool, and here's wishing that all members present meet again when "that man" is dead and gone. (*Via* G4KT).

Blackpool.—G2FT and 2GA are still very busy, and arguments are still in progress between 2FT and 5ND on the respective merits of the "side-swiper" and the "bug." 2BVV has been home for a short period and contacted 2FPA on several occasions, as did 2CUB. 5ZT paid a flying visit from Preston when home on leave and brought along 8MD.

Here is a note of interest to all local Amateurs. The Olympian Radio Club, which has made excellent progress under the leadership of BRS3841 and G5ND, will in future hold a "ragchew" on the last Wednesday of each month at G4MH, Beth's Cafe, Gynn Square, at 7.30 p.m. BRS3841 and G5ND having been posted to duties in other parts, we take this opportunity of thanking them for their excellent co-operation whilst in the town. In the meantime, any further particulars may be had from G. Musk, 2FPA, 449 Central Drive, Blackpool, who will report local activities of members who care to drop him a line. (*Via* 2FPA).

Bolton.—This month members say farewell to G3CJ, "for the duration." It is understood that he is now engaged on Air Ministry work somewhere in District 7, where he hopes to make some personal QSO's. GM2JF, a temporary resident in the district, recently visited 2DVQ where he also met 2BTO and 2ABT, the latter home on leave from the R.A.

2BTO is engaged on the construction of a frequency meter with a Franklin oscillator as the basic circuit. He states that he can recommend this type of oscillator to anyone who is considering the construction of a frequency meter. 2DVQ, having exchanged the pen for the soldering iron, is now working as a radio engineer in Manchester.

If this paragraph catches the eye of 2FPI, maybe it will remind him that the boys at home would like to hear from him again, even if it's only a picture postcard of the Sphinx. (*Via* 2DVQ).

Burnley.—The T.R. (G5ZN) has asked Mr. Dyson (8TD) to provide material for these notes while he is away on service with the R.A.F. He is stationed down South and his letter is full of cheer. We wish him all good luck. A welcome visitor recently was Cpl. J. Pollard, M.M. (G3IY) who was home on leave after his investiture. Well done, Jimmy—the town is proud of you. Our numbers are still decreasing. The latest departure is G3KT, to take up important radio work. Of the old "gang" G3SJ, 3VO, 3WU, 3XK and 8TD only remain, and they are all busy in their spare time with voluntary work of one type or another.

(*Via* G8TD), G6CX.

DISTRICT 2 (North Eastern)

Keighley.—G6MC, 6HF and 8UO are all busy on civilian work connected with the war effort. It is rumoured that BERS474 is in the town, home on leave from ZB2, but this is unconfirmed. Our sympathies are extended to G8UO on the recent death of his father.

G2LT has had no news from either Sheffield or Barnsley and feels that the local "old timers" might do a little more to keep alive the spirit of amateur radio in their midst.

Now see here, chaps. Will everyone in the District please send a card to me, answering the following questions:

1. Will you support a District meeting at, say, Leeds or Harrogate during the summer if we can get G6CL to attend?
2. Do you want District Notes?
3. Are you still interested in Amateur radio?

So far, the Yorkshire "pep and go" of which I had heard has not been much in evidence. This appeal is addressed to Service members temporarily in the District, as well as to resident members.

G2MI.

DISTRICT 3 (West Midlands)

Birmingham.—A meeting of M.A.R.S., attended by 25 members, was held on April 6, when Mr. B. George continued his most interesting lecture on alternating currents, this time dealing with induction, reaction, impedance, and the meaning of power factor.

Members of R.S.G.B., especially those serving with the Forces stationed near Birmingham, will be very welcome at M.A.R.S. meetings. They can contact the Scribe, Mr. E. Wilson, at 48 Westbourne Road, Olton, Birmingham, or phone NOR 1201.

(*Via* 2FDR.)

Coventry.—No activity can be reported for April, except that we have again been singled out for attention by the "Luftwaffe." At the time of writing it has not been possible to check up on all the Coventry members.

We have received a letter from Lieut. Swinnerton G2YS (R.C. of S.), and he wishes to be remembered to all.

We, in our turn, send 73 to all members of C.A.R.S. serving with the Forces, but what about a line from some of you? What about it, G2LU, 2JR, 5QN, and the rest? (*Via* G5GR).

DISTRICT 4 (East Midlands)

District members will know by now that our D.R. Laurie Ridgway, G2RI, is serving as a P/O in the R.A.F. The present writer who has been invited to act as Deputy D.R. records the District's thanks to G2RI for his work during the past two years. He took office at a difficult period in the history of the District and continued his work with much success during an even more difficult period. We assure him that we shall do our best to keep No. 4 on the map until he returns to take over again.

Leicester.—G2XD, now a Sgt. W/O A/G recently visited 2IX and 6VD whilst on short leave. 5MY is fit and well but a long way from home. He is now a Cpl. in the R.A.F. 3BU, in spite of being extra busy as a special constable, has found time to design a new receiver. 2RI's only contribution to the notes this month is a complaint of "blue pencil sore feet."

Local meetings will be held at G6VD, 9, Cecilia Road, Leicester, on alternate Sundays. The meetings are timed for 10.30 a.m., and a hearty welcome is extended to all who can attend.

Note the dates *now*, May 18, June 1, 15 and 29.

Nottingham.—The T.R., G8DZ, having offered the use of his QRA as a monthly meeting place, asks local members to suggest suitable dates and times for such gatherings. His new address is 14 Epperstone Road, West Bridgford.

Congratulations to G8DV (Liverpool), who is stationed locally, upon his promotion to F./O. 8DZ complains about the lack of notes for these columns. Don't forget, OM's, that it is not an easy job to make up notes, especially these days. Mark that calendar now for the 20th of each month. If no one gets to know of your activities they will come to the conclusion that the NottingHAMS have lost all interest in amateur radio.

The writer urges all service members in the District to keep in touch with him. He also asks for news from other towns. G6VD.

DISTRICT 5 (Western)

Reports are very scarce this month. Please keep the flag flying and let us hear from all areas next month.

Bristol.—Meetings have now been resumed, with fair attendances. The D.R. was requested to send a letter of sympathy to G6QW on the death of his son on active service. The T.R. hopes to see a much larger attendance at the next meeting, to be held at The Antelope, Broadmead. on June 3, at 7 p.m.

Stroud.—G4AB reports G3KA, 3MA, 4GN and 8BK active in Gloucester. He also reports visiting Cheltenham, where a most enjoyable evening was spent with the locals. On a short visit to Somerset, G6LY, G5AK and G4OM were contacted. G6RB.

DISTRICT 7 (Southern)

Bournemouth.—Best of luck to 2FSL, who leaves to take up an Admiralty appointment. Welcome to 3YU, who is doing war work in the town. 3VY, a keen member ever since he came to the town, has been posted to South Wales. We were sorry to see him go. We learn that 2ADT is in VE training as an air-gunner. 4IJ has built a pre-selector for his Comet Pro, using a 57. 2NS has also contracted "building fever." 3BM, 3UM, 3YU, 4IJ, and 2HNO attended the last Salisbury meeting. 3BM and 4IJ recently visited 5TP and the Reading Group. (*Via* 2HNO).

Croydon.—Welcome to a new member, BRS4150. But he doesn't expect to keep that number long when they start issuing tickets again. 3IG has moved to Reading. 4NI, still waiting for his call-up to the R.A.F., is doing servicing work in his spare time. 2FWA reports "that man" nearly brought the house down and covered his gear with pieces of ceiling, dust and soot. He would like to see meetings started in the area, to be held at each member's QRA in turn. If interested, write him at 72 Kimberley Road, Croydon.

G2DP is making an enlarger out of a magic-lantern. 3FP has bought a record changer and is doing his best to discover its secrets. 2KU, home on a short spell of leave, paid a visit to 3003 and an enjoyable time was spent recalling the "good old days." 5XH has had the luck to be stationed at the same 'drome as two of his Croydon Clubmates, 8TB and 2CRD; the latter, whilst in the West Midlands, had the pleasure of meeting 6BT. 3003 has found the Maths. articles in the "BULL." very useful. (*Via* 2FWA and BRS3003).

Forthcoming Events

May 25	District 11, from 6 p.m., at Aunt Jane's Café, Prestatyn.
,, 25	District 12, 3 p.m., at G4DC, 48 Foxholes Avenue, Hertford (see District 12 notes).
,, 25	Scotland "A" District, 2.45 p.m., in the Coffee Room, Y.M.C.A. Residential Club, 100 Bothwell Street, Glasgow.
,, 31	Ham Gathering, from 3 p.m., County Hotel, Salisbury.

Kingston.—A welcome is extended to 2BPW, a new member who is a cadet in the OCTU. 2921 is busy with the code. What about it, Kingston and District? "Drop us a post-card, chums." (*Via* G2GK).

Guildford.—G3VB is still busy constructing receivers and test gear for the great day. He would like to hear from 8CV should this meet his eye. 5YA and 8LT, both being on short leave at the same time, were able to lead 5WP in the direction of a noggin of ale!

A very interesting letter was received from R. A. Archer, 2AXP, of Fleet, who at the time of writing was in Greece. After his call-up in the R.A.F.V.R. he was sent to France and then on to Egypt. After eight months in SU he found SV more like civilisation, but radio gear very expensive, which no doubt accounts for the lack of SV calls before the war. 2AXP looks forward to a return to activities in the E.S. Propagation Group and 56 Mc.

Oxford.—G2QT, who is welcome to the District, took G8PX and 2ALG to the Salisbury meeting, where many interesting contacts were made. 5LO and 2CL still keep watch on the ham bands. 2AIG has built a two-stage pre-selector.

8PX is still building code practice audio oscillators for the A.T.C. Greetings from Oxford to G2DU, who is a civilian radio mechanic with the R.A.F. near Bedford.

It is hoped to hold a Ham Gathering in Oxford on a Sunday in June, to which members in the Forces will be especially welcome. Please write to G8PX, 1 Lovelace Road, Oxford, who is arranging the meeting. (*Via* G8PX). G5WP.

DISTRICT 8 (Home Counties)

In happier times we would now be busy discussing the details of N.F.D., brushing cob-webs from the portable gear, and mounting the steps of Mustill's Mill to view the familiar landscape once again. Here's hoping that the day may not be so far distant as it looks at present, when we may once again be wending our ways along those dusty lanes, with car springs groaning under the outsize load of H.T. batteries.

Cambridge.—G5JO and 2XV are planning to take a brief respite from war-work, while they swap yarns on some river-bank, with rod and line. 2DT, 8SY, 3CY, 5DQ, 5DR, 5PU, and some others are presumably in the land of the living, but are too busy to report.

March.—A hearty welcome is extended to Mr. F. E. Ward, a new member. 3DY is now in the R.A.F., while 3WW reports, "All well."

Peterborough.—Writing from "somewhere in England," 2NJ states that he has acquired a very nice bug key, on which he is putting in some intensive practice in the hope that he will one day be using it on the ham bands. He has met 8UB and 2QY in his travels.

Bedford.—BRS3585 is anxious for a personal QSO with 3TX, who is believed to be in his locality (Shefford). 2DPQ and BRS3585 called on 5FO, and found him "Digging for Victory." 2CFV is busy with morse practice. 2FFG promised to write from Yorkshire, but so far no news. (There must be some counter-attractions in Yorkshire, as he is not the only one!) 4OC, selling some gear in order to start all over again, found eager buyers among the prospective local hams. When 8KP and XYL were stationed in this area they received such wonderful hospitality from radio friends, that 8KP has written from the South of England asking the D.R. to place on record his everlasting gratitude. He will be interested to learn that the 30-watt amplifier he helped to build is now completed, and is a roof-lifter.

St. Ives.—Where is G5RL? He used to report so regularly that he earned special mention in these notes, since when there has been complete silence. 6WA was on leave recently, and visited 5JO in Cambridge. Our good wishes to 6DX, who seems to be running a fairly regular delivery of heavy goods to the Continent.

In conclusion, many thanks to all those who have reported this month. They may rest assured that their letters are really appreciated, even though they cannot always be acknowledged individually. G5BQ.

DISTRICT 10 (South Wales and Monmouthshire)

Swansea.—BRS4005, having partially recovered from a bad attack of pneumonia, is now devoting some time to experimenting with receiving aerials. The success he has achieved must also be shared by his preselector, which consists of a 6K7G fed into an EF8. Several rare DX stations have been logged. GW3XW, having completed a speech amplifier designed for use with a crystal microphone, reports that it has passed all preliminary tests. We are pleased to learn that he has been able to resume work after some years of ill health.

Several members, including GW8HI and 2CAK, suffered serious damage to their homes in a recent Blitz on the town. The latter has, however, been compensated by his marriage, and we take this opportunity of wishing the happy couple "good luck."

GW3AX and 3UO had the pleasure of meeting P./O. Ken Walker, 2WO, prior to his departure for service overseas.

The T.R. has noticed with regret that several local members have allowed their subscriptions to lapse. If this should catch the eye of anyone concerned, he hopes they will remember the oft repeated remarks made in the BULL., that the duty of every member to-day is to give the Society full support, so that it can tackle future problems tenaciously and with a sound backing. (*Via* GW3AX).

DISTRICT 11 (North Wales)

Prestatyn.—The April meeting although not as well attended as anticipated, proved quite a success. A welcome visitor was 2CZM (R.C.S.), from District 15. A further meeting will be held on May 25th, at Aunt Jane's Cafe, from 6 p.m. onwards.

It is rumoured that VE3AAA and other Canadian hams are in the locality, but no contact has yet been established.

Local meetings are held fortnightly, at BRS4027 and 2HIV respectively. Details from BRS1060, "Woodside," Meliden Road, Prestatyn.

GW4CK is anxious to contact any PA amateurs who may be in the country.

Congrats. to L./Cpl. H. J. Smith, BRS3044, who combined his recent leave with a honeymoon. His bride was Miss Elton, of London, and the best man was BRS1060. GW3CF hopes to join the R.A.F. shortly.

G3TS, 3IR and BRS2731 have been visitors at local meetings. G6US.

DISTRICT 12 (London North and Herts.)

Really, fellows, you surpassed yourselves last month—19 members attended the meeting held at G5FA on Sunday, April 27, including representatives from Watford, St. Albans, and Hertford. We were also pleased to welcome G8KZ from District 15, besides many old timers whom we had not seen for some time. A set of the new *Columbia* Morse Code records were run through to the interest of all concerned; G4DC made a valiant effort to copy the last part solid but had to give up in the face of strong opposition from the rest of the party! Before breaking up, photographs were taken.

The following new members are welcomed:—2AVU, 2CDG, 2DWM, BRS4086, 4089, 4116 and 4117.

News is not so plentiful this month, and letters have only been received from G3GX, 4GT, 2CNC and BRS4073.

Eric Woodhouse, ex-G2SX, and 3GX send 73 to the District, the latter is at present on the East

Coast with the R.A.F. and hopes to be home on leave shortly. 6WU has now left for service in the Middle East and we wish him "bon voyage." 8VM, who was at the meeting, is at present waiting for another ship, having been torpedoed twice while serving in the Merchant Service.

We believe that most members are active in one way or another, and the following are at present instructing in their local A.T.C. Squadrons :— G2GO, 4DC, 5FA, 6CL, 6LL, 6QM, 8TY, and BRS4073.

It is hoped that arrangements can be made to have a day's outing in the country at about the time when NFD is usually held. A further announcement will be made next month.

The next District meeting will be held at G4DC, 48 Foxholes Avenue, Hertford, on Sunday, May 25, at 3 p.m. It is hoped that as many as possible will be able to get out to Hertford, as our D.R. (G5QF) is arranging to be present. Routes from North London by Green Line direct to Gallows Hill, or by train to Hertford North (L.N.E.R.) and thence by No. 310 bus to Gallows Hill. G5FA.

DISTRICT 13 (London, South)

South Central and South East Areas.—The April meeting, held in the shack of 2HHB, was attended by 11 members where an enjoyable morning was spent listening to his newly-constructed Gramophone Amplifier, also ideas were exchanged on the construction of crystal pickups.

The next meeting will take place at G3DF, 30, Carminia Road, Tooting, S.W. 17, at 11 a.m., Sunday, May 18. (This QRA is 3 minutes from Balham, Tube Station).

South Western Area.—Eight members recorded their activities in the "Wartime Log" now circulating in this area.

G2JK is building and calibrating a frequency-meter, 3CU has built a 9-valve super, but seems to have a snag or two. 5PY (temporarily in Devon) has an impressive list of calls heard. 6DT still combs the air with a rotary, but wants to lease a piece of Richmond Park for a small rhombic! 6QN is still collecting gear for "presently."

Other area members please send addresses to G8QH. G8TN.

DISTRICT 14 (Eastern)

Chelmsford.—G5RV is sowing for victory, but 6LB leaves it all to his XYL! 2SA, who is quietly but efficiently helping the war effort, doesn't get time to listen to the few remaining amateur signals. BRS3650 works late and fire-watches! 5CA, 5HF and BRS4122 all help to swell the attendance regularly at local meetings. 8PB is expected home on leave shortly.

An interesting debate on post-war licence questions was held at a recent meeting, and a letter embodying the main points has been submitted for publication.

How about a Conventionette at Chelmsford during mid-June or July? Those interested, please drop a card to G5RV.

Ilford.—G3MD sends the following news: 8TL, who is still running around between Ilford and Sudbury, would welcome visitors at Ilford during the first three days of each week. He looks forward to more Portable Mobile experiments on 1·7 and 56 Mc. News of 8SK is wanted. 2RR, in Devon, likes country life and has found the Ham's ideal QRA. 3XS, Chingford, is now Experimental Assistant in one of the Services; we wish him every success. 2XP keeps his end up in Bournemouth. 2CD, our new member of Council, is reputed to be a broadcast quality enthusiast now. Congratulations to 4AT on his engagement, and to Fitz on his embarkation on the seas of matrimony. 6HU, of Barkingside, is busy on National work. News of 5MM is wanted. A letter to 3MD from 3GH, of Knowle, Devon, says she is well and very busy, and sends greetings to the 1·7 Mc. members of the Ilford group. 4LV looked in on 3MD recently. 2BHA, writing from Carisbrooke, I.O.W., sends greetings to all his friends in Essex, especially those in Southend.

Southend.—BRS4023 (2SO's brother) has been home on leave, whilst G2SO and 5VQ are now A.T.C. Signals Instructors. G5RV.

DISTRICT 15 (London West, Middlesex and Buckinghamshire)

In answer to our plea last month, G4IH has kindly offered to accommodate the District meeting on May 24. His QRA (31 Courthope Road, Greenford) is located in the first turning on the right off Oldfields Lane, going north from Western Avenue. Buses 18c and 105 to the round-about. May 24 is a Saturday, and the meeting is timed for 7 p.m.

The D.R. was recently visited by BRS1357 when on leave. He was the victim of a bus accident when nearly home and we hope by now he has fully recovered.

A welcome is extended to 2DZD, 2DWM, 2HCW, and BRS4080, 4104, 4119, 4120, all of whom are new members. We hope to see them at the May meeting.

2FCJ writes to say he has met VE1ER, 4OS, G3YQ, 4LA and 2LK, all of whom participated in a miniature hamfest. He sends 73 to G5ZA, 6RC and 6XP. G3UQ reports that 3XI is now a senior N.C.O. with his own troop. We always seem to have to say "Congrats" to this man! OK2HY is trying to organise the Allied Hams. Good luck, OM.

That's all for the present, but come and see us at the meeting and let's have those letters with news in them. G6WN.

DISTRICT 16 (South Eastern)

Only one report (a very welcome letter from G2IZ, the T.R. for Gravesend) has been received this month.

G2IZ records the District's congratulations to Mr. A. L. Daines (G2TN) on the occasion of his marriage to Miss Box, sister of G6BQ. 2TN will be remembered by the members of the Gravesend and District Amateur Radio Society for his able services as librarian. The local group send their best wishes to Mr. and Mrs. Daines. Gravesend members, in spite of many war-time duties, are still busy at their receivers when time permits and have lost none of their interest in Society affairs.

We look forward to hearing from 2IZ again, however little he may have to report; but where are all the other reports? G2WS.

Scotland

Our congratulations go to GM2IA on her recent marriage. In a letter from GM6JJ he reports having met in the course of recent travels G6LK, who is in the North, and VE3AAY, VE3AYY and VE4AGI, somewhere in Scotland. He also reports having had a letter from Bill Blyth, GM5YX, who is a sergeant in the R.A.F.

"A" District.—There was a rather smaller attendance at the April meeting, when Mr. David Niven, 2CHN, showed a 1-v-1 receiver, and demonstrated the possibilities of making the best use of the limited components available at present. GM6JD has received a letter from Don. Duthie, GM6IW, who is abroad, and wishes to be remembered to all his friends. The next meeting will take place on the 25th May.

GM6ZV.

Northern Ireland

The writer desires to thank Council for electing him to fill the post of D.R., and assures them of his full support in every way possible. GI members extend their good wishes to Mr. John Sang, the retiring D.R., and take this opportunity of thanking him for services rendered during the past few years.

New arrivals to GI are G5UD, 2HBZ, VE5AX, and W6EJU, to whom a hearty welcome is extended. VE5AX visited GI6YM (Y.M.C.A. Club) and GI5TK, at the latter's QRA. 5AX found a kindred spirit in the shape of "Our Arthur" as each is an addict to the "Bug" in preference to the old "pump handle."

W6EJU works near GI6TK and GM3TR, and has met them both. The latter is now an officer in the Air Training Corps. Congrats, O. M.

2FQQ paid us a short return visit recently. Since last here, he has met VQ2FJ, with whom he had a very interesting chat.

GI8MI is now stationed in Belfast, having been absent since the start of the war. During the recent "Blitz" the following members were bombed out of their homes :—GI3KN, GI3SG and W. E. Davey (an operator of GI6YM). They have our sincere sympathy. GI3KV and 2FIQ also had their homes damaged by fire bombs.

The D.R. records a visit from Ted Sutton, G3BN, who is almost a local, having been with us for some time.

No news, no notes, so dinna forget, lads.

GI5QX.

Empire News

From W. E. Lane, VQ4CRH, comes news that he is being kept busy by the Kenya military authorities. Bill sends his greetings to all who have worked him or have met him when on leave.

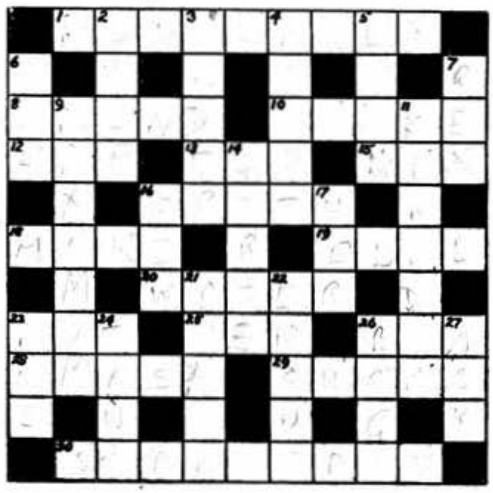
* * *

Another Bill—this time Bill Heathcote, ZS6CS, "clocks in" with a long letter giving news of pals in South Africa. Ted Cook, ZS6BT (ex-G6UO) is now believed to be in the Sudan where Bill suggests he is chasing "hams and harems"! Bill himself is a civilian Signalling Instructor in the Armoured Fighting Vehicles Organisation, as are Tommy Yule, ZS6DM, George Eva and G. D. Walker, BERS320. One recent trainée turned out to be a Canadian ham. Ronnie Wood, ZS6DZ and Arthur Cook, ZS6T are Telegraphists in the Navy. A. Knowles is a Signaller in the R.N.V. and A. M. Clapp, ZS6C, a Sgt./Maj. in one of the Native Corps.

From Australia comes news of Don Knock, VK2NO, who is now a full Lt. in the Army School of Signals, Liverpool, N.S.W. From our own "Khaki and Blue" feature he has been able to keep track of many old British friends. He reports a meeting with "Beau" of G6HB when his ship called at Sydney recently, and sends 73 to G2MI, 6LS and all others who remember him.

"HAM-RADIO" CROSSWORD No. 9

Prepared by H. H. BRABROOK, G5ZD.



CLUES

ACROSS.

1. Muted load (anagram).
8. Alter the finish after morning.
10. L.F. or H.F. component.
12. DX.
13. No. 1.
15. N.B.G.
16. Foam of sorts.
18. Used before 1.
19. E.g., 14,005 kc. in the good old days.
20. Bet you'll find a greeting in the battle.
23. Nothing in this to show disappointment.
25. Foreign coin.
26. SU5BO-G5BO
28. Anagram of 29.
29. Feigns end of wireless amateurs.
30. This sounds restful but it is a drill position (2 words).

DOWN.

2. If a carrier is this 1 distortion will probably result.
3. This 1 is just the reverse of 2.
4. You'd never expect to find a racecourse in a Scottish loch, would you ?
5. Bone colour.
6. What a fool !
7. The clue is the first part of 11.
9. This radiation was our goal.
11. A realm with 7 at the head.
14. Eat greedily.
16. Not many here.
17. Possessive Y.L. or O.W.
21. White like layer.
22. Follow this.
23. Ham please.
24. Aerial should be this.
26. Plenty.
27. Enquire.

Silent Key

We regret to record the death, through enemy action, of Mr. G. J. Shorten, G2SQ, of Whaddon, Croydon. After serving at Portishead for some years, he took up duty with the Metropolitan Police shortly after war was declared. His wife and two children were killed at the same time.

LETTERS TO THE EDITOR

The Editor does not hold himself responsible for opinions expressed by correspondents

Post War Amateur Radio Transmitting Licences

To the Editor, THE T. & R. BULLETIN

DEAR SIR,—As a result of numerous opinions expressed recently in *The Wireless World* and THE T. & R. BULLETIN, on the subject of the re-issue of amateur transmitting licences after the war, an interesting debate on this subject has been held by the Chelmsford and District members of the Society.

It is thought that the following list of points, finally agreed upon by those taking part in the debate, might be of general interest to all amateurs, and possibly of use in helping to frame any new conditions if such be contemplated by the authorities.

1. *Operators' Certificates*, as distinct from station licences, to be granted in two grades. These certificates would enable successful applicants to operate any duly licensed amateur station without the necessity of owning a station personally, or of operating a station to which a visit is paid. The operating facilities to be in accordance with the grade of certificate held by the operator and the relevant log book entries to be signed in ink by him. Responsibility for operation of station to rest with the licensee.

Grade A.—Morse test 12 w.p.m. send and receive, and operating procedure. Elementary knowledge of modern receivers and transmitters and C.W. transmitter adjustment.

Knowledge of safety precautions and first aid treatment for electrical shock.

Grade B.—Morse test 15 w.p.m. and operating procedure. Technical test to prove good general knowledge of modern receivers and transmitters, both for C.W. and telephony operation. Knowledge of methods for avoiding interference with local broadcast receivers and accurate checking of modulation level in a transmitter.

Knowledge of safety precautions and first aid treatment for electrical shock.

It is suggested that applicants be examined by a competent representative of the Post Office at a local Head Post Office and that an examination fee of 5/– be charged.

2. *Station Licences.*

Grade A. (Beginners' Licence).—Applicant must hold the Grade A operator's certificate. Licence to permit installation of a C.W. transmitter of 10 watts input to final amplifier on 1·7, 3·5 and 7 Mc. (or equivalent low frequency bands as allocated).

Radiating aerial to be used. Annual fee £1.

Grade B Licence.—Applicant must possess Grade B operator's certificate and have previously held a Grade A certificate for at least six months. Licence to permit installation of a C.W. and telephony transmitter on radiating aerial with inputs up to 100 watts to final amplifier. All amateur frequencies available. Annual fee £2.

Permission to use powers in excess of 100 watts, if required, to be the subject of special application after having held the Grade B licence for six months.

3. The amateur should not be required to specify any *particular* line of experimental work, but should give an undertaking to use his licence facilities for general experimental work in wireless telegraphy (and telephony).

4. Amateurs who held radiating licences for six months or more before the outbreak of war to be granted Grade B operators' certificates and licences automatically. Those licensed less than six months before the war to be granted Grade A certificates and licences.

5. No permission to be requested for third party message handling, as it is felt that, even if the P.O. were willing to grant such permission, commercial interests might be unnecessarily antagonised.

For operators interested in message handling, Navy, Army and R.A.F. networks should be formed on the lines of such organisations existing in the U.S.A.

Signed on behalf of: L. J. Fuller (G6LB), H. A. Savage (G2SA), Dr. N. L. Yates-Fish (G5CA), H. R. Heap (G5HF), and J. R. Goodchild (BR4122).

Yours faithfully,
R. L. VARNEY (G5RV) (D.R.).

The W3EDP Aerial

To the Editor of THE T. & R. BULLETIN

DEAR SIR,—The aerial erected by G4JW and described in the November issue appears to be acting as a radiator $\frac{5}{8}\ \lambda$ long, on 7 Mc.; thus taking the full wave as 134 ft., $\frac{5}{8}\ \lambda$ is 83 ft. 9 in., which together with the usual addition for cutting, etc., gives 84 ft. or 85 ft. as specified.

The given voltage distribution lends some support to this contention. At $\frac{5}{8}\ \lambda$, the maximum would be $\frac{1}{4}\ \lambda$, or $\frac{2}{5}$ of the working length from the free end, say 34 ft. along a radiator 85 ft. long. (2HMN's figure is 28–30 ft. approximately.)

It is difficult to say just what *is* the function of the counterpoise. If at right angles to the main aerial it should not interfere with its directional pattern; if coiled, etc., it is acting as a non-radiating portion. The presence of the tuning coil complicates matters.

The fact that $\frac{5}{8}\ \lambda$ radiators are useful has been shown by Moullin (J.I.E.E., date unknown), who calculated their use in the vertical position for broadcast purposes, taking advantage of their marked directional properties to give a low angle radiation. The $\frac{5}{8}\ \lambda$ is not the optimum, but serves as a useful description.

A formula which I evolved for my own purposes, for a radiator having a standing sinusoidal voltage wave distribution beginning at the free end, and in free space is:

Effect at a large distance proportional to:

$$\frac{1}{(\sin\theta - 1)}\left[\sin\left(\frac{\pi}{2} - \frac{2\pi\varkappa}{\lambda}\right) - \sin\left(\frac{\pi}{2} - \frac{2\pi\varkappa}{\lambda}\sin\theta\right)\right]$$

$$-\frac{1}{\sin\theta + 1}\left[\sin\left(\frac{\pi}{2} + \frac{2\pi\varkappa}{\lambda}\right) - \sin\left(\frac{\pi}{2} - \frac{2\pi\varkappa}{\lambda}\sin\theta\right)\right]$$

where θ = angle made with perpendicular to aerial.

$\varkappa$ = length of aerial.

λ = wave-length used.

This formula gives results closely agreeing with the accepted standard values and was easier for me to handle.

With a $\frac{5}{8}\lambda$ radiator, the directional properties approximate to those of "four $\frac{1}{4}\lambda$s in phase"—a very useful aerial in quite a small space.

Trials with these aerials began in the middle of 1939, but had to stop in September! The arrangement used is shown in Fig. 1, and the few results obtained tended to confirm theory. No other adjustments were made; in fact the Windom-feed was connected in the same position as on the full-wave aerial previously used, hence the coincidence of the central connection. The aerial was cut for 14 Mc. operation and the unwanted $\frac{3}{8}\lambda$ portion looped as shown—thereby causing great inquisitiveness in the neighbourhood!

The effect of two radiators at right angles was accidentally tried out when the aerial, shown in Fig. 2, was erected (through an error, the centre

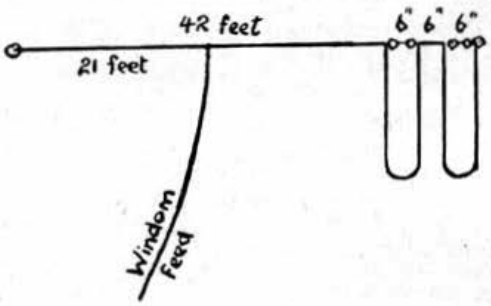


Fig. 1.

A $\frac{5}{8}\lambda$ Aerial used on 14 Mc.

loop was made $\frac{1}{2}\lambda$ long instead of $\frac{1}{4}\lambda$ in order to give two $\frac{1}{4}\lambda$s in phase). Thus, the $\frac{1}{2}\lambda$ loop acted as a vertical radiator and the top as a horizontal full-wave radiator. The few results obtained before the error was rectified gave evidence of the directional properties due to the full-wave radiator, the

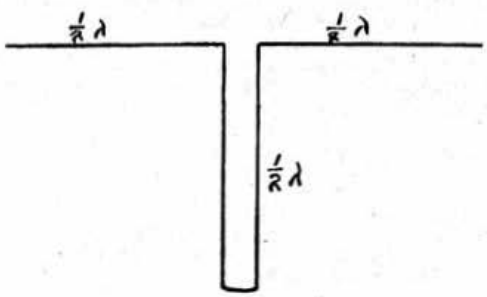


Fig. 2.

Full Wave Aerial with $\frac{1}{2}\lambda$ centre loop.

vertical portion giving good local B.C.L. interference! The $\frac{5}{8}$ radiator was not tried vertically. I intended to use the 56 Mc. band for further work, and received the necessary permit only ten days before the declaration of war.

Yours faithfully,
R. H. PARKINSON (G3BT).

Shunts for Measuring Instruments

To the Editor, THE T. & R. BULLETIN

SIR,—Many thanks are due to Mr. Clark (2BIB), for his interesting article on the "Design of Amateur Constructed Measuring Apparatus,"

After reading this article, I find that there is one item that does not conform with modern practice, namely, the question of using copper wire as the material for shunts of 1 to 100 mA capacity. Perhaps an example will illustrate the inadvisability of using copper wire for even these small shunts.

Let it be assumed that a moving coil instrument has a range of 1 mA for a full scale deflection, and that its resistance is 100 ohms—from Ohm's Law it will be appreciated that 100 milli-volts will also give a full scale deflection—and it is proposed to shunt the instrument so as to give a full scale deflection with 10 mA.

The resistance of the shunt

$$= \frac{\text{Meter Resistance}}{(N-1)} = \frac{100}{(10-1)} = 11{\cdot}11 \text{ ohms.}$$

Shunts are designed to operate at a temperature rise of about 20°C., when carrying full load. In the case of a shunt made of manganin—which has a zero temperature co-efficient—it would have an initial resistance of 11·11 ohms, and at a temperature rise of 20°C. the resistance would be substantially the same. But, this would not be the case if it were made out of copper wire.

Copper has a temperature co-efficient of ·43 per cent. per degree C. Therefore, the resistance of the copper shunt will increase by ·43 x 20 = 8·6 per cent. per 20°C. rise.

It is obvious that an increase of 8·6 per cent. in the shunt resistance will make the instrument read over scale with 10 mA—approximately 7·5 per cent.—which error is greatly in excess of that for B.S. Grade 1 meters.

In conclusion I would like to state that while a swamp resistance serves a dual purpose, it is used more for temperature compensation than voltage dropping and is omitted altogether on instruments that are designed exclusively for use as voltmeters.

Yours faithfully,
R. C. HARRIS (2BAB).

Greetings from "Down Under"

To the Editor, THE T. & R. BULLETIN

DEAR SIR,—Succeeding issues of THE T. & R. BULLETIN have given members of my Division of the Institute details of the work being done by British Isles amateurs in all sections of the fighting forces, and their deeds are related with no less enthusiasm than those of the VK amateurs. It is my privilege to extend the congratulations of all Australian amateurs, on the fine job of work being performed by the "G's," "GI's," "GM's" and "GW's."

Unfortunately we have learned to expect that success must sometimes be accompanied by casualties; to the next-of-kin of those British Isles amateurs who have been called before the Great Brasspounder, I should be pleased if you would extend the condolences of Australian amateurs.

Yours faithfully,
Wireless Institute of Australia,
N.S.W. Division,
W. RYAN, VK2TI,
Honorary Secretary.

HEADQUARTERS CALLING

Publicity Posters

A publicity poster suitable for display in technical institutes, libraries and schools, Army and Air Force camps, etc., is now available on request from headquarters. The poster which is printed in blue and measures 20" x 15" sets out the aims and objects of the Society and gives details of subscription rates.

It is hoped that all members who are in a position to arrange for display will make application forthwith, stating the number required.

War-time Subscription Rates

For the benefit of newer members, the Council wishes to explain that the decision to reduce to 10/–, the subscription rate for those serving in H.M. Forces, was made because it was felt, in the early stages of the war, that many younger members would be adversely affected financially.

The Council desires to record its thanks to those members serving with H.M. Forces who have not taken advantage of the reduced rate. In many cases such members have specifically stated that, as their financial position has not been adversely affected, they desire to pay the full subscription.

Headquarters' Office Hours

The Secretary-Editor would greatly appreciate it if matters concerning Society *business* could be dealt with during office hours.

For 18 months certain members have taken advantage of the telephone facilities provided by the Society, by making calls late at night and at week-ends. It is appreciated that occasionally a matter is sufficiently urgent for a call to be made outside business hours, but the great majority are of a trivial nature.

In addition to unnecessary telephone calls, a number of members call at Temporary Headquarters after hours and at week-ends to pay subscriptions or purchase Handbooks.

Please co-operate by noting carefully the office hours in force at Headquarters :—

Weekdays ; 9.30 a.m.—1 p.m.
2 p.m. —5.30 p.m.
Saturdays ; 9.30 a.m.—Noon.

Members who desire to meet G6CL in person would be advised to telephone in advance.

Technical Books

Headquarters will be pleased to obtain technical books for members. The " Selected References " Chapter in the reprinted 2nd Edition of the Handbook has been completely revised to include up-to-date prices. Please add postage when ordering single books.

It is hoped that this arrangement will prove helpful to Service members in need of technical literature.

For the information of those who wish to obtain comprehensive current price lists, we give below the names and addresses of leading publishers :

Chapman & Hall, 11 Henrietta Street, Covent Garden, W.C.2.

Iliffe & Sons, Dorset House, Stamford Street, S.E.1.

George Newnes, Ltd., Tower House, Southampton Street, W.C.2.

McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, W.C.2.

Sir Isaac Pitman & Sons, Ltd., 39 Parker Street, W.C.2.

Advice to intending Purchasers of Communication Type Receivers and Kits

Due to prevailing conditions, the Council recommends that members who wish to purchase communication type receivers, or kits of parts, should, prior to sending money to an advertiser, inquire when delivery can be made. This arrangement will, it is believed, overcome many present difficulties, besides avoiding disappointment.

District 4 Representation

Council, acting on the advice of P./O.L. Ridgeway, has been pleased to appoint Mr. W. Vendy, 9, Cecilia Road, Leicester, as Deputy D.R. in the absence of Mr. Ridgeway on active service.

" Radio " for December, 1940

We have been advised by Mr. J. A. Thompson, Circulation Manager of *Radio Ltd.*, that replacement copies of the December issue of " Radio " have been sent to all British Isles subscribers who have notified the publishers of their loss. Any subscribing member who is without a copy should communicate direct with Mr. Thompson, at 1300, Kenwood Road, Santa Barbara, California.

Australians on Active Service

Mr. Eric Trebilcock, BERS195, has kindly furnished us with further lists of Australian amateurs on active service, but as these have already appeared in *Amateur Radio* (official Journal of the W.I.A.), we have decided that no useful purpose will be served by reproducing them in this publication.

Our earlier action in this connection was taken at a time when we were uncertain of the intentions of the W.I.A., regarding publication, but we are happy to learn that a record has been kept and publicity given.

Our Conversion Booklet

" A copy of the Kilocycles to Metres Conversion booklet has been a most welcome addition to the labour saving devices at an important radio station operated by one of the services overseas. It is a much thumbed publication and equals a bug in usefulness ! "
ZD2H.

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79

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THE Owner of Patent No. 482835 is desirous of arranging, by way of Licence or otherwise on reasonable terms, for the commercial development in Great Britain of this invention, which concerns improvements in or relating to Television Plant. For particulars, address: ELKINGTON and FIFE, 20, 23 Holborn, London, E.C.1.

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No. 1

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(2) What is the exact time?
(3) No. Fresh water, 4,700 ft. per second; sea water, 4,900 ft. per second.
(4) Simple Harmonic Motion.
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