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Current Comment

The Stresa Conference

IN this issue an account appears of the deliberations of the Stresa (I.A.R.U.) Conference at its first Plenary Assembly and of the work done by the Administrative Committee. Certain decisions reached at the final Plenary Assembly are under discussion by the Council of the R.S.G.B. and for that reason will not be commented upon here at the present time.

Two items of more than passing interest were dealt with at the first Plenary Assembly. At that meeting one of the R.S.G.B. representatives on the International Committee reported that information had been received that week from I.T.U. Headquarters in Geneva to the effect that no I.T.U. Radio Conference is likely to be held until at least 1959. In view of that fact the International Committee recommended the Assembly not to proceed with plans to appoint delegates to attend the C.C.I.R. VIIIth Plenary Assembly which is due to open in Warsaw next month. The Committee had originally assumed that the Warsaw meeting would be a "curtain raiser" to an I.T.U. Radio Conference in 1957. In that event Region I representation at Warsaw would have been most desirable, if for no other reason than that it would have enabled the I.A.R.U. delegates to meet and get to know well many of the Government delegates who would be in attendance at the next I.T.U. Conference. Because the "make-up" of Government delegations changes so rapidly the Committee had reached the conclusion that there would be little point in sending representatives to Warsaw in 1956 because by the time 1959 comes along the personnel of Government delegations will have changed considerably. The Committee's recommendation not to send delegates to Warsaw was approved.

The other point of considerable interest was the decision of the Conference to accept the recommendation of the International Committee that up to three delegates from Region I shall be appointed to attend the next I.T.U. Radio Conference. Listening to the discussions at Stresa it became clear that many of those present were quite unaware that the R.S.G.B. carried the major burden of I.A.R.U. representation at the Atlantic City Conference in 1947. The Society's two representatives were away from England, in one case for three months and in the other case for more than four months. The pattern of the next Radio Conference is not by any means clear at present but it will no doubt be quite as drawn out and difficult as the Atlantic City Conference. If, as seems probable, the Conference takes place in Europe (Geneva is our guess) then I.A.R.U. representation should be a little easier in so far as Region I is concerned, but even so it will not be a simple matter to find competent people who can spare the time to be away from their business for several weeks at a time. Yet that may very likely be necessary.

It is worth recording at this time that the R.S.G.B. was the first to suggest to the Societies in Region I that they should get together in order to protect the interests of amateurs in the Region as a whole at future International Conferences.

In preparation for the next Conference, the Council of the R.S.G.B. will maintain and strive to extend its present excellent liaison with the appropriate branches of the Post Office and other Government Departments.—J.C.

Seeking The Plateau

BURIED in the report of Council Proceedings a couple of BULLETINS ago was a phrase which must have caused a certain amount of foreboding. Another rise in printing costs was reported.

No member who read *Current Comment* last February will be in any doubt about the seriousness of the continued rises in costs with which societies such as the R.S.G.B. are faced. These rises keep on happening to an extent that makes any review of them out of date almost as soon as it is printed. That is true of the February *Current Comment*. Not only have printing costs gone up but there has been yet another rise (7 per cent) in illustration block charges. Of the increased postal charges all members at home will be only too well aware.

Independent publishers can offset some of these imposts by increasing their cover price and advertising rates—if their readers and their advertisers will stand it. While the BULLETIN could do the latter (a distasteful duty at the best of times, and compelling an answer to the natural question: "Will you give me extra coverage for the extra cost of my advertising?") there is a much better way around the problem.

It is simply: *Get more members!*

Almost *ad nauseum* the exhortation has been aired on this page for the last year or two. Remembering the power of reiteration, we make no excuse for uttering it again. Already it has produced results, if the imposing lists of New Members published in recent issues are anything to go by.

If, now, each of those New Members would himself secure *another* new member his Society would be enabled to sit more securely on that plateau of stability which the Chancellor of the Exchequer has recently mentioned.

And don't forget tomorrow's old-timers, the teenage lads of today. For those who cannot immediately find the 27s. 6d. for Corporate membership there are plenty of Non-corporate application forms to be had from Headquarters. It is better to enrol the young enthusiast as an Associate than not to enrol him at all!—J.H. (Since this "Comment" was written BULLETIN printing costs have risen again by 10 per cent, equal to another £450 per annum.—J.C.)

Principles of Colour Television

Part 1—Colorimetry

By P. S. CARNT, B.Sc. (Eng.), A.M.I.E.E. *

In Part I of this article, which is based on a paper read to a meeting of the Society held at the Institution of Electrical Engineers, London, on March 23, 1956, the author explains the difference between Monochrome and Colour Television Systems and discusses the problems confronting the Colour Television research engineer.

A TELEVISION system is expected to convey visual information from one location to another, and to present the received picture in such a way that it will appear as realistic as possible to the observer.

Television systems which endeavour to meet this requirement with an achromatic display (the so-called monochrome or "black and white" systems) are now well known. Given that the display is to be two-dimensional, it follows that the greatest loss of realism introduced by these systems is due to the complete absence of colour information, and the provision of a coloured display would be an obvious step forward in television development. This would have the incidental advantage that the shortcomings of a two-dimensional picture would tend to be offset; for example, a foreground and background of different colours would not be merged as in monochrome systems.

In order to provide for colour in a television system it seems logical to elaborate an existing monochrome system so that it is able to carry the additional information required, and in fact all colour systems which have so far been investigated all use the basic principles of monochrome systems, together with new principles which are not applicable to monochrome.

The essential features of all television systems are the analysis of the scene to be transmitted, the transmission of the results of the analysis, and finally the synthesis of the received information. In general, the ether space available is severely restricted and hence the amount of information which can be transmitted is also restricted. In other words, the extent of the analysis cannot be made indefinitely thorough, and the resulting received picture must be of inferior quality compared with the original scene.

However, it is fortunate that the human eye must necessarily form a part of a television system, and the eye has certain characteristics which can be used to offset the degradation of quality which a television system inevitably introduces.

Monochrome Systems

In the case of monochrome systems, the useful characteristics of the human eye are its finite acuity and its persistence of vision. It has been found that the normal eye can just resolve detail which subtends an angle of about half a minute of arc at the retina. This means that for a given picture size and viewing distance, there is no point in increasing the number of scanning lines beyond a certain value, so the bandwidth required is reduced. The persistence of vision property of the eye is such that the retinal image persists for some time after excitation, therefore there is no need to present a sequence of pictures faster than about 25 per second. Again, this reduces the amount of information which needs to be transmitted, and saves bandwidth. The actual use of these two properties of vision is probably best illustrated by a brief description of the present British 405-line system.

The camera at the transmitter has a photo-sensitive mosaic on which the image is focused. An electron beam is directed at the mosaic, and at the point of contact secondary electrons are emitted which are collected by a plate. The number of secondaries, and hence the voltage of the plate, is a function of the brightness of the image on the mosaic at the point of contact of the electron beam.

The electron beam is now scanned from left to right across the mosaic at the relatively high line frequency of 10125 c/s; at the same time it is scanned from top to bottom at the relatively low frame frequency of 50 c/s. Hence the image is analysed along lines, and the voltage on the camera plate at a particular time instant is a measure of the image brightness at the particular position of the beam which corresponds to that time instant.

After 1/50 of a second, the line scan has completed 202½ cycles, or 202½ lines. After a further 1/50 of a second, the line scan covers 202½ lines as before, but these start ½ a line displaced compared with the previous lines, so the complete picture is analysed by a total of 405 lines in 1/25 of a second, alternate 202½ lines being analysed every 1/50 of a second. Therefore, from the information point of view, there are only 25 complete pictures per second, but the flicker frequency is 50 c/s. Hence the use of an interlace technique doubles the flicker frequency without increase in bandwidth, for although the eye, by virtue of its persistence of vision, can integrate 25 images per second, it is conscious of flicker unless this is faster than about 50 c/s.

The finer the detail of the image on the camera mosaic, the faster must the voltage change on the camera collector plate. The video frequencies, therefore, cover a band depending on the detail in the image. In the British system this is roughly 0 to 3 Mc/s.

In transmission the camera voltages are amplitude modulated on to a carrier, and double sideband modulation results, the sidebands extending 3 Mc/s on each side of the carrier. But since all the information is carried by either set of sidebands, there is no need to transmit both. This leads to the vestigial or asymmetric sideband transmission, where only a part of the "unwanted" sideband is transmitted. Single sideband quadrature distortion is then confined to the higher modulation frequencies only.

Colorimetry

Monochrome television systems depend for their operation on the measurement of the brightness of each element of the image. A colour television system, however, must measure the colour as well as the brightness of each picture element. The science of colour measurement, or colorimetry, is therefore applicable to the study of colour television systems.

Most colour systems which have been investigated are those which employ three basic colours, and hence the popular belief that a three-colour system can deal only with these three colours. This is fortunately not true, for it has been found that, with certain limitations,

* *Research Laboratories of The General Electric Company, Limited, Wembley, England.*

any colour can be subjectively matched by a suitable mixture of a given set of three basic colours or primaries.

Colorimetry deals with the measurement of colour in terms of three primaries, which is possible because of the trichromatic property of human vision. In fact, the human eye behaves as though it is responsive to mixtures of three primaries only. It should be pointed out that the actual mechanism of colour vision is not fully understood, and it may well be that the eye does not have three-colour receptors as such. But, from the colorimetry point of view this is not important, the essential feature being the apparent trichromatic property of the eye.

There are several rules of colorimetry, and the most significant are as follows:—

1. Any colour can be matched by a suitable mixture of three coloured lights or primaries. It will be seen later that this is not true in some cases, but the limitations are not serious in colour television.
2. The eye cannot distinguish the individual components of such a mixture.
3. The total luminance (i.e., photometric brightness) of a mixture is equal to the sum of the individual luminances.
4. Colour matches obey the algebraic laws of addition and subtraction. Thus if colour A matches colour B, adding or subtracting colour C will not destroy the match.

At present in colour television, coloured lights are added at the receiver, and the physical primaries which give the largest colour gamut for this additive process are red, green and blue.

In printing and painting, however, the subtractive process applies, for the unwanted colours are subtracted from white light. The optimum subtractive primaries are therefore minus red, or cyan; minus green, or magenta; and minus blue, or yellow. Thus a mixture of cyan and yellow paints would subtract the red and blue content of white light, leaving green. Incidentally, "cyan" and "magenta" paints often depart so far from the ideal that they are more nearly blue and red. This leads to the familiar but not optimum subtractive primaries blue, red and yellow.

The purest colours which can be obtained are monochromatic lights, that is, radiant energies of indefinitely narrow bandwidths. These are the spectrum colours and can be obtained, for example, by passing daylight through a succession of prisms. The refraction of the light through the prisms is a function of the wavelength of the light, the shorter or blue wavelengths being refracted more than the longer or red wavelengths. It is interesting to note that the human eye interprets these different wavelengths of radiant energy as being different colours.

Now, according to colorimetry, it would be possible to take any one of these spectrum colours, and to match it by means of a suitable mixture of a given set of red, green, and blue, primaries. The eye would then not be able to notice any difference between the real spectrum colour and the "artificial" mixture of red, green and blue. Furthermore, by using different mixtures of the same three primaries, all the other spectrum colours could be matched.

In colorimetry, the amounts of the primaries required for a colour match are measured in tristimulus units, sometimes called trichromatic units (T.U.). These are defined by the statement that one T.U. of red, plus one T.U. of green, plus one T.U. of blue will give three tristimulus units of a specified white. Thus, the tristimulus units are normalized for a white match. The ratios between the actual luminances of the tristimulus units are called luminosity coefficients, and for typical television primaries these have the values 0.30, 0.59, and 0.11 for red, green and blue respectively. Hence, 0.3 e.f.c. of red, plus 0.59 e.f.c. of green, plus 0.11 e.f.c. of blue would match 1 e.f.c. of white, but, dividing by the appropriate luminosity coefficients, it is seen that the tristimulus values of the primaries are equal. The use of tristimulus values instead of actual luminance reduces errors in measurement, and also increases the numerical value of the blue content which would otherwise be inconveniently small.

Quantitative colour matching data can be obtained by presenting equal radiated powers of each spectrum colour in turn to an observer, and asking him to obtain a subjective match by varying the amounts of a given set of primaries under his control. If the experiment is repeated for several observers, the average results can be plotted as in Fig. 1.

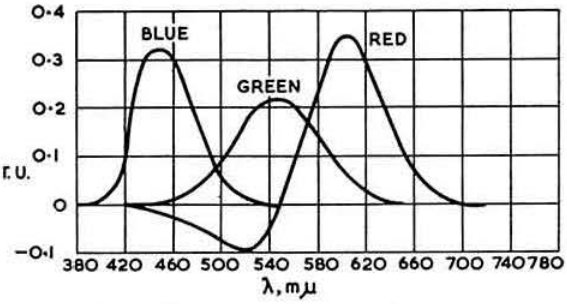

Fig. 1. Colour mixture curves for the spectrum, using primaries red = 700mμ, green = 546.1mμ and blue = 435.8mμ.

These curves are the colour-mixture data for the spectrum for the Standard Observer, using three primaries defined by red = 700 mμ, green = 546.1 mμ, and blue = 435.8 mμ. Thus, suppose a match is required to the spectrum colour 620 mμ. Then 0.30 tristimulus units of the red primary plus approximately 0.02 tristimulus units of the green primary would give a subjective match for the Standard Observer.

Suppose a match is required to the spectrum colour 500 mμ. It can be seen that roughly 0.05 T.U. of blue, plus 0.09 T.U. of green, minus 0.08 T.U. of red are required. Therefore this match can be obtained only by the use of a negative red light. This is a case where the first rule of colorimetry breaks down in practice because negative light is not available, and the curves are interpreted here by using the fourth rule of colorimetry. That is, if 0.08 T.U. of red is added to the spectrum colour, the resulting colour can be matched by a mixture of 0.05 T.U. of blue with 0.09 T.U. of green.

In general, it will be required to match distributions of radiant energy rather than particular spectrum colours, and the tristimulus value of, for example, the red primary required to match a distribution is obtained by multiplying each ordinate of the red colour mixture curve by the corresponding ordinate of the distribution, and then integrating over the entire red colour mixture curve. Similarly the green and blue tristimulus values can be found. As an example, to match a distribution of radiant energy which is constant over the band (i.e., parallel to the λ axis), the amount of blue primary required will be proportional to the area under the blue mixture curve, and similarly for the red and green curves. Since this particular distribution is equal energy white, for which the tristimulus values of the primaries are equal, it follows that the areas under each of the curves are equal.

While the three tristimulus values R T.U. of red, G T.U. of green, B T.U. of blue completely specify a

colour, it is obvious that a colour could be defined in terms of its total luminance and the proportions of red, green and blue required to match it. For such a colour,

$$\text{the proportion of red is } \frac{R}{R+G+B};$$

$$\text{of green } \frac{G}{R+G+B};$$

$$\text{of blue } \frac{B}{R+G+B}.$$

As these fractions all sum to unity, there are clearly only two independent variables. These fractions are called chromaticity co-ordinates, and it follows that a colour may be specified in terms of its luminance and two chromaticity co-ordinates. Since a necessary condition for a colour match is that the luminances must be equal, we may obtain the significant details of a colour match by a knowledge of two chromaticity co-ordinates only. The plot of one chromaticity co-ordinate against another gives a chromaticity diagram, as in Fig. 2. Here, the green chromaticity co-ordinate

$$g = \frac{G}{R+G+B}$$

has been plotted against the red co-ordinate

$$r = \frac{R}{R+G+B}.$$

The locus of the spectrum colours is shown and this has been obtained from the values shown in Fig. 1.

For example, to match the spectrum colour 590 mμ, we require approximately r = 0.75, g = 0.25, and then b = 0. Hence a mixture of red and green primaries is required whose total luminance is equal to the luminance of the 590 mμ spectrum colour, and this mixture must have 75 per cent red, 25 per cent green, 0 per cent blue.

A chromaticity diagram may be used to predict the resulting chromaticity of a mixture of two different chromaticities. Suppose a certain tristimulus value of white (point E, Fig. 2) is added to a certain tristimulus value of the spectrum colour 590 mμ. Then the resulting colour will have a chromaticity which lies on the line joining the point E and the point 590 mμ, and the required chromaticity point on this line will be at the centre of gravity of the white tristimulus value at E and the 590 mμ tristimulus value at the point 590 mμ. Thus, if the white content is increased, the centre of gravity will be near the white point, giving a desaturated or pastel chromaticity. Conversely, a decrease in white will move the centre of gravity towards the 590 mμ point to give a more saturated chromaticity. Hence a kind of polar representation of chromaticity can be obtained in terms of distance from the white point, or saturation, and angular position around the white point, or hue.

It should be pointed out that if colour mixture data has been obtained in terms of one set of primaries, then it is possible merely by calculation to express the same information in terms of any other set of primaries. For convenience in numerical work, a set of non-physical primaries X, Y, Z has been defined, and these are used most frequently in the literature. Fig. 3 shows a chromaticity diagram in which

$$y = \frac{Y}{X+Y+Z}$$

$$\text{is plotted against } x = \frac{X}{X+Y+Z}.$$

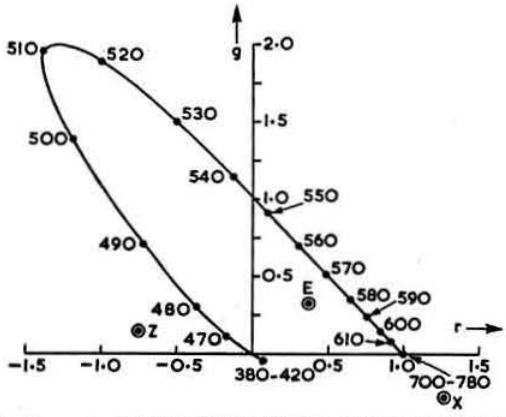

Fig. 2. Green v. red chromaticity diagram, using primaries red = 700mμ, green = 546.1mμ and blue = 435.8mμ. Reference primaries X, Y, Z, are shown.

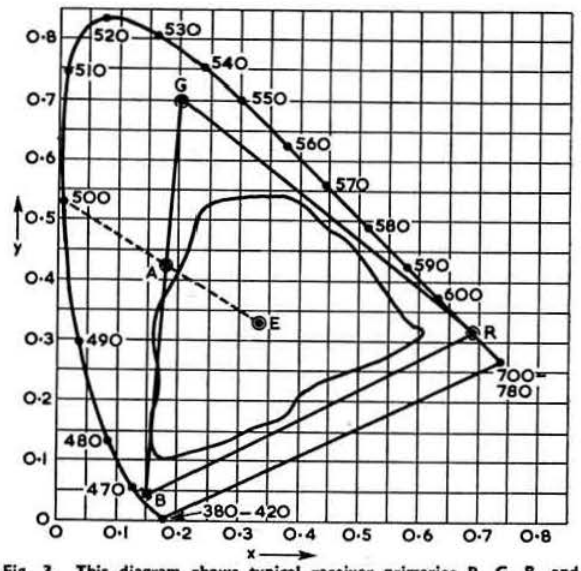

Fig. 3. This diagram shows typical receiver primaries R, G, B, and locus of extreme purities of dyes and inks.

The spectrum locus is shown, and this is the same information that was used in Fig. 2 but in terms of the reference primaries X, Y, Z. The actual chromaticities of X, Y, and Z are shown in Fig. 2, and they are non-physical because they lie outside the spectrum locus. In fact, they were specially chosen in this way so that all physical chromaticities would be positive when expressed in terms of X, Y and Z. Notice that in Fig. 3 the spectrum locus lies in the positive quadrant.

Typical television receiver primaries are marked on Fig. 3 at R, G, B. The centre of gravity law indicates that any chromaticity which lies within the triangle formed by joining R, G, B can be matched by suitable mixtures of these primaries.

(*Continued on page* 28)

The GPR-90 Communications Receiver

THE GPR-90 15-valve communications receiver has recently been put on the American market by The Technical Materiel Corporation of Mamaroneck, New York, whose first amateur communication receiver it is. The firm is, however, well known as a supplier of radio apparatus to the U.S. forces.

The frequency coverage is 0.54 to 31.5 Mc/s in six switched bands and the circuit is arranged to operate as a single conversion superhet on the three lower frequency bands and with double conversion from 5.4 Mc/s upwards. The two intermediate frequencies are 3955 and 455 kc/s, the second converter being crystal controlled.

The tuning ranges are:—

Band 1—0.54-1.4 Mc/s; Band 2—1.4-3.3 Mc/s; Band 3—3.2-5.6 Mc/s; Band 4—5.4-9.7 Mc/s; Band 5—9.4-17.8 Mc/s; and Band 6—17.3-31.5 Mc/s.

The Circuit

Starting with the aerial input, the receiver is somewhat unconventional as a wide band transformer with a ferrite core caters for aerial impedances of either 75 or 300 ohms and is in circuit on all ranges. The first valve, a 6AB4 grounded grid triode is in operation from 3.2 Mc/s upwards and has a high-pass filter in its cathode circuit: on the two lower ranges the input transformer feeds into the 6CB6 pentode second r.f. amplifier.

The coupling between the first and second r.f. stages and between the latter and the mixer is by double-wound transformer on the lower ranges but in each case the primary windings are replaced by a resistance capacity arrangement on the higher frequency bands. The aerial trimmer condenser is in the grid circuit of the second r.f. stage.

An elaborate form of electrical bandspread is employed consisting of a nine-section three-gang variable condenser having capacities of 6, 12.5 and 44pF, the sections being brought into circuit in varying combinations by the band switch. In addition, each section of the three-gang main tuning condenser is divided into two parts—135pF and 190pF, the latter being connected only on bands 1 and 2.

A 6AU6 r.f. pentode serves as the first mixer, a type of valve which, the makers state, was chosen in preference to the more normal 6BE6 because of its greater freedom from self-generated noise and its better image rejection. This valve derives its local oscillator input from a 6AG5 e.c.o. by cathode injection across 330 ohms and 2,700 ohms resistors in series to chassis, the latter resistance being by-passed by a condenser. The output of the oscillator is taken from its cathode through 68pF and 100 ohms in series.

With any double conversion superhet designed for general coverage there is the problem of where to put the first intermediate frequency. This would normally lie between 1.5 and, say, 4 Mc/s and would necessitate a gap in the tuning range of the receiver of 100 kc/s or more. The object of double conversion is to establish a satisfactory signal to image ratio, but as this does not become pressing at frequencies below 7 Mc/s or so, a conventional superhet is perfectly satisfactory up to that point. This is what the makers of the GPR-90 have done, and the somewhat ingenious circuit which avoids switching in other than d.c. circuits is shown in Fig. 1. It will

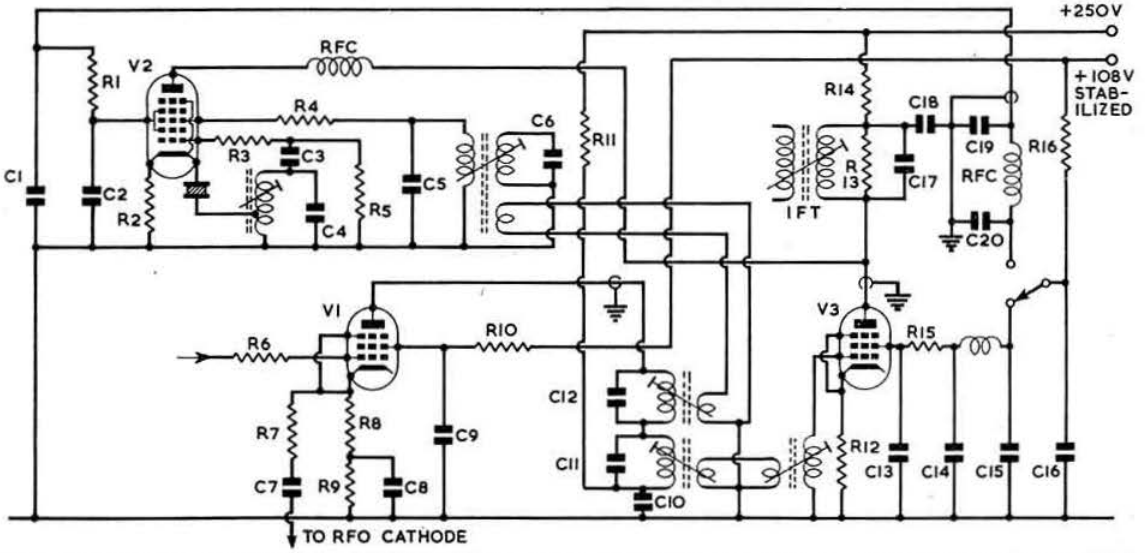

Fig. 1. The first and second mixers, i.f. buffer amplifier and method of switching from single to double conversion in the GPR-90. Elaborate screening and decoupling are employed in this section to prevent oscillator radiation. The secondary of the transformer in the anode of V3 feeds the crystal filter.

C1, 2, 8, 9, 10, 13, 14, 15, 16, 18, 19, 20, 0.01μF; C3, 120pF; C4, 17, 220pF; C5, 6, 200pF; C7, 68pF; C11, 1000 pF; C12, 180pF; R1, 10,000 ohms; R2, 150 ohms; R3, 4, 47 ohms; R5, 15,000 ohms; R6, 22 ohms; R7, 100 ohms; R8, 330 ohms; R9, 2,700 ohms; R10, 150,000 ohms; R11, 4,700 ohms; R12, 510 ohms; R13, 390,000 ohms; R14, 6,800 ohms; R15, 100,000 ohms; R16, 12,000 ohms; V1, 6AU6 first mixer; V2, 6BE6 second frequency changer; V3, 6BA6, i.f. buffer amplifier; X, 3,500 kc/s crystal.

be seen that the primaries of two transformers, one tuned to 3955 and the other to 455 kc/s, are connected in series in the anode circuit of the first mixer. The secondary of the first transformer is connected to the signal grid of the 6BE6 crystal controlled second frequency changer and that of the 455 kc/s component to the grid of the 6BA6 i.f. buffer amplifier, link windings being used for coupling in each case. To change from single to double conversion it is only necessary, therefore, to connect screen voltage to the appropriate valve, an operation which is accomplished by a s.p.d.t. wafer on the band change switch.

The 455 kc/s i.f. amplifier comprises three stages, in addition to the buffer amplifier just described, with an overall bandwidth of 5 kc/s and is preceded by a crystal filter of conventional design which provides additional selectivity in five stages down to 200 c/s in the sharpest position.

The GPR-90 Communications Receiver measures 20 in. by 10 in. by 15 in. deep and weighs 52 lb. It costs $395.

(Photo by courtesy of The Technical Materiel Corporation)

A signal meter calibrated to read S9 for a receiver input of 50μV is arranged in a bridge circuit in the second i.f. stage, while the b.f.o. injection is made to the grid of the following valve which runs at full gain at all times.

A conventional diode detector and series diode noise limiter follow the third i.f. stage and the signal then passes to one section of a double triode for a.f. amplification. The response of this stage may be varied so as to provide a flat characteristic for broadcast and gramophone reproduction, a reduced audio range for communications listening or, in the third position of the switch, variable selectivity centred on 1,200 c/s. This latter response is achieved by means of a sharp toroid filter in series with the inductance of which is a variable resistor which determines the width of the skirts of the audio pass band. With the aid of this filter in its sharpest position a worthwhile improvement in c.w. reception is obtainable while with the response flattened by means of the width control speech may be read in really difficult circumstances. The circuit, with values, will be found in Fig. 2. The other triode section of the valve is connected as a diode and acts as a.v.c. rectifier

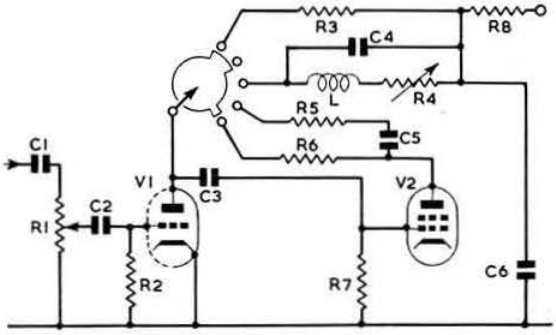

Fig. 2. The variable audio selectivity circuit shown in the " flat response " position. Both this and the following switch position for communication reception depend upon n.f.b. from the anode of the output stage.

C1, 2, 3, .01μF; C4, .025μF; C5, 82pF; C6, 20μF; L1, 0.7 H toroid; R1, 1 Megohm; R2, 8.2 Megohm; R3, 7, 470,000 ohms; R4, 1,500 ohms; R5, 220,000 ohms; R6, 2.2 Megohm; R8, 120,000 ohms; V1, one section of 12AX7; V2, 6V6 output stage.

Other design points in the receiver include the use of ceramic formers for all signal frequency inductances, manual or automatic gain control on the two r.f. and first two i.f. amplifiers and provision for i.f. output from the grid of the third i.f. valve for use with a " signal slicer " for s.s.b. reception.

The send/receive switch removes h.t. from all valves except the third i.f., output, and the oscillators: there is no provision for using the receiver to monitor c.w. transmissions.

A power socket is provided into which a shorting plug is inserted for mains operation or a battery plug when external supplies of 6 and 180 volts are in use. An accessory socket gives 250 volts at up to 10mA and 6.3 volts a.c. at 0.6A.

The makers claim a sensitivity of better than 5μV for Band 1 and 1μV on the remainder of the frequency coverage for a signal-to-noise ratio of 10 db, a signal-to-image ratio better than 60db and an a.v.c. characteristic giving not more than 12 db alteration in output for 80 db change in input.

Valve Complement

The fifteen valves used are: 6AB4—grounded grid r.f. amplifier; 6CB6—second r.f. amplifier; 6AU6—first converter; 6AG5—r.f. oscillator; 6BE6—second converter and oscillator; 6BA6—i.f. buffer amplifier; three 6BA6 i.f. amplifiers; 6AL5—detector and noise limiter; 6AG5—b.f.o.; 12AX7—a.v.c. rectifier and a.f. amplifier; 6V6—output; OA2—voltage regulator; and 5U4G—rectifier.

* * *

The receiver, complete in cabinet, measures 20in. by 10in. by 15in. deep, weighs 52 lb. and costs $395.

W.H.A.

The Modulator Stage

A Review of Power Amplifiers

By G. L. BENBOW, M.Sc., A.M.I.E.E. (ex-G3HB)*

GENERALLY speaking, the modulator stage of an amplitude modulated transmitter is a power amplifier (*i.e.*, an amplifier which delivers power into a load of given impedance) rather than a voltage amplifier. There are two possible arrangements of valves in power amplifier circuits, *parallel* and *push-pull*.

In the parallel circuit, corresponding electrodes in each valve are connected together; thus the power output is proportional to the number of valves used. Parallel operation is normally confined to two valves, although there is no reason why more should not be used, provided care is taken to ensure a reasonable layout. In the case of two valves, since their anode resistances are in parallel, the load impedance required will be half that for one valve.

In the push-pull arrangement, the grids and anodes of the valves are connected to opposite ends of a balanced circuit, usually a centre-tapped transformer. Due to the phase difference of 180° between the voltages at the ends of the secondary winding of the input transformer, the grid of one valve goes negative while the other grid goes positive; consequently, the anode current of one valve increases as the anode current of the other decreases. Each valve, therefore, functions on alternate half-cycles, their outputs being combined in the centre-tapped output transformer—hence the term *push-pull*, since in effect one valve "pushes" while the other "pulls." Since even harmonics tend to cancel out in the anode circuit, a push-pull amplifier produces less distortion than a parallel connected amplifier; for this reason, push-pull connection is a preferable method of obtaining increased output.

The use of four valves in a combination of these connections, known as "parallel push-pull," is fairly common in a.f. work as it enables quite large outputs to be obtained from four relatively small valves, without adopting a layout prone to instability.

Conditions of Operation of Power Amplifiers

There are three main conditions of operation of power amplifiers. These are known as class A, class B and class C operation and are defined completely by the relative amounts of grid bias and input voltage applied to the amplifying valve. The difference between these conditions is clearly seen by reference to the anode-current/grid-voltage curves of the valves concerned.

Class A Operation

A class A amplifier is defined as one in which the values of grid bias and alternating input voltage are such that the anode current flows during the whole of the input cycle. This is illustrated in Fig. 1, which represents a typical *Ia/Eg* valve characteristic. The value of the operating grid bias, represented by the point P, and the input voltage represented by the curve a, b, c, d, e, are such that a similar current cycle A, B, C, D, E, is caused in the anode circuit. In order that the output cycle should be an exact replica of the input cycle, *i.e.*, that there should be no distortion, it is necessary for the operating point to be chosen so that equal positive and negative excursions of grid-input voltage cause equal positive and negative excursions of anode current. In other words, the portion of the valve characteristic in use, namely X Y Z, should be as linear as possible.

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Even in the absence of a signal, a steady anode current flows; this is represented by the point Q and indicates a continuous loss of power, which has to be dissipated in the valve—hence the efficiency of a class A amplifier is low. Continuous anode dissipation also places a limit on the power handling capacity of the valve. Class A amplifiers may be used in parallel or push-pull, but due to low efficiency, power input is generally restricted to about 15 watts or less.

Class B Amplifiers

A class B amplifier is one in which the grid bias is approximately equal to the cut-off voltage, *i.e.*, the grid voltage at which the anode current is just reduced to zero; the anode current, therefore flows for only slightly more than half the input cycle, as shown in Fig. 2. Class

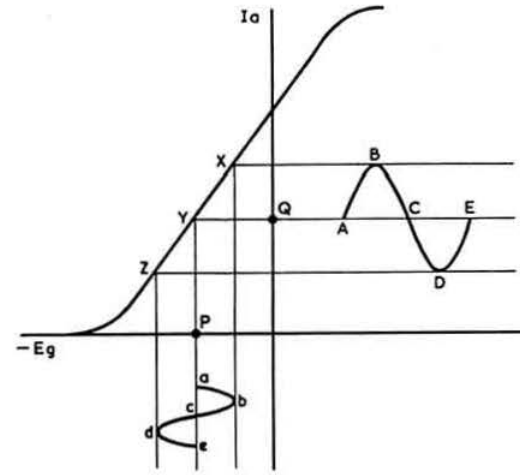

Fig. 1. Grid voltage/anode current relationship in class A operation.

B amplifiers are almost invariably operated with a large input voltage, the peak value of which is greater than the grid bias. Consequently, on peaks, the grids run positive with respect to the cathodes and so grid current flows, and the grid circuit consumes power. Since the grid current varies over the audio cycle, the power consumed, which must be supplied by the driver stage, also varies. The driver stage must, therefore, have good regulation (*i.e.*, low output impedance), or, in other words, the output voltage of the driver stage should be as constant as possible over the audio cycle.

The anode current flows in pulses, each pulse lasting half a cycle and corresponding to each positive half-cycle of grid voltage. During the negative half-cycles the anode current is reduced to zero, and it is, therefore, obvious that class B operation at audio frequencies requires the use of two valves in push-pull. In the absence of a grid-input signal the standing anode current is low, therefore the power to be dissipated in the valves is low. Due to the large variation in anode current between zero grid input and maximum grid input, a power supply of good regulation is essential.

Class B operation enables full advantage to be taken of the linear or nearly linear portion of the *Ia/Eg* curve which lies in the positive grid region, thus practically the whole of the curve is used. The curved lower portion of the individual characteristics are combined in the output circuit to produce a linear transition from one valve to the other. The efficiency is high and the waveform distortion can be kept reasonably low, so that class B amplification is very suitable for use in high-power amplifiers (*i.e.*, with outputs of more than 100 watts). Special valves, having a high amplification factor and operating at zero or almost zero grid bias, have been developed for class B operation, a typical example being the American TZ40 (G.E.C. types DA41 and DA42), a pair of which will give an output of 175 watts.

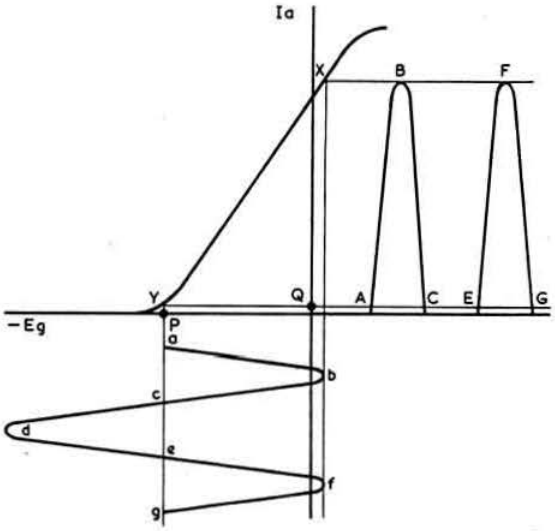

Fig. 2. Grid voltage/anode current relationship in class B operation.

Class C Amplifiers

Although this mode of operation is not used for a.f. purposes, a note on class C amplification is included for completeness. In class C operation the operating grid bias is more than the cut-off value and so the anode current flows for less than half a cycle. The grid-input voltage required is, therefore, large, and the anode current flows in short "flicks" at the peaks of the input waveform. It follows that the output waveform must always be a distorted version of the input waveform.

Class AB Amplifiers

As its name suggests, class AB operation is an intermediate stage between class A and class B conditions. In a class AB amplifier, the anode current flows for more than half of the input cycle but for less than the whole cycle. There are two quite distinct sub-divisions, namely, class AB1 and class AB2. In the former, no grid current flows, *i.e.*, the grids are never driven positive, whereas, in the latter, grid current is allowed to flow, and consequently the driver stage must deliver power. The fixed grid bias is higher than in class A, hence a larger input signal can be handled before the grids go positive, and the standing anode current is reduced. The efficiency and power handling capacity are, therefore, appreciably increased.

To summarise the foregoing, it may be said that the change in standing anode current and hence anode dissipation under no-signal input conditions, resulting from the variation of operating grid bias as the mode of operation changes from class A, through class AB to class B, causes a considerable increase in power handling capacity and efficiency. Against this, however, must be set the fact that both the h.t. and grid drive requirements become more critical. The grid-input voltage required increases, and, in the case of AB2 and B operation, the driver stage or last stage of the speech amplifier must be designed to supply the necessary power with good regulation; in addition, since the h.t. current varies between wide limits, the power supply must have good regulation.

Practically any power valve (including those designed specifically for r.f. operation), triode, tetrode or pentode, may be used in any class of operation. As a general rule, tetrodes and pentodes produce more distortion than triodes although, of course, their efficiency and stage gain is much higher, and class B operation produces more distortion than class A; but it must be remembered that the overall distortion depends also on other factors such as the use of negative feedback, regulation of power supply and driver stage, and the "goodness" of the modulation transformer.

Power Required for Full Modulation

It was stated in the first article of this series (R.S.G.B. BULLETIN, January, 1956, p. 320) that the power required for full modulation was one-half of the d.c. input to the p.a. stage. It is now necessary to consider the practical implications of this statement.

A certain loss of power is inevitable in the modulation transformer. This is due to losses in the iron circuit of the transformer (*i.e.*, the laminations) and also to the voltage drop in the primary and secondary windings. In a well-designed modulation transformer which is not being overrun, the total losses would be of the order of 10 per cent of the input power. Thus, in order to fully anode modulate a p.a. stage having an input of 150 watts, an audio power of 75 watts + 10 per cent or, say, 83 watts would be required. In the case of modulation of the anode and screen of a tetrode or pentode p.a. stage, a further 10-20 per cent audio power would be required for the screen grid. Hence, it would be necessary to provide about 100 watts of audio power in order to modulate fully such a p.a. stage having an input of 150 watts.

Power Obtainable from Commonly Used Valve Types

The following table shows the approximate range of audio power which may be obtained from different classes of valves operating in various conditions.

Table 1

Type of Valve	Class A	Class AB1	Class AB2	Class B
Noval-based	5W	12-15W	25-30W	
25W tetrode/pentode (single ended)	15W	30W	50-70W	
25W tetrode/pentode (double ended)	23W	30-50W	80-120W	120W
40/50W triode	20W	40W	100W	150-200W

From Table 1, it will be seen that the maximum requirements of the British amateur station may be most conveniently met by 25 watt anode dissipation tetrodes or pentodes operating in class AB1, AB2 or B. However, it must be appreciated that in order to obtain the maximum output from tetrodes or pentodes operating in class AB2 or B, it is necessary that both the grid bias and the screen grid voltage be as constant as possible.

Basic operating conditions of valves commonly used as modulators in this country are given in Table 2.

Reference to this table shows that under class AB2 or class B conditions, there is a considerable variation in both anode and screen-grid currents between zero and maximum signal conditions. There will consequently be a similar variation in the bias if this is obtained automatically by the voltage drop across the cathode resistor, and also in the screen grid voltage if this is obtained by the usual dropping resistor. The net effect of such variations will cause the operating points of the valves to be continuously changing and so the full output of which the valves are capable cannot be obtained.

Such difficulties as the above are, of course, avoided by the use of class B triodes, preferably operating at zero bias. However, these have the disadvantage of requiring an h.t. voltage of at least 1000 volts and greater driving power or voltage.

A compromise which is fairly commonly used today is a pair of triode-connected 807s operating in class B with zero bias. In this arrangement, the input is taken to the screen grids which are connected to the control grids via 22000 ohm resistors. This circuit is capable of an output of 120 watts and requires an h.t. supply of 750V at 240 mA. These figures correspond to those for class AB2 operation of a pair of 807s. Both classes of operation have definite advantages. 807s in class AB2 require only 0.2W of grid drive but a stable source of h.t. and grid bias voltages, whereas the zero bias class B circuit does not require grid bias or screen grid supplies but does need a low impedance speech amplifier capable of supplying 5.5 watts.

Table 2

Characteristics of valves commonly used as modulators.

Type No.	Maker	No.	Class	Heater V	Heater A	Anode Volts	Screen Volts	Anode Current (No Sig.) mA	Screen Current (No Sig.) mA	Anode Current (Max. Sig.) mA	Screen Current (Max. Sig.) mA	Input Volts (r.m.s.) V peak	† Load Resistance ohms	Power Output W
6N7	U.S.A.	1	B	6·3	0·8	300	—	—	—	2×35	—	58	8000	10
6V6	U.S.A.	2	AB_1	6·3	0·45	285	285	2×35	2×2	2×46	2×7	35	8000	14
6L6	U.S.A.	2	A	6·3	0·9	270	270	—	—	2×72·5	2×8·5	35	5000	18·5
6L6	U.S.A.	2	AB_1	6·3	0·9	360	270	2×44	2×2·5	2×65	2×8·5	45	9000	24·5
KT55	G.E.C.	2	AB_1	52	0·3	200	200	2×110	2×7·5	2×113	2×22·5	29	2000	25
KT66	G.E.C.	2	AB_1	6·3	1·27	390	275	2×52	2×2·5	2×62·5	2×9	70	8000	30
6L6	U.S.A.	2	AB_1*	6·3	0·9	360	270	2×44	2×2·5	2×102·5	2×8	72	6000	47
807	U.S.A.	2	AB_1	6·3	0·9	600	300	2×40	2×3	2×75	2×9	60	10,000	47·5
KT66	G.E.C.	2	AB_1*	6·3	1·27	480	375	2×40	2×1·5	2×87·5	2×9·5	80	5000	50
EL37	Mullard	2	AB_1*	6·3	1·4	400	400	2×50	2×6	2×138	2×36	60	3250	69
EL34	Mullard	2	AB_1*	6·3	1·5	800	400	2×25	2×3·0	2×91	2×19	67	11,000	100
807	U.S.A.	2	AB_2*	6·3	0·9	750	300	2×26	2×2·5	2×120	2×10	92	7000	120
807	U.S.A.	2	B	6·3	0·9	750	—	2×6	—	2×120	—	554	6650	120
QV06/20 (6146)	Mullard	2	AB_1	6·3	1·25	750	195	2×12	2×1	2×110	2×13	100	8000	120
TZ40	U.S.A.	2	B	7·5	2·5	1000	—	2×22	—	2×140	—	220	7000	175

* Indicates fixed bias conditions. † Anode to anode resistance in case of push-pull pairs.

The Driver Transformer

Little need be said about this component, except to emphasize that, in the case of class AB2 or class B operation, the driver transformer must be capable of handling a reasonable amount of power, say, up to 10W, without causing distortion.

The Modulation Transformer

The modulation transformer is a most important component, for its object is to impress the output of the modulator upon the r.f. output of the transmitter and so achieve the process of modulation. To do this satisfactorily it must also provide a good impedance match between the modulator and r.f. amplifier; it must also present an adequate load to the modulator valves.

To avoid distortion, due to saturation of the iron core, the modulation transformer should be of generous design and should always be used well within its ratings.

To allow for the different conditions likely to arise in the amateur station, the use of a multi-ratio transformer is advisable. This has tapped primary and secondary windings and enables practically any combination of modulator and r.f. amplifier conditions to be matched.

The exact design of a.f. power transformers is outside the scope of this article, but to those who have the necessary winding facilities, the following notes should enable a reasonably successful modulation transformer to be made. For the restricted frequency range necessary for communication purposes, the requirements of high primary inductance for good l.f. response and low leakage inductance for good h.f. response are not overriding considerations.

Table 3 gives the approximate size of core area required for different a.f. power levels when using silicon-iron laminations such as Stalloy or Silcor. The turns ratio may then be calculated from the ratio of the modulator load impedance and the modulating impedance of the r.f. stage. A suitable wire gauge must next be chosen. The maximum mean currents which flow through the primary and secondary are known, but the peak values at full output will be appreciably higher than these. As the peaks will not occur often, it is reasonable to design on a current which is some 20 to 30 per cent higher than the mean value. The wire size chosen should permit a current density of about 1200 amperes per square inch. The primary and secondary windings can be proportioned to fill the available winding space, allowing sufficient room for insulation. A centre-tapped primary winding may be wound in two halves, with the secondary between

Table 3

A.F. Power	Core Area	Air Gap
15W	1¼ sq.in.	$\frac{3}{32}$ in.
30W	1¾ sq.in.	$\frac{1}{32}$ in.
60W	2½ sq.in.	$\frac{1}{16}$ in.
90W	3 sq.in.	$\frac{1}{16}$ in.
120W	3½ sq.in.	$\frac{3}{32}$ in.

them. It is advisable to put about five layers of empire cloth between windings and a layer of thin paper between every other layer of each winding. An air gap is necessary in the magnetic circuit; an approximate value for this being given in Table 3.

A practical example should make the foregoing procedure clear. A transformer is required to modulate a single 35T r.f. stage by a pair of KT66s in class AB giving an output of 50 watts (load resistance = 5000 ohms). Assuming that the transformer has an efficiency of 90 per cent, the audio power available for modulation is 45 watts; thus to achieve full modulation of the 35T the input must be restricted to 90 watts. If, therefore, the d.c. input to the r.f. amplifier is 95 mA at 950V, the modulating impedance is 10,000 ohms, and the modulation transformer is required to match an impedance of 5000 ohms into a 10,000-ohm load. A "step up" is necessary and the turns ratio is 1 : $\sqrt{\frac{10{,}000}{5000}}$ or 1 : 1.41. The approximate core area required is, from Table 3, 2¼ sq. in. A suitable core to use would be a 2in. stack of no. 28 Stalloy (Sankey or Magnetic & Electrical Alloys, Ltd., numbering system) giving a core area of 2½ sq. in. The total winding space available on this size of stamping, allowing for the thickness of the bobbin, is approximately 3.6 sq. in. The maximum d.c. currents which flow in the primary and secondary windings are 87.5 mA and 95 mA respectively. The peak currents will be appreciably higher than these, but as suggested earlier, it is reasonable to design on currents some 20-30 per cent higher than the d.c. values. Suitable minimum wire sizes are, therefore, no. 32 s.w.g. (enamelled) for the primary and no. 30 s.w.g. (enamelled) for the secondary. These wire sizes occupy 6500 and 5300 turns per sq. in. respectively. Assuming the primary has 5000 turns, then the secondary will require 7100 turns; thus the windings will occupy 0.77 sq. in. and 1.32 sq. in. respectively or a total of 2.1 sq. in. It should be noted that the space that these windings will actually occupy will depend on the proficiency of the winder and the quality of the winding machine, but there should be no difficulty in accommodating these windings and the necessary insulation in the space available. The wire should be wound on tightly and evenly in layers in the order already stated, namely, half the primary winding, then the secondary winding and finally the remaining half of the primary winding. The end of the first half and beginning of the second half would be joined to form the centre tap. The stampings should be inserted with an air gap of about $\frac{1}{16}$in. in each limb of the stampings.

As pointed out earlier, it must be emphasized that this is an empirical design and is not necessarily the optimum or the most economical one, but nevertheless it should prove reasonably satisfactory for the purpose intended.

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"You're on the Air, Mrs. Smith!"

THE Post Office has published a leaflet with the title "You're on the Air, Mrs. Smith!" the purpose of which is to draw the attention of the general public to the interference caused by domestic equipment. Copies may be obtained from all main post offices.

Radio Amateur Emergency Network

By C. L. FENTON (G3ABB)*

WITH the approach of summer and the better weather, R.A.E.N. activity tends to wane in many places. It seems to be generally felt that nothing can happen during the fine weather, so let's relax. This is not necessarily true, and we appeal to members to continue to have their equipment, both mobile and fixed, serviceable at all times. Above all, continue to monitor the Emergency Calling Frequencies specified for the use of R.A.E.N. It is some time since these were last publicized, and as a reminder here they are again:—1980 kc/s, 3600 kc/s, 7050 kc/s, 14100 kc/s, 21150 kc/s, 28200 kc/s and 145 Mc/s.

Activity Reports

It is a source of continued regret to those administering R.A.E.N. that more frequent reports are not received from E.C.O.s. Despite frequent appeals in this column, regular reports are not forthcoming. Without such reports the Committee cannot tell whether groups are still active or otherwise. Members of the Committee give up much of their spare time in order to further the cause of R.A.E.N., and look to the E.C.O.s to support them by reports on what is happening in the various districts. Please try to send in a report at least each alternate month.

The resignation of Mr. S. Poole as E.C.O. for Romford, Essex, has been withdrawn.

Membership and Membership Cards

The new R.A.E.N. membership cards are now available, and may be obtained on application to your E.C.O. If you have no E.C.O., write direct to the Honorary Secretary, enclosing a stamped addressed envelope.

It is apparent, from correspondence received recently, that some members think that their membership must be renewed annually. This may be due to the fact that the old type of membership card was valid for the year of issue only. But it is not correct: once having enrolled in R.A.E.N., a member is considered to be a member until such time as he, or she, submits a letter of resignation.

Emergency Communications Officers and the County Controllers are appointed only until December 31 each year. The appointments are, however, automatically renewed annually, no action being necessary by either side, unless the Committee decide that it is advisable, in the interest of a particular group, for an E.C.O. to be renominated.

Many areas continue to be without an appointed E.C.O., although the individual membership in those areas is comparatively large. Anyone willing to undertake the duties is requested to write to the Hon. Secretary.

Unless absent from home, G3ABB is operating on 3700 kc/s 'phone on Sunday mornings and is free for contacts with members from about 08.45 hours G.M.T.

The rules for the next R.A.E.N. Rally, to be held in the autumn will be published as soon as possible.

* * *

Reports for inclusion in the next R.A.E.N. feature should reach the writer not later than July 20, 1956.

* "Niarbyl," Gay Bowers, Danbury, Chelmsford, Essex. (Tel.: Danbury 518).

A Self-Contained Microphone and Pre-amplifier

By REV. F. NESS, M.A. (G3ESV)*

THE choice of a microphone for portable or mobile work is automatically limited by the need for an output of at least 2 or 3 volts. This normally rules out both the crystal and the moving-coil or moving iron types. In a recent article[1], however, G8TL showed how a small external pre-amplifier could be used with crystal microphones. The writer had available a couple of surplus hand-sets type AP13220, usually advertised as "sound-powered telephones—no batteries required." Both microphone and ear-piece are moving iron units of identical construction. The d.c. resistance of the windings is about 100 ohms, and it seems likely that the impedance will be several times that figure. An input transformer would normally be used to couple this microphone to the grid of the first speech-amplifier stage, but it occurred to the writer that here was the ideal place to use a junction transistor. Data for the Mullard type OC71 showed that, over a reasonable range of working conditions, its input impedance would be between 500 and 1,000 ohms when operated as a grounded-emitter amplifier—not a bad match for the moving-iron microphone.

The circuit used is shown in Fig. 1. C must be of fairly large capacitance and small in size, so the smallest available type of cathode by-pass capacitor was used.

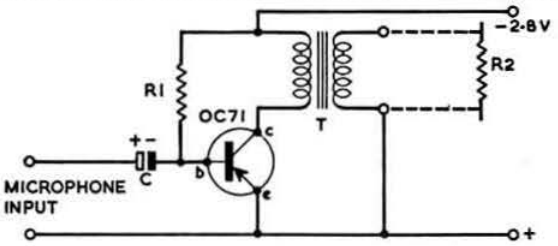

Fig. 1. Circuit diagram of the transistor pre-amplifier. C, 25μF 25V or smaller (value not critical but observe polarity); R1, 150,000 ohms (see text); R2, 500,000 ohms (grid resistor of main amplifier); T, midget intervalve transformer, ratio 1:4.3, primary to carry 1 mA (see text). The transistor is a Mullard type OC71.

Special miniature electrolytics are made for transistor circuitry, but they were not available locally. The transformer is a Wearite Hyperloy, type 209, available from Webb's Radio. The primary has an inductance of 30 Henrys (at the operating current of 1mA) which is ample; and its use enables a remarkable degree of amplification to be obtained. It should be remembered that the whole secret of using transistors as voltage amplifiers lies in the correct matching of both input and output circuits. The closer the match the more gain is secured, and the output into .5 Megohm is approximately 5 volts peak when speaking normally at six inches from the microphone.

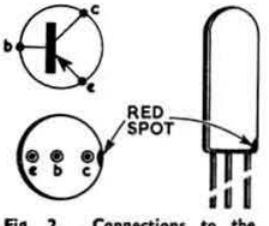

Fig. 2. Connections to the OC71 transistor.

For test purposes, the unit was coupled via a 3ft length of coaxial cable to the high-level input socket of a Grundig TK9 tape recorder, and a number of recordings made. The expected diaphragm resonance was not troublesome, and a piece of unbleached linen over the diaphragm provided enough top-cut.

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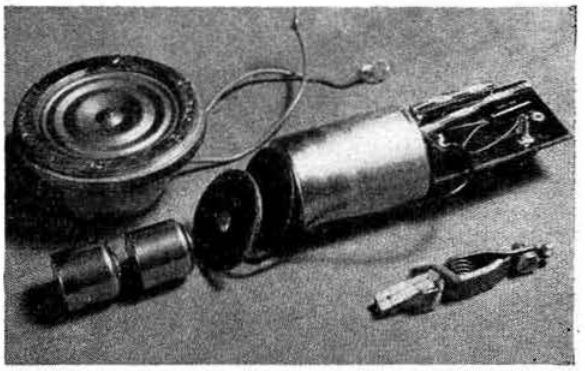
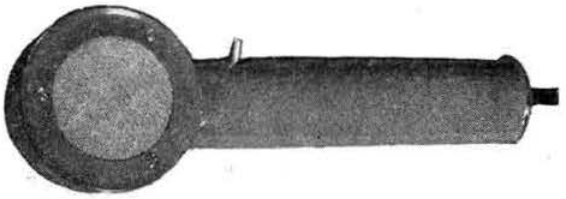


Exploded view showing the arrangement of parts. The OC71 is on top of the paxolin panel, with C and R below. A "thermal shunt" is in the right foreground and the Mallory cells are on the left.

Construction

It was decided to mount the transistor amplifier and batteries inside the handle to make the whole affair self-contained. Two 1.4 volt Mallory cells (type RM-1) were chosen to keep bulk to an absolute minimum, though at 2s. 3d. each they are admittedly expensive. Giving only 1 mA, however, their life should be indefinite. One *very* important point to remember is that the steel can of the Mallory cell is *positive*—this is the reverse of normal dry-battery practice, and while anyone who follows the circuit will find no difficulty, those who plan to use ordinary Leclanche cells must allow for the change in polarity.



The completed microphone weighs 11 ounces including the battery. The coaxial microphone lead is brought out through a hole in the rear and is supported by small cable clamps soldered to the handle.

The microphone case is a 1 oz. tobacco tin, while the handle is of thin copper foil 4¼in. long, and just wide enough to contain the transformer. In fact it is wise to use the transformer as a mandrel while forming the copper to shape. A press-button actuates a strip of springy brass about 2in. long which is soldered inside the handle; it should be fitted before soldering the case on the top. The general arrangements of parts is shown in the exploded view.

The paxolin sheet and the transformer are made a tight push-fit inside the tube, and a contact piece joined to the emitter is so positioned as to lie under the press-button when everything is assembled. Operating the button then completes the circuit by earthing the emitter to the case which is in contact with the can of the cell in the base of the handle. This gives simple push-to-talk and also prevents the amplifier being left on by accident.

(*Continued on page* 28)

THE MONTH ON THE AIR

By S. A. HERBERT (G3ATU)*

DESPITE the advent of Summer, which has had its usual effect on the two highest frequency DX bands, the month under review has been an interesting one and got off to a clamorous start on "U-Day"—June 1. Amateurs all over the world suddenly realised that the Russians were anxious, willing and able to engage in light conversation on the subject of QSLs via Box 88, Moscow. Indeed, the first week's free-for-all alone must have filled that Box to overflowing, as 95 per cent. of the QSOs during that time seemed to have a U at one end! By now, though, things have returned more or less to normal, with the first rush over.

To add to the excitement, expeditions have been active from various places. The ON4 trip to Luxembourg duly took place and over 400 QSOs were made in two days. XE4A turned up on Revilla Gigedos as promised, but here Nature took a hand and a storm warning forced the expedition to make tracks for home after only a short stay on the island. The YV0AA jaunt to Bird Is. had better luck and was in situ for some eight days, though little of them appears to have been heard in Europe, due presumably to poor conditions, as their advance publicity promised continuous activity on one band or another throughout their stay. Most activity from these and other DX turnouts took place on twenty metres and so we start with that band.

Twenty Metres

Quite apart from the above-mentioned activities, there has been a slight improvement in DX conditions generally since last month and though nobody could call the band red hot, at least there is usually something interesting going on—short skip and straying phones permitting. **GM2DBX** (Methilhill) heard KM6AX and then found two more who were not straying and worked them both—LZ1KAA and M1B—not common or garden either, yet both called "CQ" more than once before making their next contacts. Jimmy wants to congratulate the B.R.S. members for all their gen and to thank them for sharing it so willingly with the rest of the DX fraternity. **G6YQ** heard the pack in full cry after XE4A one night, but no sign was heard from the XE and George had no better luck next morning, when the whole of W6 was working him, but he did manage to work HI8FR for a welcome new one. **G8PL** has been on only in the early mornings, when an indoor dipole netted him QSOs with VK and most W districts, plus some good South Americans like OA4AV, CO2GR, CX6CM, PZ1BS, LU and YV.

B.R.S.20317 (Bromley) expects to have a converter for the h.f. bands in front of his BC348 soon. Meanwhile he is doing well on the others with a 1956 score of 173C-40Z. Latest on the key were AC4LP (12.30). This one has been quite active of late—'3ATU heard him weakly one night about 19.00 — FE8AE (20.10), FB8BX, UA0KJA (Blagoveschensk, Zone 19), UA0OM, '0KQB (Yakutsk), PZ1AA, VP2AB, VS9AS/P (N.F.D.), XE1NP, YS1O and ZD8SC, but Bill is still chasing HR, VP1, VQ3 and I5. **B.R.S.18017** (Warwick), waiting a new 67 ft aerial, found the h.f. bands good and mentions phones ZP5CF and AC2US in the Far East (who sounds like a M.A.R.S. type). On c.w., John logged UA9, VU2DK and two new ones—UD6BM and PZ1AM. **B.R.S.20135** (Newport, I.o.W.) has sterner matters to attend to than radio during the yearly tourist invasion of the island, but he had time for a little listening and heard lots of Russians, including UA1KBB, VP6, KG1FA, VP5RR (Turks Is.), W6SXI and ZA1UB, who specifies his QTH as Tirana. **Bob Crocker** (Plymouth) uses an Eddystone 750 and 264 ft of wire, a combination which netted him phone from VK, ZL, W7, YK1AC, VPs '5FH and '5RR (Turks), VP5DX, HR3HH, HH7RA, TGs '9AD, '9AL, '9TU, VPs '1EK, '1AK, '2DA, XEs '2XV, '2KW, '3AF (05.00), 4S7YL, VP9CL/P, YN1JB, KG4AA, HZ1TA, SU1AB, ZA1UB, OY7ML, VK7RX, VK3AAE (s.s.b.), YV0AA and VK9RH (Norfolk Is., 07.20).

B.R.S.15079 (Eaton Socon, Hunts) was with YI2AM until returning to the U.K. last January. Latest news from out there is that YI3WW and YI2RP are back home—'2RP is now G3KVX—leaving YI2AM going strong and the only "official" YI, though '2DX, '2DY and '2DK are also active inside Iraq. '15079 is swotting for his R.A.E. and meantime is listening with the aid of a CR100, with 90 odd countries to show on twenty and fifteen so far.

B.R.S.20106 (Petts Wood) makes a significant comment in the course of his usual thorough survey of available DX. He has heard 195 countries this year—his best ever, yet he finds himself preferring to do house jobs rather than stay on the rackety bands—a state of affairs which must apply to quite a few of us as a result of the ever-increasing volume of rubbish we have to put up with these days. Let's hope it may be a case of things getting worse before they get better! Norman must be one of the few in Europe to hear XE4A, who was coming through at 05.20-06.16, working W0, W9 and ZL1HY, with a loud FA8 sitting on him and calling throughout. Other c.w. DX of note was FE8AE, heard once in over an hour through the mob calling him, with BV1US nearby apparently escaping notice, XE1AJ, '1NP, YK1AH, VP8BC, FY7YB. KH6, CP, JA, YN, VQ4, VP9, KG1 and FK8AO have all been heard, more or less at the same time during evenings, with phone from YS1O, VP5RR, HK and MP4KAB on phone. The domestic receiver was also tried and FM7WF, VK5GD, VK7RX, VP1JH, 4S7WA, OA5G, VP1EK and SV0WU (Rhodes) were picked up with a piece of wire up the wall for an aerial! **G3ATU** managed to hook HI8FR and YV0AA for new ones, but failed to hear a squeak from XE4A who was being called by all and sundry one night. BV1US was heard briefly on c.w., as was the somewhat suspicious AC4LP (18.30). ZA1UB was worked on phone and said he was the QSL Manager for Albania, where there were now seven stations licensed—all with a 30 watt

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power limit. '3ATU is not unduly optimistic, but if a QSL *does* materialise—you will be informed!

Ten and Fifteen Metres

Ten remains in a sorry state for the nonce and almost escapes comment, but on fifteen, things have improved somewhat after several weeks of very poor stuff. Some of the more exotic calls have been coming through and **G3BID** (Abbotsbury) fell upon a prize when he worked PJ2MC on Sint Maartin Is., operated by none other than Reg Tibbets, W6ITH, who is also still active as FS7RT from the French side of the island. **G6CJ** remarks on the improving state of affairs. Loud W6 and W7 on twenty are usual enough, but to work VE7ZM at breakfast time on fifteen is something! **GM2DBX** raised ZD8SC and VP8BT for two new ones on phone, while **B.R.S.18017** heard FF8AP, UA4FA, EL2D and OQ5GT.

R. J. R. Crocker came upon ZM6AS (07.15), VP2FI, VP3HAG, VP5RR, VP4TI, VP7NS, SV6FR, HH2Y and CR5SP (St. Tome), while on ten metres he logged KP4BU, MP4KAC, VP6AM, VS2EZ, VQ4RF and ZD8SC. **B.R.S.20135** pulled in VS2DQ, OA4C, '8B, CR6AO, ZD4AF, VQ2 and ZS, then turned to fifteen phone for VP8BS, FB8BZ, FM7WF, KR6QV, VU2JP, ZD2JHP, VS1FE, '2DB, VS6BE and VS6CT. **B.R.S. 20106** heard VQ4EO arranging a sked involving KX6ZB on about 21300 kc/s (Saturday, Sunday, 12.00), and logged phones EA6AF, SV0WN (Crete), VK2GU, VE5DK, VP3YG, KG1FR, K5CTN/VE8 and on c.w., 3W8AA, UA9CC, ZL2ATW, ST2NG, JA1AM, VE6VK and XE1PJ. Openings on ten provided CE3, VS2EZ, OQ0DH, ZD4BK and VK4HV on phone, with VS1GX on the key. **VS4BO** is newly active on fifteen phone from Kuching, where he is due to stay for the next eighteen months. John is ex-VS1BO.

Other Bands and News

B.R.S.20317 heard UA9, UA0AD and a 4X4 on forty c.w. and got snatches of a TA3 and an SU through the racket on eighty, on which band **GM2DBX** raised GM3HLQ/MM, sailing down the Clyde, and the four watt phone from GW3GRO/P, operating 2,500 ft up in the Welsh "Alps"! **G2BP** (Chatham) has just received his OH Award. He will soon be active on 160, 80 and 40 metres, using a TA12C. **G2DHV** met G6ZG/M and others while at Lowestoft and operated his A3 rig from the Y.M.C.A. there, which also houses the local club station, G3IFI. G2DHV/A, G3FTI/A and G3HEV also operated 1.8 to 14 Mc/s during the recent R.A.R.C. Exhibition at Downham.

G3EEM worked VK1PN (Heard Is.) in 1952—since when, silence. Has anyone had a card? As mentioned last month, **VS9AH** is active from R.A.F. Khormaksar. His father, **G3TA,** would like to hear from Gs who work him and will ensure that a prompt QSL is forthcoming. '3TA hears also that VQ4EV (G3GBO), now an Inspector in the Kenya Police, has recently been made Honorary Editor of the R.S.E.A.'s monthly newsletter.

Overseas News

As is usual during N.F.D., one or two U.K. portables were heard at various DX points, which demonstrates once again the efficacy of good aerial systems and a good location, even when used with inputs of five watts or less. So far, two overseas reports have arrived and the first—from **VK6EJ** (Bencubbin)—highlights 7 Mc/s, where G5RI/P and G8CR/P were heard, shortly after 5 a.m. local time. Local QRM was very bad and though many other portables were heard, their full calls could not be copied. '6EJ says that out there, s.w. broadcast and commercials make DX work impossible except for some two hours, between 4 a.m. and 6 a.m., when the band is good, so for the next two months he will be looking for U.K. stations daily, between 23.00-24.00 G.M.T. VK6EJ is Jack Cowles latterly of Suffolk who emigrated to Australia a year or two ago.

G6CJ/P worked ZL4GA on 7 Mc/s, but couldn't get through to **ZL3GQ.** Dud passes on a note from ZL3GQ.

Frequency Predictions for August, 1956

PREPARED BY J. DOUGLAS KAY (G3AAE)

BAND	NORTH AMERICA	CENTRAL AMERICA	SOUTH AMERICA	SOUTH AFRICA	NEAR EAST	MIDDLE EAST	FAR EAST	AUSTRALIA
28 Mc/s	2000	2015	1200—2200	0830—1730	0830—2000	0900—1100	1000	0800
21 Mc/s	1100—0000	1000—0030	1030—0030	0630—2000	0630—2330	0700—2130	0800—1900	2100—0030 0700—1100
14 Mc/s	0900—0300	ALL DAY	0900—0400	0600—2230	ALL DAY	ALL DAY	1000—2400	1500—0200 0700—1000
7 Mc/s	0000—0400	0200	0400	2200—0200	2200—0400	0200	0200	2000
3.5 Mc/s	0200	0200	0400	0100	0100	0200	0200	2000

These predictions are based on information provided by the Engineer-in-Chief of the Post Office. All times are G.M.T.

Between approximately May and September Sporadic E reflection may result in short skip conditions on the higher frequency bands. The incidence of Sporadic E is unpredictable but is most pronounced around mid-day and dusk.

whose time on the air was limited owing to local power cuts. Between 05.00 and 06.00 G.M.T., the ZL worked G3IEW/P and heard G5PP, G2RT, G8BU, G3BEX and portables from HB, DL and F. Conditions on 14 Mc/s were poor, but at 21.00, G6LX and G3RQ were logged, while 06.00 G.M.T. produced G2ASS, DL and HB.

Luxembourg: DL1CR (Esslingen) writes that he, together with DL3AO, DL9CI and DJ1BP, will be active from Luxembourg for seven days, starting on August 5 or the following week. Calls will be assigned upon arrival in LX, thanks to a request by the Federal Bundespostminister to his counterpart in the Grand Duchy. Activity will be on c.w. only, using all bands from ten to eighty metres.

G6UT (Bishop's Stortford) passes the news that G5RV has been operating as **VP6RV** (he was a good signal during N.F.D., working as VP6RV/P) and that he expects to return to Barbados from time to time. Louis expects also to be issued with the call YV5RV, for use from Caracas, where he is at present stationed. Another wanderer is that DX stalwart Jim Kirk (G6ZO). **G6YQ** (Liverpool) had a long talk with him with '6ZO operating CE3RE and it seems likely that before long, he will be issued with his own CE3 call. **VQ4GL** (Nairobi) points out the very important part played by the R.S.E.A. during the "Coronation Safari" car efficiency test held during May. Amateurs from Kenya, Uganda and Tanganyika operated most of the control stations, with the main control at Nairobi manned continuously for the four-day test. Information received there was passed to the computing section, who were able to work out competitors' marks long before their log books arrived. One result was a very good write-up in the local press—most gratifying to all concerned as the "backroom" activities of Amateur Radio are not invariably recognized when official thanks are being offered.

G8PL (London, N.W.3) worked ZB2R, who would like to reassure us that he and ZB2I, 2S and 2T are quite genuine! ZB2S is with Cable and Wireless and the other three are with the R.A.F. The present rig at '2R is a modified ET4331 running at 100 watts, but a 150 watt 813 with TZ40 modulator is ready to go. The aerial started as a dipole, but wind altered all that and the result is a wire with 22ft vertical and 26ft semi-vertical which they call a half-rhombic. Anyhow, it radiates! Activity is mostly on twenty, with excursions to eighty on quarter power. Forty has been dead and one-sixty is "out" owing to BCI, so that the h.f. bands seem to be the best bet in Gibraltar. Carl, **W3TYW** and Don, **W2EIK**, have ideas of expeditioning to a certain Bank or Cay during September if clearance is forthcoming and country status is assured. As usual, transport is the big problem, but should plans mature, Carl promises to advise us through this column.

Now some items filched with thanks from the pages of the North California DX Club's *The DX'ER*. Last minute information via W6LGD has it that Danny Weil (VR1B) closed down in British Phoenix about June 10 and left for Nauru (VK9TW). He may stop at the Gilberts en route. From W6SR (via KV4AA) comes news that two operators from VQ8 are to be on Jan de Nova Is. (off Madagascar) for about a year. Possible that this will eventually count as a new one, so watch out for FB8BI. W6HNX is on Turks Is. and some of the boys have worked him on A3 as VP5FH. CE0AB and CE0AC were expected to begin operation from Easter Is. on May 23, using 375-450 watts on 7 and 14 Mc/s phone and c.w. And finally, a sample of the DX currently audible in California, where VR6AC's phone on 14140 kc/s and c.w. such as CR10AA, HL1AC, '1AB, FR7ZA, YJ1AA, '1RF, KJ6BJ, ZK1AA, '1BS, AC3SQ, KC6AL, FK8AO, ZC5SF and JZ0PS feature in sundry W6 logs.

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Which brings us to the end of yet another month. See you next month, in the meantime, good hunting as usual and 73.

P.O. Electrical Engineers' Journal

DURING the 1956-57 session the Institution of Post Office Electrical Engineers will celebrate the Fiftieth Anniversary of its foundation. For this reason, the October 1956 issue of *The Post Office Electrical Engineers' Journal* will be a special number devoted to articles reviewing the development and growth of the British Post Office telecommunications services and of the mechanization of the postal services, with particular reference to advances in more recent years.

Orders for copies of this issue, price 2s. 9d. each post free, should be sent to Messrs. Birch and Whittington (Prop. Dorling and Co. (Epsom), Ltd.), 49 Upper High Street, Epsom, Surrey, by August 1, 1956.

A.T.C. Amateur Radio Club

NO. 114 Squadron Air Training Corps Amateur Radio Club (West Ruislip) is active on phone and c.w. on 3.5 and 7 Mc/s on Sundays from 10.30 to 12.30 B.S.T. and on Tuesdays and Thursdays from 19.30 to 21.30 B.S.T. using the call-signs G3LAF and G4GB/A. Reports on transmissions will be welcomed and should be addressed to the club, c/o No. 4 Maintenance Unit, R.A.F., West Ruislip, Middlesex.

Fourth Midlands Topsfest

THE Tops C.W. Club will hold its combined Fourth Midlands Topsfest and Tenth Anniversary Meeting at the Swan Hotel, Lichfield, on August 12, 1956, commencing at 2 p.m. A comprehensive programme including a draw with many valuable gifts has been arranged. All transmitting amateurs and short-wave listeners are invited to attend. Admission will be 2s. at the door but a combined ticket, price 8s. 6d., covering admission and high tea may be obtained from C. J. Morris (G3ABG), 24 Walhouse Street, Cannock, Staffs.

CQ Single Sideband

Continued from page 21

Low Noise Convertor

The convertor shown in Fig. 2 was developed by G3MY and although a little unconventional, has a measured noise factor of better than 6 db. There is nothing special about the circuit that makes it suitable for s.s.b. reception only, and it may be used for the reception of all types of signals. But like so many ideas that have been associated with s.s.b. operation, it is simple, and offers a neat crystal controlled front end for both mobile and home receivers. It should be noted that the coupling between L1 and L2 is provided by a 2pF capacitor. Feeding the aerial to the cathode of V1a makes for easy coupling to coaxial feeder. For use on the higher frequency bands it may be necessary to use an overtone crystal oscillator in place of that shown.

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Notes and news with circuits and data of use to other s.s.b. enthusiasts should reach the writer by September 20 for publication in the October issue of the BULLETIN.

CQ Single Sideband

By H. F. KNOTT (G3CU)*

SINCE the spring a number of operators have turned to mobile s.s.b. operation. The latest is G3MY. Work has been progressing slowly on the mobile rig which is now modified to operate on 3.8 and 14 Mc/s, the arrangement in use following the usual line-up for mobile single sideband operation, in which all oscillators are common to both the transmitter and receiver, tuning being done with the v.f.o. This has the advantage that the receiver is always tuned to the transmitter channel.

The oscillator on 420 kc/s acts as the b.f.o., and the transmitter and receiver each have identical filters. G3MY has worked quite a number of American s.s.b. mobiles on 14 Mc/s so the prospect of transatlantic mobile contacts seems quite good. The greatest advantage of mobile s.s.b., as has been pointed out before in this column, is that the effective radiated power for a given drain on the car battery is far greater than can ever be hoped for when using a.m. with its high standing input and modulator power.

Two Metres

After some months of hard work G3ILI reports that he has completed his 144 Mc/s s.s.b. transmitter to his satisfaction. The main difficulty has been the construction of a suitable TR switch at these frequencies; this now appears to have been overcome. The transmitter was shown at the London V.H.F./U.H.F. Convention where it created a great deal of interest.

The single sideband signal is produced by a phasing exciter on 16 Mc/s which is followed by two mixers to reach 144 Mc/s, the requisite frequencies being obtained from a single 8 Mc/s crystal. A suitable linear amplifier is now under construction so that the full permitted peak output power may be obtained. G3ILI says that he finds most 2-metre operators very willing to co-operate in the various tests that need to be carried out.

Round and About

VE2AEE (ex-G3IXL) has returned to Canada after spending three months in the U.S.A., and is now settled at Kitchener, Ontario, where he will be operational on 14 and 21 Mc/s using a VE3 call. He hopes to have a Collins 75A4 receiver soon, by which time he should have finished his linear amplifier using a pair of 6146s in parallel.

JA1ACB has forwarded details of Japanese activity along with various circuits and data. He is writing a s.s.b. section in *CQ Ham Radio*, the journal of the Japanese Radio Society. Japanese s.s.b. stations are to be found on all bands from 3.5 to 50 Mc/s. The latest list of s.s.b. calls includes JA1AIB, '1ICE, '1HV, '1ADN, '1MN, '1ANR, '1AEA, '1AKP, '1AUG, '1CB, '1CP, '1DD, '1DI, '3AJ, '3EK and '6BI. G3GKA has been received in Japan at RS59+ on 21 Mc/s. JA1ACB also reports that VR2CG (Fiji) is active on 3.7 as well as 21 Mc/s.

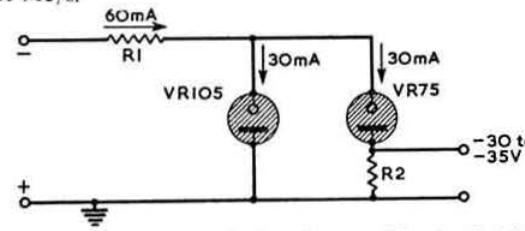

Fig. 1. The simple bias supply for a linear amplifier described in the text. R1 and R2 should be adjusted for the appropriate current through the respective voltage regulator tubes.

In the U.K. there have been several additions to the already long list of stations using the system. G3GKF has worked over 40 countries on 21 Mc/s. G3BXI, mainly on 14 and 21 Mc/s, has a Multiphase 10A exciter followed by a 100 watt linear amplifier, and three-element beams for each band. G3GKG (Sheffield) is on 3.8 Mc/s with a phasing rig as also are G5BJ and G3GWR.

G3IRP (Morden) has been active for some time on 1.8 and 3.8 Mc/s, with a filter exciter using the 85 kc/s i.f. transformers from a BC453 receiver. With the single sideband produced at 85 kc/s the signal is changed first to 465 kc/s then to 9 Mc/s before being heterodyned into the appropriate bands. The transmitter will eventually cover all bands from 1.8 to 28 Mc/s. G3EPL, who runs an 813 on 14 Mc/s with 1200 volts on the anode has been holding daily QSOs with AP2BP, AP2CR and ZD4BF between 17.00-18.00 B.S.T. '4BF hopes to be back in England by early August when he will have an opportunity of meeting old friends.

Bias Supply

To obtain the bias voltage for a linear amplifier below 75 volts can be quite a problem. A number of deaf-aid batteries can be used but it is not always apparent that with a little judicious juggling with the VR type tubes a number of voltages are available.

The circuit shown in Fig. 1, sent in by JA1ACB, is one such arrangement. The voltage available in this case is −30 volts, but it does depend on the actual stabilising voltage of the particular VR tubes in use, as they can differ by as much as five volts from their nominal voltage. The output from the circuit described is quite suitable for an 807 tetrode operating in class AB2 with from 400 to 750 volts on the anode and 300 volts on the screen.

(*Continued on previous page*)

*15 Hampden Road, Wantage, Berks.

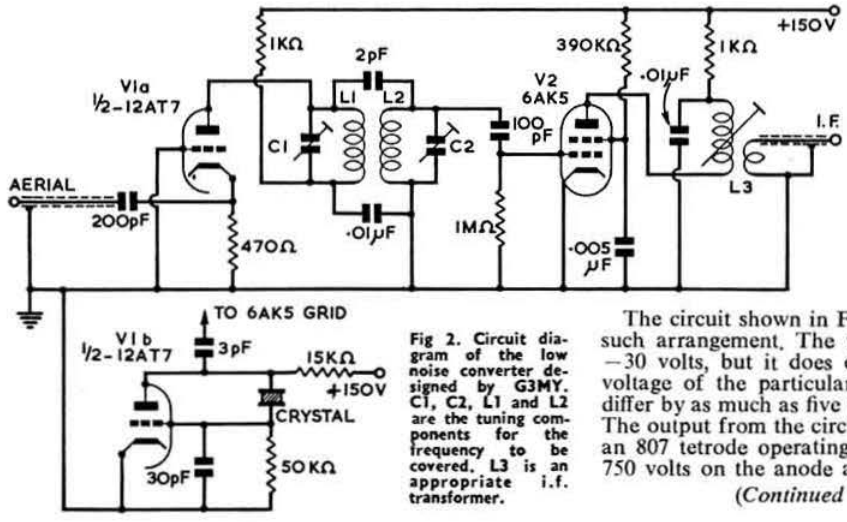

Fig 2. Circuit diagram of the low noise converter designed by G3MY. C1, C2, L1 and L2 are the tuning components for the frequency to be covered. L3 is an appropriate i.f. transformer.

TWO METRES AND DOWN

By F. G. LAMBETH (G2AIW)*

ONE of the most important facts brought out at the London V.H.F./U.H.F. Convention was the rapidly increasing interest in equipment for the 1215-1300 Mc/s band. Many u.h.f. workers are now actively producing equipment, and it is expected it will not be long before many more contacts are reported. F3SK has already described the lively interest in France and some time ago similar activity was reported from Holland.

It is obvious that this portion of the spectrum will become more important as time goes on. There is very much to be gained by encouraging activity in both the experimental and communication fields, and, as has already been stressed, the accent should be rather on simplicity of design than on complicated equipment. The vexed question as to whether the apparatus should be crystal controlled or self-excited will be decided by individual experimenters, as also will the position each station will occupy in this large band, although it is of no avail to work at one end of the band if everyone else is listening at the other. This is another band to which amateurs, having staked their claim, must now justify it by occupancy. One or two have already done so, but many more are necessary if we are not to be left behind in this very important sphere of u.h.f. activity.

Two Metre Happenings

Conditions during the period under review have not been nearly so good as last year, although some Continental stations have been in evidence on a number of occasions. Northern Ireland came into the picture in June, but only for a short time. The best that can be said is that DX was usually workable, although nothing spectacular was experienced except by those fortunate enough to live on hill-tops!

B.R.S.16075 (Shirley, Southampton) found conditions fair to good for most of the month. Activity was also better especially late at night. The 4-over-4 beam is working out well from a rather shielded position as is evidenced by the *Calls Heard* list. The Bristol stations and GC3EBK are very consistent, '16075 asks the v.h.f. operators to use the key when signing as many weak signals are unidentifiable otherwise. **B.R.S.19162** (Dewsbury) had a disappointing month. During the night of the London V.H.F. Convention, on what appeared to be a completely dead band, G5YV (Leeds) was heard knocking off DL, PA and ON "by the score." Since then there have been a few openings to the North Midlands and G5MA was heard on May 30, but otherwise nothing of note. '19162 is collecting components for a heavy building programme next winter, and meantime wonders what effect, if any, thick palls of industrial smoke (usually found at Dewsbury) have on 2m propagation. Has anyone studied this, and if so are there any comments?

G3GOP (Southampton) wishes something could be done about the local TV oscillators which make listening on 2m almost impossible, blotting out DX and even comparatively local signals! **G3EMU** (Canterbury) says that the period around the end of May and early June was quite good and a number of nightly QSOs with PA0FB resulted, but since then conditions have been as bad as the weather. In the lull, the opportunity was taken to incorporate the TNS circuit (*Mobile Column*, March, 1956) into the 2m receiver and car noises are now almost non-existent. Good conditions are awaited in order to assess its capabilities with weak signals.

G3JGJ (Plympton) finds activity both in transmission and listening increasing steadily in the Plymouth area. G3KDK (Plymouth), using a grounded grid r.f. converter into an HRO has worked G2BMZ (Torquay). **G3HPC** (Plympton) has just got going and is putting out a very strong signal from a 3 element Yagi. G3GRA is active, and '3JGJ has worked G2BMZ and kept up his sked with GC2FZC, having had some nice contacts S9 both ways on phone. The sked with GC2FZC is every evening between 18.15 and 19.00 B.S.T. and also Sunday morning at 10.00. **G3KHA** (Knowle, Bristol) has not found conditions very good, but notes a reasonable opening on the night of June 18 when Home Counties stations were worked at S9 both ways; unfortunately very few people were on. **G3IRS** (Locking, Weston-super-Mare) is again active on 145.26 Mc/s, and another station operating from Weston is G6LQ.

G8LN (Plumstead) found little of interest on 2m until the weather warmed up. QSOs are now spreading further afield. Several new stations have been contacted recently, and it is gratifying (says '8LN) to hear so many G3K calls coming into the band. The sked with G3ANB still runs on Sundays at 18.30. **G3EIW** is again active with a miniature rig (highly efficient) which also serves as a portable. June 10 was a very good day for DX. Conditions seemed to peak, in spite of a falling barometer and damp conditions. Cambridge stations were strong at midday. Tests on a new 2m receiver have been hampered by a sometimes complete lack of signals on the band.

G5OX (Chatham), using a v.f.o. on 2m with an indoor beam, is looking for contacts. **G5MR** (Hythe, Kent) found the month quiet. May 27-30, however, was good, and G3JQN (Croydon) was worked for a first QSO. During the Region I I.A.R.U. Contest Period (June 16-17) conditions were very poor, with continuous rain, and little was heard. '5MR was looking forward to the R.S.G.B. Open Contest on July 7-8 and says he approves of the new rules under which only fixed stations may actually submit entries, "after all, the portable stations have two contests of their own each year." A reasonable amount of c.w. opration is also hoped for. **G3KEQ** (Sanderstead) also refers to the generally poor conditions, but has had some luck to the West, especially G3KHA, '2BMZ and '5DW. A bright spark of life on an otherwise dead band late on June 10 was provided by EI9C and GI3GXP. The best QSOs otherwise were with PA0FB, F3LQ, F9EA/P and GW3XC/P (Radnor). **G5CP** (Chesterfield) tells us that the sked with G5MA

*21 Bridge Way, Whitton, Twickenham, Middlesex.

has recommenced for Saturday nights only at 23.00 B.S.T. G5CP is on 144.28 and 5MA 145.07 Mc/s c.w.

G3XC (Slough) sends a list of stations worked during a 3-day visit to Wales, May 20-22. It appears that provided interesting stations are on the air the general activity is not so low as might sometimes appear! '3XC has since heard that many more stations called him than were worked, but all stations heard *were* worked.

News from Scotland—Two Metres

That indefatigable correspondent, **GM6WL** (Glasgow), reports that activity among GM stations has increased noticeably. GM8MN (Crieff) continues to work the Lanarkshire and Renfrewshire stations, whilst '6XW (Larbert) has made a remarkable improvement in signal strength by putting up a 4-over-4 on a 50ft mast. June 9-10 found better conditions to the South and G3BW (Whitehaven) had contacts with GM3DIQ, '3EGW, '6WL, and '3KPD (the latter's first G contact) and '2FHH (Aberdeen). On June 10 there was also a QSO between G3BW and GM8MN.

GM4PW (Prestwick), again active on 2m, has been working into Edinburgh, Carluke and Glasgow. Using low power he is handicapped by a noisy receiver. Results should improve when these troubles are overcome. On June 17 GM3GAB worked '2FHH (S9 with deep fading) and '3DYC (Glasgow) had his first contact with GM6XW (a very elusive station hitherto). GM6ZV has had some good QSOs with '2FHH as well as with '8MN and '6XW. **GM3BDA** is now at his summer QTH on the hills above North Berwick.

GM2FHH (Aberdeen) says conditions during the month were fairly good with the best signals from GM3FGT, '3IBV and '3GAB in that order, but all over S9. G3BW, worked on June 10, was also heard for almost 2 hours at 579! No other English station was heard—are all the G beams turned to the Continent? '2FHH had some fun in the R.S.G.B. 2m Field Day. Going to the top of Cairn o' Mount, Kincardine (remember last July?) the only DX signals were G3BW and G2BDQ. Then the rains came, and that was that! There was competition from the ignition of cars in a Motor Rally which also favoured Cairn o' Mount. They could be heard labouring up the incline for miles.

Two Metre News from Ireland

EI2W (Dublin) is again active from his mountain QTH at Sandyford, co. Dublin (EI2W's *fixed* station). The frequency is 144.14 Mc/s, usual time 22.00-24.00 B.S.T. EI2W is especially looking for GM6XM (Larbert) in order to qualify for Stirlingshire. He will also be on 434.7 Mc/s from August 1. EI2W sends particulars of another very interesting Irish station, EI4E (Killarney), who operates on 145.1 Mc/s using phone and c.w. The transmitter has a 3E29 final at 60-70 W and the receiver is Walman cascode and HRO. The beam consists of 16 elements in phase with 16 reflectors — gain 15 db approximately—at a height of 40 ft. EI4E is active from 19.00-23.30 G.M.T. almost every evening and listens for 2m stations in Wales and South-west England. Skeds will also be arranged with any interested operators.

Two Metre Conditions Improve

On Sunday, June 24, when conditions were extremely good from the North Midlands to Scandinavia, **G5YV** (Leeds) worked several OZ and SM stations. At the time of writing no other reports have been received but it is probable that they were not audible far south of Yorkshire. The PA0s and ON4s and a few DLs were in evidence on the evening of the same day and several contacts with southern and Home Counties stations resulted. It really looks as if 2m is trying to open up although there is as yet no evidence of the superlative conditions of a year ago! *Flash !* Conditions during the R.S.G.B. 144 Mc/s Contest on July 7-8 were excellent.

Seventy Centimetre News

G3GOP (Southampton) and his XYL were out portable on June 17. The original intention was to work on 70 cm, but as no stations were heard 2m was tried and many stations worked. Later G3FAN was a welcome contact on 70 cm. The weather was drizzly and very windy. G3GOP thinks there would have been more QSOs had there been any other portable stations within 50 miles of Meonstoke. The 70 cm portable gear consists of a 6J6 tripler driven by the 2m portable. The aerial is a 9 element Yagi fed with 52 ohm co-ax. The receiver uses a 1N23A mixer and crystal multiplier chain. '3GOP will be portable on 70 cm again and asks "why not one or two more v.h.f. contests during the summer?"

G3EMU (Canterbury) has had several enquiries from the Continent for skeds so has decided to make a start on 70 cm. **G8PX** (Oxford) has the /P rig working, but bad weather has stopped operations. During a short period during the week-end June 16-17 G3HBW, '3KEQ and '6NB were worked, whilst G2AIH and '3FZL were heard. **G3KEQ** (Sanderstead) says 70 cm Contest conditions were very poor, the best DX being G2XV, '3HAZ, '6NB and 'PX. G2DDD, '2DUS, '3CGQ and '3FUL were heard but no QSOs resulted.

G2XV (Cambridge) worked G2DDD and '3IOO for his best contacts in the 70 cm Contest. Conditions could not have been worse, with cloud, rain and gale! Both stations were only audible for about 15 minutes, but were very good while they lasted.

On July 1, G3HBW and G3GDR exchanged signals on 1250 Mc/s for the first time.

London V.H.F./U.H.F. Convention

In addition to the items listed on page 424 of the April issue of the BULLETIN, The Short Wave Magazine Ltd. donated four book and subscription tokens while Universal Electronics presented a v.h.f. absorption wavemeter for the London V.H.F./U.H.F. Convention free draw. These gifts were very much appreciated.

* * *

We hope improved conditions will lead to additional interesting reports next time. Deadline July 21, please.

Worked and Heard on Two

B.R.S.16075 (Shirley, Southampton) May 21-June 19.
Heard: F8GH, G2AIW, 2BMZ, 2DDD, 2DSP, 2DVD, 2HCG, 3AUS, 3FIH, 3FWW, 3GHO, 3GOP/P, 3HHY, 3HSD, 3IOO, 3ION/P, 3JFR, 3JQN, 3KHA, 3KPT, 3XC, 4GR, 5KW, 5MA, 6NB, 6OX, 8DA, GC3EBK, GW2ACW, 3XC/P, 8SU, ON4BZ.

GM2FHH (Aberdeen) May 18-June 18.
Worked: G3BW, GM3NG, 3BDA/A, 3BSQ, 3DIQ, 3EGW, 3ENJ, 3FGJ, 3GAB, 3IBV, 3INK, 6KH, 6XW, 6ZV. *Heard:* GM5VG.

GW3XC/P (Brecknock) NGR.32/151 150 May 20.
Worked: G2DVD, 3FAN, 3FIH, 3GHO, 3HAZ, 3IOW/P, 3KHA, 5DW, 5KW, 5MA, 6AG, 6NB, 6TA, 8IL.

GW3XC/P (Radnor) NGR 32/220 480 May 21.
Worked: G2YB, 2FIR, 3EJO, 3FIH, 3GHO, 3HBW, 3IER, 3IWQ/P, 3JZG, 3KEQ, 3KFD, 5KW, 5MA, 6AG, 6NB, 6TW, 6WF, 8IL.

GW3XC/P (Montgomery) NGR 22/975 815 May 22.
Worked: G3EPW, 3JZN.

Stresa (I.A.R.U.) Conference

Seventeen Region I Societies represented at Second Triennial Conference

THE Grand Hotel et des Isles Borromees, Stresa, was chosen as the venue for the Second Triennial Conference of I.A.R.U. Region I Societies. The hotel is located on the shores of Lake Maggiore but the beauties of that famous Italian lake were somewhat marred during the Conference by cloudy and often rainy weather.

The organisation of the Conference was in the capable hands of a small Committee of members of A.R.I. led by Mr. Guilio Schiff, I1AXD, who is Secretary to the Italian National Society. The business meetings were held in the "Villa delle Azalee," a well-appointed building in the gardens of the Grand Hotel.

During the evening of Monday, June 11, 1956, and again throughout the morning of Tuesday, June 12, the International Committee (SM2ZD, PA0DD, G2IG, G2MI, G6CL and HB9GA) met to discuss final arrangements for the Conference and to prepare up-to-date reports for submission to the first Plenary Assembly.

FIRST PLENARY ASSEMBLY

Capt. Per-Anders Kinnman (SM2ZD), Chairman of the International Committee, presided at the first Plenary Assembly which was opened at 4 p.m. on June 12. The proceedings began with an address of welcome to the delegates from Mr. Roberto Sesia, I1FA, President of A.R.I. Other speeches were delivered by the Mayor of Stresa and the head of the Stresa Tourist Office, both of whom expressed their pleasure at seeing delegates from many countries present. Capt. Kinnman then briefly addressed the meeting after which he invited nominations for the office of President of Honour. Amid acclamation the President of A.R.I. was unanimously elected. Mr. Sesia, in thanking the delegates for their kindness, explained that as he had many other duties to perform he would prefer the delegates to elect a Conference President who would act whilst he was absent from meetings. On the motion of the voting delegate of the R.S.G.B. (Mr. W. A. Scarr, M.A., G2WS), supported by the delegates of Denmark and Sweden, Mr. R. H. Hammans, G2IG (President of the R.S.G.B.) was unanimously elected President of the Conference.

Among those featured in this group taken outside the Conference meeting place can be seen F8GB, HB9J, SM2ZD, ZS5KL, HB9GA, W1LVQ, G2MI and W1BUD.

STRESA ROLL-CALL

THE following Societies were represented at the Stresa (I.A.R.U.) Conference:—

Austria	O.V.S.V. (By D.A.R.C.)
Belgium	U.B.A.
Denmark	E.D.R.
Finland	S.R.A.L.
France	R.E.F.
Germany	D.A.R.C.
Ireland	I.R.T.S. (By R.S.G.B.)
Italy	A.R.I.
Morocco	A.A.E.M.
Netherlands	V.E.R.O.N.
Norway	N.R.R.L. (By E.D.R. and S.S.A.)
South Africa	S.A.R.L.
Spain	U.R.E.
Sweden	S.S.A.
Switzerland	U.S.K.A.
United Kingdom	R.S.G.B.
Yugoslavia	S.R.J.

A resolution conveying the greetings of the Board of Directors of A.R.R.L. to the assembled delegates was read by Mr. A. L. Budlong, W1BUD (General Manager of the A.R.R.L.) who was present throughout the Conference with Mr. John Huntoon, W1LVQ (Assistant General Manager of the A.R.R.L.).

The meeting then adjourned for refreshments.

On re-assembling, the President (Mr. Hammans) invited nominations for the position of Chairman of the Administrative Committee. Capt. Per-Anders Kinnman, SM2ZD, Mr. W. J. Dalmyn, PA0DD and Mr. J. Lips, HB9J were nominated. The ballot proved to be in favour of HB9J.

Mr. H. A. M. Clark, B.Sc.Eng., M.I.E.E. (G6OT), the R.S.G.B. representative on the Technical Committee, was unanimously elected Chairman of that Committee.

Report of the International Committee

The Report of the International Committee prepared by the Honorary Secretary (Mr. Arthur Milne, G2MI) was accepted without discussion.

Recommendations of the International Committee

Mr. Clarricoats, speaking on behalf of the Committee, informed the Assembly that information had recently been received from Geneva to the effect that the next I.T.U. Conference would not take place until 1959 at the earliest. In view of that fact the Committee felt that their earlier recommendation that Region I should be represented at the C.C.I.R. VIIIth Plenary Assembly in Warsaw during August 1956 should be withdrawn. The Committee had originally assumed that the Warsaw conference would become, in effect, a "curtain raiser" to an I.T.U. Conference in 1957. In that event Region I representation at Warsaw would have been highly desirable.

After Messrs. Laett and Budlong, both of whom have had wide experience of I.T.U. and C.C.I.R. Conferences, had spoken in support of the view put forward by Mr. Clarricoats, it was agreed to withdraw the recommendation.

A recommendation to the effect that the period of office of the International Committee shall be as from the first day of the month following the end of the Regional Conference at which it is appointed to the last day of the month following the next Regional Conference, was adopted.

A further recommendation to the effect that members of the International Committee attending Committee Meetings may claim out-of-pocket expenses plus travelling expenses to the place of the meeting up to a maximum of the cost of air passage and/or first class rail fares on the mainland of Europe was also adopted, as was a recommendation that the expenses of members of the International Committee who attend meetings shall be a charge on Fund 2.

Mr. Clarricoats, on behalf of the Committee, then proposed that Region I Division should be represented at any I.T.U. Radio Conference which may be held prior to the next I.A.R.U. Region I Conference by not more than three delegates to be appointed by the International Committee.

The delegates of France and Italy suggested that only two delegates should be appointed. Mr. Milne stressed that the chief reason for the existence of Region I Division was to ensure that the Region was adequately represented at I.T.U. Conferences. (At the last I.T.U. Radio Conference held in Atlantic City, New Jersey, during 1947 the I.A.R.U. delegation was led by two R.S.G.B. representatives, Messrs. Lewer, G6LJ, and Clarricoats, G6CL, and the R.S.G.B. carried the full burden of the cost of their attendance—an amount well in excess of £1,000—EDITOR.)

Mr. Laett pointed out that I.T.U. Conferences are very lengthy. For that reason, among others, he suggested that it should be left to the Committee to decide how many persons are appointed. He explained that it may be necessary for them to work in relays. Mr. Clarricoats mentioned that at the Atlantic City Conference it often happened that matters of importance to amateurs were being discussed at two or three Committee meetings simultaneously.

The recommendation authorising the International Committee to appoint up to three delegates was then adopted unanimously.

Honorary Treasurer's Report

Mr. Clarricoats, in his capacity as Honorary Treasurer Region I Division, submitted a detailed financial statement of which the following is a summary:—

Fund 1 (General Expenses)

Receipts			£505 14 0
Transferred to:—			
Fund 2	£68 0 0		
Fund 3	£68 0 0		
		136 0 0	
		369 14 0	
Expenditure		150 9 0*	
Balance as at May 31, 1956		£219 5 0	

* Includes £50 transferred to A.R.I. for Stresa Conference expenses.

Fund 2 (International Committee Meetings)

Receipts	£974 7 7
Expenses	£630 8 1†
Balance as at May 31, 1956	£343 19 6

†Includes £337 payments made in advance to members of the International Committee attending Stresa Conference.

Fund 3 (I.T.U. and C.C.I.R. Conferences)

Receipts	£1,030 19 0
Expenses	—
Balance as at May 31, 1956	£1,030 19 0

Total Credit Balance as at May 31, 1956 £1,594 3 6

Mr. Clarricoats said that Member Societies were informed during 1954 that no application would be made for further contributions to Fund 1 until after the 1956 Conference. The calls on Fund 1 had been considerably less than was anticipated at the Lausanne Conference in 1953.

Mr. Clarricoats moved, Mr. Laett seconded and it was resolved, unanimously, to receive and adopt the Report of the Honorary Treasurer.

Constitution of Region I Division

On behalf of the International Committee the Honorary Secretary submitted a draft Constitution for Region I Division.

It was suggested by Mr. Budlong, and agreed, that the use of the word "Constitution" was unfortunate, bearing in mind that the I.A.R.U. itself is governed by a Constitution.

It was agreed to use the term "Rules of Region I Division" in place of "Constitution of Region I Division."

After minor amendments had been approved the Conference adopted the draft Rules for Region I Division. (The Rules will be published in a future issue of the R.S.G.B. BULLETIN.—EDITOR.)

U.H.F.-V.H.F. Contests

Acting on a suggestion put forward by the R.S.G.B., the Assembly agreed to set up an *ad hoc* Committee comprising DL3FM, F8GB, G2WS, PA0LR and SM5MN to discuss arrangements for v.h.f.-u.h.f. contests and other v.h.f.-u.h.f. activities in Region I.

* * *

The first Plenary Assembly terminated at 8 p.m.

Bill Scarr, G2WS, Otfried Luhrs, DL1KV, Roberto Sesia, I1FA, Guilo Schiff, I1AXD, with Mrs. Schiff and Miss Loreddanna Schiff, in the private gardens of the Grand Hotel, Stresa.

ADMINISTRATIVE COMMITTEE

Meetings of the Administrative Committee were held throughout Wednesday, June 13, and Thursday, June 14. At these meetings a wide variety of subjects were discussed of which the following is a summary.

Licence Position Generally in Region I

It came to light during the meetings that although several Administrations in Region I have the right to allocate up to 200 kc/s to the Amateur Service in the band 1715-2000 kc/s, in point of fact the United Kingdom and Eire are the only countries that permit amateurs to operate in that band. Mr. Clarricoats expressed the view that the National Societies concerned should continue to press their licence-issuing authorities for permission to use frequencies in the Top Band.

It was also disclosed that Italian amateurs are permitted to use only 34 kc/s in the band 3500-3800 kc/s.

The Chairman of the Committee (HB9J) displayed a stick-on label which is being widely distributed by the Stuttgart Amateur Radio Club. The label calls upon amateurs to "fight" commercial stations which operate in the 3.5 and 7 Mc/s bands. HB9J stated that it was intended deliberately to jam non-amateur stations in the 3.5 Mc/s band. He also stated that certain commercial stations had been recorded and their transmissions played back on their own frequencies in order to drive them off the band.

G6CL spoke in strong terms against the action of the Stuttgart Club in causing deliberate interference to commercial stations working in the 3.5 Mc/s band. He pointed out that such stations have every right to use that band. Mr. Budlong also expressed concern at the suggestion put forward by the Stuttgart Club. The idea of sharing bands between different services was first put forward at the Washington International Radio Telegraph Conference in 1927 and the idea has been steadily increasing ever since. The problem is to accommodate a large number of stations in a small amount of frequency space. Mr. Budlong expressed the view that the 3.5 Mc/s band can only be retained by amateurs in Region I either by giving them a smaller but exclusive allocation or by interleaving as is done at present. Mr. Budlong warned the Committee that amateurs would stand a good chance of losing the band if deliberate interference with commercial stations took place. He deplored the activities of the Stuttgart Club and warned the Committee against the proposal to "fight" commercial stations in the manner which had been suggested. The Chairman, as well as the delegates of Sweden and Germany, also denounced the policy of deliberate interference. After a long discussion G6CL proposed, the delegate for South Africa (ZS5KL) seconded, and it was unanimously agreed to place on record that the Committee condemns the policy put forward by the Stuttgart Amateur Radio Club of deliberate interference by amateurs with commercial stations.

"Intruders"

G6CL introduced this item by reading from a report which he had received just before leaving England from Major D. W. J. Haylock, G3ADZ. The report gave details of broadcasting and commercial stations which Major Haylock and his colleagues had heard working regularly in the "exclusive" amateur portion of the 7 Mc/s band. The report also listed the calls of amateur stations that had been interfered with by the "intruders." SM2ZD stated that he had a list of 13 non-amateur stations operating in this band which did not appear in the R.S.G.B. list.

Mr. Budlong reminded the Committee that the question of interference was a matter between Governments. He suggested that the data should be correlated by each amateur society and brought to the notice of its Government. He emphasized that interference must be consistent and the information given correct. I.A.R.U. Headquarters are now circulating to Member Societies information regarding non-amateur stations heard in amateur bands.

After discussion it was agreed to set up an *ad hoc* Committee consisting of two members of the Administrative Committee and two members of the Technical Committee to prepare a standard form for reporting intruders (SM2ZD and PA0DD were appointed to represent the Administrative Committee).

A further discussion followed on the operation of certain DL4 stations who use the amateur bands for the purpose of handling messages. Mr. Budlong stated that these stations must now conform to the German licensing regulations. Message handling between DL4 and W stations is now illegal and will be stopped. Military traffic is normally handled outside the amateur bands. Military stations have no priority rights in exclusive amateur bands.

European Band Plan

In summarizing the history of the present European Band Plan Mr. Scarr stated that the plan had been universally adopted and had proved an unqualified success.

Mr. Scarr proposed that the present plan, which provides for exclusive c.w. operation in the bands 3500-3600 kc/s, 7000-7050 kc/s, 14000-14125 kc/s, 21000-21150 kc/s and 28000-28200 kc/s be continued as heretofore except that the c.w. band on 14 Mc/s be reduced to 14100 kc/s. The Finnish and Italian delegates opposed this proposal but after Mr. Milne had explained that the telephony band does in fact already extend down to 14100 kc/s it was carried by 12 votes to 4.

Special Guard Band

Discussion took place on a proposal put forward by the Chairman that the 10 kc/s between 14100 and 14110 kc/s should be set aside for "rare" DX stations, expeditions and the like. After it had been pointed out that it would be asking too much of radio amateurs who are already pressed for spectrum space to have, in effect, 10 kc/s more or less permanently unused the proposal was put to the vote and rejected by 8 votes to 2.

Occupancy of Bands

DL1KV referred to records made by D.A.R.C. and the German Post Office regarding the occupancy of the 3.5 and 7 Mc/s bands. These records were in the form of a sweep-scan over a large part of the spectrum and showed that only about two-thirds of the c.w. portion of the 3.5 Mc/s band and only about one-half of the phone band were really useful to amateurs. About 15 per cent of the c.w. portion of the 7 Mc/s band is of no use to amateurs because of the presence of other stations. D.A.R.C. had looked into the activities of amateurs generally. Their investigations showed that about 25 per cent of all licence holders are active. Of these, 35 per cent use c.w. exclusively and 25 per cent use telephony exclusively. About 45 per cent use phone and c.w. It was thought that about 30 per cent of the active amateurs use the 3.5 Mc/s band, about 20 per cent the 7 Mc/s band whilst between 35 and 40 per cent use the 14, 21 and 28 Mc/s bands. The German delegation urged that the low frequency bands should be more fully occupied.

No resolution was put to the meeting in connection with the occupancy of bands.

Reciprocity

The question of reciprocity between Governments regarding the issue of amateur licences to aliens was fully discussed, each delegation in its turn outlining the arrangements (if any) in force in their respective countries.

A summary of the position follows:—

Country	*Reciprocal arrangements with*
Belgium	Foreigners can obtain a licence subject to passing a test.
Denmark	None at present.
Finland	None at present.
France & Morocco	A wide range of countries including Finland, Holland, Ireland and Switzerland.
Germany	Austria, France, Luxembourg. Negotiations with Switzerland in progress.
Italy	None at present.
South Africa	None at present.
Spain	Belgium, Colombia, Costa Rica.
Sweden	None at present.
Switzerland	Foreigners can obtain a licence.
United Kingdom	None at present.
Yugoslavia	Germany, Sweden, U.S.A. Foreigners can obtain a licence.

Mr. Clarricoats stated that the British Post Office had informed the R.S.G.B. that they would be prepared to enter into a reciprocal arrangement with any country provided the first move is made by the other country. The British P.O. will not take the initiative. He gave it as his opinion, based on discussions with representatives of the British P.O., that the reason why reciprocal arrangements have not so far been made is due to the fact that there is a large number of U.S. Services personnel in the U.K. The British P.O. is concerned that if U.S. personnel stationed in the U.K. are granted permission to operate amateur stations they will handle third-party traffic. Third-party traffic handling is not permitted in the U.K. He expressed the view that if the U.S. Government would give an unqualified assurance that no U.S. amateur station in the U.K. would indulge in third-party traffic, then the present difficulty would probably be overcome.

Mr. Budlong stated that a reciprocal arrangement had been made between the U.S. and Canadian Governments. He did not think there was any hope at present of a reciprocal arrangement being reached between the U.S.A. and other countries.

G2MI traced the history of reciprocal arrangements from the time of the Lausanne Conference. He suggested that the aim to which all I.A.R.U. Societies should aspire is that just as anyone may take a motor-car across frontiers with the minimum of formality (thanks to international agreements between governments and motoring organisations) so an amateur going abroad should be allowed to take with him his mobile or portable transmitter and by the simplest formalities be allowed to operate in the country of his choice.

After general discussion G6CL proposed, OZ2NU seconded and it was agreed to inform the Plenary Assembly that the Administrative Committee have taken note of the great improvement in reciprocal arrangements that has occurred since the Lausanne Conference. The Committee therefore

(a) *Recommends the Plenary Assembly to urge every Society to do its utmost to improve still further the situation in respect to reciprocal arrangements.*

Emergency Networks

Dr. Arthur Gee, G2UK (Vice-Chairman of the R.S.G.B. Radio Amateur Emergency Network Committee) was invited by the Chairman to comment on the British Emergency Network. Dr. Gee explained how the R.A.E.N. functions in the United Kingdom and stressed that Amateur Radio should do all it can to provide a social service in the event of an emergency.

The delegates of Morocco, Denmark, Italy, Germany, Switzerland and France gave details of the emergency arrangements which operate in their respective countries.

The delegates of Yugoslavia and South Africa stated that there are no Amateur Radio network functions in their respective countries.

After discussion G6CL proposed, HB9J seconded, and it was agreed to

(b) *Recommend the Plenary Assembly to urge those Societies who do not at present operate emergency networks to do all in their power to establish such networks without delay.*

Emergency Calling Frequencies

An *ad hoc* Committee consisting of CN8MM and G2UK from the Administrative Committee and HB9RS and PA0NP from the Technical Committee was appointed to examine a proposal that emergency calling frequencies should be recognized internationally.

V.H.F. Bands

SM2ZD asked if the 50 Mc/s band could be made available to amateurs in Region I during the present sun-spot cycle. G6CL pointed out that this could not be done because the band is not allocated to amateurs in Region I. He thought, however, that it might be possible for certain Societies in Region I to persuade their respective Governments to follow the example of France and Russia by allowing amateurs to work between 72 and 72.8 Mc/s. He believed there is a good chance that amateurs in the U.K. may obtain such an allocation. (The Atlantic City Convention Frequency Table authorizes the Governments of France and Russia to allow amateurs to use the band 72-72.8 Mc/s.—EDITOR.)

After discussion it was proposed by G6CL, seconded by SM2ZD, and agreed to

(c) *Recommend the Plenary Assembly to urge Societies in Region I to make every endeavour to obtain permission to use the band* 72-72.8 *Mc/s.*

Procedure for Reporting "Intruders"

At this point the Committee gave consideration to a report prepared by the *ad hoc* Committee which had been set up to consider the procedure for reporting intruders.

After discussion it was proposed by G6CL, seconded by OH2TK, and agreed that the Plenary Assembly should be informed that the Administrative Committee has given very careful consideration to the problem of "intruders" in exclusive amateur bands; that an *ad hoc* Committee has been set up to consider a procedure for reporting such intruders; that the report of the *ad hoc* Committee has been accepted; accordingly the Committee

(d) *Recommend the Plenary Assembly to adopt the procedure outlined in the Report of the* ad hoc *Committee for reporting intruders in exclusive amateur bands.*

International Friendships

The Committee considered a lengthy paper submitted by the Yugoslav Society (SRJ). In this the importance of maintaining good relations between amateur societies

and individual amateurs was stressed as was the necessity for engendering a favourable public opinion and for enlisting the favourable opinion of the Press.

G6CL in congratulating the SRJ delegation said the paper contained many interesting proposals. He moved, and the delegate of Switzerland seconded, that the Administrative Committee place on record its thanks to SRJ for their paper. The motion was unanimously adopted.

G6CL then suggested and it was agreed that the Plenary Assembly should be informed that, although the Committee realizes that much of the material contained in the paper submitted by SRJ is of an ethical nature, the importance of the proposals is fully appreciated. It was thereupon agreed to

(e) *Recommend the Plenary Assembly to refer the paper submitted by SRJ to the International Committee for detailed study and action where it is considered to be desirable and possible.*

Liaison with Official Sources

PA0DD emphasized the necessity for establishing good relations with the Armed Forces and with the Posts and Telegraphs Department in each country. G2MI outlined the way in which the R.S.G.B. maintains good relations with official quarters.

Mr. Budlong commented that PA0DD had touched the very heart of the matter. Delegations arriving at an I.T.U. Conference have already received their instructions and it is then too late to influence major policies. It was therefore necessary to ensure that each National Society maintains the best possible liaison with its Administration. He emphasized that if those present thought that in sending a delegation to an I.T.U. Conference they could thereby ensure the retention of amateur privileges they were sadly misinformed. Mr. Budlong explained how an I.T.U. Conference is organized and emphasized that in general it is a battle of compromise. Each delegation goes to a Conference pledged to further the aims of its own Administration. The Conference is, in fact, called only in order to effect such compromises as may be necessary. Mr. Budlong stressed that each Society should take the responsibility of seeing that its own Administration is favourably briefed on the Amateur Radio situation.

It was agreed that liaison matters concerning Region I should be studied by PA0DD and G6CL and that they should frame a recommendation to the Plenary Session.

Other Business

Other matters discussed by the Administrative Committee included the arrangements for sending delegates to V.H.F. Committee Meetings; mobile facilities for Italian amateurs; the multiplicity of awards and certificates; the part amateurs can play in connection with the Geophysical Year.

This completed the work of the Administrative Committee.

* * *

A report of the work done by the Technical Committee and of the decisions taken at the final Plenary Assembly will appear in the August issue of the BULLETIN.

Power Transistors

Continued from foot of opposite column

sistors in the output stage—valves are still used in the earlier stages. A transistor convertor replaces the vibrator, so eliminating the need for a separate power pack. The set is available for 12 volt systems only.

The Principles of Colour Television

Continued from page 10

The significance of the negative values in the colour mixture curves now becomes apparent, because the chromaticity 500 mμ, for example, lies outside the triangle and cannot therefore be matched. But the point A can be reproduced, and this has the same hue as 500 mμ. Thus, the limitation mentioned in the first law of colorimetry is that while the correct hue can always be obtained, the saturation cannot necessarily be made high enough, particularly in the blue to green region.

The irregular locus in Fig. 3 is typical of good quality printing inks and dyes, however, and it can be seen that on the whole the television reproduction covers a larger colour matching gamut.

Next month, colour television systems will be considered.

A Self-Contained Microphone and Pre-amplifier

Continued from page 17

The two cells are mounted in series in a cardboard tube and packed in position with paper or card. The top (negative) contact presses on a lead riveted to a paxolin disc, the lead running up to one side of the transformer primary. The bottom (positive) contact is earthed via a spring in the base of the handle. The base can be a tight push-fit or may even be spot-soldered on: battery changes will be infrequent.

When soldering the OC71 in position, its leads were purposely left long, and a thermal shunt was clipped on to each before applying heat. What might be mistaken for tarnish on these leads is actually gold-plating!

Operation

The value of R1 (which determines the bias applied) may need altering slightly, as transistors vary in their characteristics much more than ordinary valves do. It should be replaced by a fixed and a variable resistor connected in series, each of 100,000 ohms, in a temporary hook-up. The variable resistor can then be adjusted until the collector current is 1 mA, after which the combination can be measured and the nearest fixed resistor available substituted.

Reference

[1] "Two Simple Microphone Pre-Amplifiers," C. H. L. Edwards (G8TL), R.S.G.B. BULLETIN, October, 1954.

Mullard Film Strips

MULLARD, LTD., has made available a new filmstrip entitled "Servicing the Projection Television System." It may be obtained, with a printed booklet of teaching notes, from Unicorn Head Visual Aids, Ltd., 184 Aldersgate Street, London, E.C.1, price 12s. 6d. Other filmstrips in the same series include "The Manufacture of Thermionic Valves" (10s.), "The Thermionic Valve (Diode and Triode)" (12s. 6d.), "The Cathode Ray Oscilloscope" (12s. 6d.), "Indicating Instruments" (12s. 6d.) and "Transformers" (12s. 6d.).

Power Transistors

PYE Industrial Electronics, Ltd., claim to be the first company producing power transistors in the United Kingdom. The type being made is capable of 4 watts output, but in spite of this very high output, it does not have to derive its power from h.t. battery sources.

An associated company, Pye Telecommunications, Ltd., has recently announced a car radio which employs tran-

(*Continued in previous column*)

"The World Above 50 Mc/s"

By E. P. TILTON (W1HDQ)*

ONE of the outstanding talks at the London V.H.F./U.H.F. Convention in May was a recorded address by Ed Tilton of the American Radio Relay League in which he surveyed v.h.f. and u.h.f. activity in the United Kingdom and U.S.A. Mr. Tilton's remarks proved of such interest to those present that they are printed here in slightly shortened form for the benefit of all members.

Mr. Tilton said: "I am happy indeed to have the opportunity of talking to you. The only happier arrangement that I can think of would be if I were able to be with you in person. I hope I will have the opportunity of doing that some day, for I have followed the work you fellows have been doing on the v.h.f. and u.h.f. bands with a great deal of interest over the years.

"When G2AIW sent me the invitation (to make the recording) he mentioned that it might be a good idea if I spoke a little about techniques being employed by American amateurs in working on the 420 and 1215 Mc/s bands. Actually I feel that this should be done the other way round and that it would be more appropriate for some of you British 'hams' to tell us what you are doing and how you are doing it.

"In the years that I have been reading British publications devoted to Amateur Radio, I have been tremendously impressed with the progress that you are making and there is no doubt in my mind but that the work you are doing is, at least, on a par with the accomplishments in America. Your work has certainly progressed at least as rapidly as ours, but while we have both arrived at about the same level of performance, particularly as regards the 420 Mc/s band we have done it in slightly different ways. I know, for instance, that British amateurs have concentrated on improving the performance of crystal mixers to a very high degree, whereas the American 420 Mc/s enthusiast has gone more for r.f. amplifiers, letting the mixer performance fall where it may. There are probably good reasons for that; I believe that we have had, for several years, some r.f. amplifier valves that perhaps showed to a little better advantage but I am quite confident that your work with crystal mixers has brought us up just about even, as far as receiver performance in the u.h.f. field is concerned. One thing I am sure of is that a higher percentage of British amateurs work on 420 Mc/s than American amateurs. Again there is a good reason: you have no 50 or 220 Mc/s bands and have been able to concentrate on 144, 420 and 1215 Mc/s. Also because of your geographical situation, a small area with many amateurs, you have had very good results with 420 Mc/s. Then again there is little doubt that the average British amateur is more of an experimenter than his American counterpart. In that I envy you, for certainly the willingness to find out for oneself, to make one's own gear and to strive eternally to make it a little better is one of the true Hall Marks of Amateur Radio.

Amateur Television

"One field in which you are certainly ahead of us is that of Amateur Television. I think that I have read almost every edition of Mike Barlow's little paper *CQ TV* since the very first one and I can assure you that there is nothing like it in America. Just the other day I received word from G3CVO that amateurs had demonstrated two-way colour television in England; this is a field which so far as I know has not even been touched by American 'hams.' I would like to congratulate Mike Barlow on the splendid work which he has done in reporting and promoting interest in Amateur Television all these years. It certainly has been a marvellous job of work.

Novices and Technicians

"Here in this country, perhaps due to our two newer classes of licence, the Novice and Technician Class 'tickets' which were made available about five years ago, most of our newcomers have been interested primarily in the 144 and 50 Mc/s bands. About a year ago the latter band was opened to Technician Class licensees and we have experienced a tremendous spurt in 50 Mc/s interest as a result. It has shown very clearly that the newcomer is the fellow who makes the wheels go round in any phase of Amateur Radio. The Novice Class licence has always allowed operation in the middle portion of the 2 metre band and that was quite a favourable shot in the arm for 2 metre activity. Between these two factors we have had a tremendous growth in v.h.f. interest, perhaps to a certain extent at the expense of activity on the higher bands. However, 220 and 420 Mc/s are coming along: there are several hundred amateurs around the U.S.A. working on those two bands and perhaps a hundred or so that work on 1215 Mc/s and a scattered few on all higher bands up to 10,000 Mc/s.

Two of the best-known French V.H.F. enthusiasts with Fred Lambeth, G2AIW, at the London V.H.F. Convention. Centre: F3SK; Right: F8NH.

"We have had recent reports on several W6s who have been doing quite good work on 1215 Mc/s with crystal controlled transmitters and receivers covering distances up to 95 miles, I believe in two-way work, and some of that over non line-of-sight paths. I recently received a report, a translation from a Czechoslovakian radio magazine, to the effect that two OK stations had worked 125 miles on 1215 Mc/s which is, of course, a record for that band as far as we are able to determine. However, I feel that operation from two highly elevated sites, regardless of how high the frequency may be, is no particular proof of performance or merit and that extending the range between home stations through the improvement of transmitters, receivers, antennas and operating techniques is really the heart and soul of v.h.f. and u.h.f. work.

*V.H.F. Editor, QST.

"The World Above 50 Mc/s" is the title of Mr. Tilton's monthly v.h.f. feature in *QST*.

V.H.F. Propagation

"One factor of the v.h.f. picture that seems to be interesting an ever greater number of American amateurs is propagation. We have been doing quite a lot of work on ionospheric scatter, tropospheric scatter, auroral reflection, sporadic E and all the other factors that come along to provide us with unusual range and there seems to be a growing interest in that sort of thing which I think is all to the good. This is one of the fields where amateurs can still make worthwhile contributions and it is a source of considerable pride to me to look back over the Amateur Radio record and see that nearly all the forms of propagation that are known today were turned up originally by amateurs and in most cases exploited by them several years before there was any scientific interest at all in that particular field. Examples, of course, were tropospheric bending dating back to 1933 or thereabouts, sporadic E skip which was discovered by 'hams' working in the 5 metre band not long after that, and auroral reflection which was turned up in about 1936 or so and was well known in amateur circles before any of the scientists paid attention to it. We were able to contribute worthwhile information in the period just after the conclusion of World War II in our work on the 50 Mc/s band over long paths and I am sure that there must be some of you who were in on the great thrill in working across the Atlantic on 50 Mc/s back in 1946-47. The work over long north/south paths on 50 Mc/s in particular revealed factors which are still not completely explained and we are looking forward to the collection of amateur reports during the current sun-spot cycle in the hope of shedding more light on this peculiar propagation that occurs at times of the day and night when it should not happen.

International Geophysical Year

"I would like to pass along to you the fact that we are making plans for a comprehensive programme of amateur observation and reporting that will be Amateur Radio's contribution to the International Geophysical Year. The complete details are not yet worked out but we hope soon to announce these in *QST* (in the July issue—EDITOR) and through the medium of the International Amateur Radio Union. We will collect reports and observations on sporadic E skip and on high F2 layer MUF and auroral propagation—those three categories particularly—but any unusual form of long-distance propagation in the v.h.f. or u.h.f. range is of interest and we would like to collect just as much information as possible for future study by scientific bodies. A.R.R.L. is arranging to handle this programme and to sort data that may be available from the reports to make it available in a form that will be usable to scientific agencies.

"We would like to enlist the co-operation of amateurs all over the world and we hope that some of you will be interested in participating in this work. We trust that it will put Amateur Radio in a favourable light and may well help us a great deal in the years to come, for surely as the years go by the demands for space in the radio frequency spectrum can only increase the pressure on Amateur Radio to give way for other services. Certainly one way in which we should be able to justify our existence at future international radio conferences should be to show that amateurs have made good use of their hands and brains and contributed to the scientific knowledge of the means by which signals get from one place to another.

"I would like to take this opportunity to thank all of you who have written to me from time to time . . .

"For now, best wishes for more and better DX in the 'World Above 50 Mc/s.'"

Tests and Contests

The B.E.R.U. Contest, 1956

SOME 400 stations—approximately one-half of them in the United Kingdom—took part on January 28-29, 1956, in the Nineteenth B.E.R.U. Contests. They found themselves under the spell of the long-awaited sunspots, which provided the first opportunity for 21 Mc/s to show its real paces: and this despite a week-end of conditions which, it is generally agreed, could be described only as fair to middling when compared with those ruling in preceding weeks. Even the long dormant 28 Mc/s band opened up briefly, mainly on southerly paths (though the appearance of an MP4 and VE stations suggests that other possible path openings on the band were missed). As might be expected, results on 3.5 Mc/s and to a lesser extent on 7 Mc/s lagged well below those achieved in recent years.

The informative table published in 1955 showing conditions on all bands as they affected U.K. stations attracted favourable comment, and a similar tabulation has been prepared this year. More details are also included this time in the table of results to show the coverage achieved by each station on each band. The first five figures in the "zone-band" column indicate the number of contest zones contacted on 3.5, 7, 14, 21 and 28 Mc/s respectively, and the final figure gives the total number of different scoring zones contacted (the three sections of zone 2 are combined for this purpose).

Senior Contest

Worthy winner, once again, of the Senior event was George J. Dent (VQ4AQ) who has now won the top award three times in the last four years. His fine performance—3,465 points from 392 contacts—represents an increase of almost 600 points on his winning score in 1955. With the sole exception of 3.5 Mc/s, on which there was no operation due to heavy static, VQ4AQ made the best recorded score on each band: some 750 points on 7 Mc/s, almost 1,400 on 14 Mc/s, over 800 on 21 Mc/s and over 500 on 28 Mc/s. His total "zone-band" figure of 59 was also the best recorded, though his contacts with 22 out of the possible 24 scoring zones was one less than that achieved by G4CP. VQ4AQ operated for about 40 out of the 48 hours (00.00-22.00 on January 29, 04.00-23.30 on January 30) using AR88 and HRO-5TA1 receivers. At one stage, on 21 Mc/s, contacts were coming along at an average of better than one every three minutes, VQ4AQ was running 150 watts to a rhombic and Vee beams.

Second in the final placing was Victor J. Williams (VE3KE) with 2,690 points from 265 contacts: he made 279 points on 3.5 Mc/s, 505 on 7 Mc/s, 1,012 on 14 Mc/s, 791 on 21 Mc/s and 103 on 28 Mc/s. He was running 300 watts to two aerials each three half-waves in phase for 7 and 3.5 Mc/s, two inverted rhombics for 21 Mc/s and a three element rotary beam on 14 Mc/s. Close behind, with 2,642 points, was George F. Barrett (ZC4IP, formerly G8IP) whose 335 contacts gave him 508 points on 7 Mc/s, 1,188 on 14 Mc/s, 652 on 21 Mc/s and 294 on 28 Mc/s. He ran 150 watts on 7, 14 and 21 Mc/s and 40 watts on 28 Mc/s to either a fixed two-element W8JK beam or folded dipole on 14 Mc/s; a ground plane on 28 Mc/s; with the folded dipole used also on 7 and 21 Mc/s: the highest of these, the dipole, being only 13ft above the roof. VO1D gained the most points—327—on 3.5 Mc/s with 120 watts to an end-fed 125ft aerial.

Outstanding performances by British stations included that of F. J. U. Ritson (G5RI) of Hexham, Northumberland, who, with the aid of his very fine set of aerials (rhombic, Vee beam, 275ft Zepp and dipoles for 21 and 28 Mc/s), again qualifies for the award for the leading U.K. station: his 2,085 points came from 159 contacts with a points analysis of: (3.5) 141; (7) 462; (14) 800; (21) 569 and (28) 113. For all-round coverage, a remarkable log was compiled by C. R. Perks (G4CP) of near Dudley, Worcs. With the help of only a simple 66ft aerial, centre-fed with 33ft of open line, he contacted every scoring zone except the elusive "VR" zone in which no activity was reported. His points were: (3.5) 155; (7) 274; (14) 634; (21) 596; (28) 103: a total of 1,762 points from 126 contacts. G2DC showed that the spirit, if not the call, of DL2RO lives on in Bulford, Wilts.: his 1,737 points, also from 126 contacts, were gleaned with a home constructed table-top transmitter running 130 watts to a 270ft Zepp(N-S) or 21 Mc/s ground plane, and came as follows: (3.5) 138; (7) 323; (14) 529; (21) 661; (28) 86. A noteworthy performer on 21 Mc/s was G8KS of Petts Wood who, with a Panda Globemaster Minibeam, made 760 points from 58 contacts with 18 zones on that band. Other most successful British signals included those from G3FPQ's 60 watts to a 250ft top, centre-fed with tuned feeders, a two-element driven beam on 14 Mc/s and a four-element Yagi on 21 Mc/s; G3FXB's 120 watts to a 137ft Zepp (3.5), a 66ft Zepp (7), a rotary cubical quad driven array cut for 14 Mc/s with matching stubs for use on 14 or 21 Mc/s, and half-wave dipole on 28 Mc/s; GM2FHH's 150 watts to a 135ft centre-fed aerial for 3.5, 7 and 28 Mc/s, a ground plane for 14 Mc/s, and a three-element rotary for 21 Mc/s.

Browsing through the Senior logs, the little green-eyed monster kept getting excited at such items as VE6NX's 400 watts to a four-element 20 metre beam; VE2NI's 350 watts to two dipoles, a two-element beam and a 1,000ft long wire; ZE3JL's remotely controlled transmitter for break-in on all bands to a 20 metre ground plane or 540ft long wire; G3FKH's Vee beam with 558ft legs; G6XL's three-element rotary 52ft high; G2HPF's 12-valve home-built superhet to supplement an AR88 with DB20 pre-selector. But at least some of us can take heart from VK9XK's 15ft high, 136ft long aerial . . . and plenty of other good results by stations using variations of the old reliable Zepp and its centre-fed counterpart.

Junior Contest

Year by year, Jac C. van Wyk (ZS6R) romps home in the Junior Section. His trusty 807 final—same valve in use since 1950—feeds folded dipoles on 7, 14 and 28 Mc/s (the 7 Mc/s aerial is also used on 21 Mc/s and, Marconi-tuned, on 3.5 Mc/s). On the receiving side he has an RF24 (output 3.5 Mc/s) into an NC200 with a BC453 Q-fiver tacked on the end. His 206 contacts brought him 2,288 points made up of: (3.5) 44; (7) 301; (14) 960; (21) 572 and (28) 411. Most successful British stations were G3IDC, GW3AHN and G5MP. G3IDC's signals were helped on their way by a 500ft long wire, an all-band dipole, and vertical dipoles for 21 and 28 Mc/s, but GW3AHN used only a 68ft Windom and a ground plane for 21 Mc/s, while G5MP stuck to a 104ft long wire 30ft high (below roof and tree-top level).

Receiving Contest

The Receiving Contest was revived this year, and was notable for the very high standard of logs received: quality even if not quantity is the keynote of this section. Winner was A. R. Smith (B.R.S.20206) of Tupsley, Here-

ford, using an HRO-5T with a 132ft long wire, a two-band Windom for 7 and 14 Mc/s, and a 21 Mc/s dipole in the roof space. Logging 138 stations in 23 zones, he appears to have spent some 37½ hours in compiling his very fine score of 1,874 points. G3KSH was a close second, using an HRO with a 67ft doublet. Several entrants in the receiving section point out that the excessive use of " BK " by the transmitting stations renders the task of the listener an unnecessarily difficult one.

Comments

Since the scoring system for the 1957 B.E.R.U. contests is being radically changed (see Rules in the May issue), the comments on the scoring this year have lost their point. Similarly the general desire to have earlier rules and better overseas publicity will, it is hoped, be fully covered by action already taken by the Contests Committee. Other general requests were for more details in the results and for their earlier publication: the observant reader may have already spotted that these points have not been entirely overlooked!

Now for a quick round-up of some other comments:

" Highlight was 21 Mc/s, which was open most of the time, but at varying levels . . . periods when the band appeared to be closing, which made one feel that the whole ether was being pushed up in a tremendous wave, later settling for another short spell or two, followed by sudden, 100 per cent fade out and then back."—VU2JP.

" My first c.w. contest . . . hard work but enjoyable."—

RESULTS—SENIOR B.E.R.U. CONTEST, 1956

Zone	Call-sign	Contacts	" Zone-Band "	Points	Placing	Zone	Call-sign	Contacts	" Zone-Band "	Points	Placing
2(a)	*G4CP	126	5, 10, 20, 17, 5, 23	1762	7		ZB1ZR	39	–, 1, 2, –, –, 2	359	54
	G2DC	126	3, 10, 17, 17, 3, 21	1735	10	5	*VO3X	184	3, 8, 9, 5, –, 13	1993	5
	GM2FHH	92	2, 10, 12, 18, 4, 21	1292	20		VO1D	160	3, 4, 7, 5, –, 8	1766	6
	G2QT	85	2, 8, 11, 16, 2, 19	1158	26		VE1EK	102	3, 5, 6, 2, –, 7	1235	23
	G2DPY	82	1, 8, 15, 7, –, 16	1125	27		VO6U	91	1, 2, 7, 6, 2, 9	1082	29
	G4TM	50	2, 7, 12, 10, –, 16	725	39		VO6N	60	3, –, 5, 3, –, 5	764	37
	G2HPF	36	–, 5, 9, 7, –, 12	516	50	6	*VE2NI	154	3, 7, 13, 6, 1, 14	1728	9
	G2AJB	34	–, 2, 4, 12, 2, 13	491	51		VE2WA	56	–, 6, 9, 8, –, 13	791	36
2(b)	*G3FPQ	115	6, 6, 19, 14, 4, 21	1584	11		VE2YU	46	3, 3, 10, –, –, 10	620	46
	*G3FXB	97	3, 8, 12, 14, 4, 18	1340	18		VE2JR	28	–, 1, 1, 6, –, 7	369	55
	G3FKH	75	2, 9, 15, 15, –, 20	1073	30		W6AFJ/VE2	23	–, 5, 5, 2, –, 8	325	†
	G3AAE	73	2, 7, 10, 14, 3, 17	1024	33	7	*VE3KE	265	3, 7, 16, 13, 4, 17	2690	2
	G3EBH	50	3, 6, 8, 9, 1, 14	711	42		VE3BMB	48	2, 9, 7, –, –, 11	626	45
	GM3CIX	41	–, 4, 7, 11, 2, 15	579	47		VE3ADV	44	–, 3, –, 8, 9	575	49
	G3BYM	27	3, 3, 4, 4, 1, 8	385	53	8	VE6NX	62	–, –, 10, –, –, 10	714	41
	G3FBA	10	1, 1, 1, 3, –, 5	146	60	10	*VK2GW	141	4, 7, 17, 7, –, 17	1549	12
	G3APN	18	–, –, 12, –, –, 12	123	63		VK2HZ	17	–, 2, 8, –, –, 8	244	58
	G3WP	5	–, –, –, –, 5, 5	75	64	11	VK3ADW	55	–, 5, 11, 3, –	709	43
2(c)	*G5RI	159	5, 12, 17, 16, 4, 21	2085	4	13	*VK9XK	114	3, 7, 15, 5, –, 15	1297	19
	*G6XL	87	2, 6, 17, 13, 4, 22	1191	24	15	VP8AI	54	–, 6, 4, 4, 2, 9	719	40
	G8KS	87	–, –, 9, 18, 4, 20	1162	25	16	*VQ4AQ	392	–, 15, 22, 14, 8, 22	3465	1
	G5BZ	83	2, 3, 11, 16, 5, 19	1116	28	17	ZD6BX	173	2, 7, 19, 9, 4, 20	2122	†
	G5JU	75	4, 5, 9, 15, 6, 18	1070	31		*ZE3JL	151	2, 6, 14, 10, –, 17	1534	13
	GW5SL	74	4, 6, 12, 12, 2, 16	1047	32		VQ2GW	118	–, 2, 13, 11, 2, 15	1384	15
	G5HB	59	2, 4, 12, 12, –, 17	815	34		ZE6JX	10	–, –, 6, –, –, 6	143	62
	G5MR	55	1, 2, 10, 9, 2, 14	759	38	18	*VQ6LQ	122	–, 10, 13, 10, –, 16	1377	16
	G5ZK	40	2, 4, 6, 7, 3, 10	576	48		MP4BBE	96	–, 4, 14, 6, 4, 14	1248	22
	G5US	30	–, –, 15, –, –, 15	412	52	20	VS6DE	53	–, –, 7, 11, –, 11	692	44
	G5CP	20	–, –, 4, 7, 4, 10	292	57	22	*ZL3JA	151	2, 10, 15, 8, –, 16	1761	8
	G6GH	16	–, 3, 2, 6, 8	235	59		ZL1MQ	60	–, –, 17, 2, 17	795	35
	G8KU	10	–, –, –, 6, –, 6	145	61		ZL3GR	23	–, –, 10, –, –, 10	328	56
4	*ZC4IP	335	–, 7, 18, 11, 5, 18	2642	3	24	ZS6AEW	42	–, 2, 6, 4, –, 8	516	†
	ZB1HKO	174	1, 2, 8, –, 4, 10	1503	14		ZS6BJ	36	–, 3, 6, 9, –, 12	513	†
	ZB1AY	169	–, –, 6, 5, 4, 9	1366	17	25	*ZS5U	92	3, 6, 12, 10, 4, 17	1269	21

RESULTS—JUNIOR B.E.R.U. CONTEST, 1956

Zone	Call-sign	Contacts	" Zone-Band "	Points	Placing	Zone	Call-sign	Contacts	" Zone-Band "	Points	Placing
1	*VU2JP	170	–, 7, 14, 13, –, 16	1767	3	14	VP1AA	34	1, 2, 7, –, –, 7	426	18
	4S7MR	47	–, –, 13, –, –, 13	620	14	16	*VQ4KPB	60	–, 4, 10, 8, 3, 12	832	10
2(b)	*G3IDC	59	3, 5, 9, 14, 4, 15	853	8		VQ4CC	47	–, 3, 12, –, –, 12	626	13
	GW3AHN	52	–, 4, 7, 12, 4, 16	737	11	17	*ZE5JE	94	–, 4, 13, 9, 4, 14	1193	5
	G3GNS	40	2, 4, 6, 9, 2, 12	572	15		ZE3JO	64	–, 4, 10, 5, 4, 12	862	7
	G3DFR	36	–, –, 10, 8, 2, 13	509	16	21	*ZD2DCP	183	–, 11, 16, 11, –, 17	1939	2
2(c)	*G5MP	53	1, 6, 5, 6, 4, 9	736	12		ZD4BQ	93	–, 6, 8, 10, –, 11	1001	6
3	*DL2UY	83	2, 2, 3, 2, 5	827	9	22	ZL2ARL	34	–, 4, 9, 3, –, 9	465	17
	DL2XS	15	1, 1, 1, –, –, 1	206	19	24	*ZS6R	206	2, 11, 18, 10, 6, 19	2288	1
4	*ZB2I	178	–, 2, 6, 6, –, 8	1271	4						

RESULTS—B.E.R.U. RECEIVING CONTEST, 1956

Call-sign	Stns. Logged	" Zone-Band "	Points	Placing	Call-sign	Stns. Logged	" Zone-Band "	Points	Placing
BRS20206	138	6, 10, 18, 16, 5, 23	1874	1	G3EUE	82	1, 5, 13, 13, 3, 16	1150	5
G3KSH	133	5, 10, 15, 16, 5, 21	1823	2	BRS19965	43	2, 7, 6, 9, 1, 13	619	6
BRS19107	125	4, 10, 18, 14, 2, 20	1694	3	BRS17241	34	2, 6, 4, 6, 2, 9	492	7
BRS15822	101	4, 12, 13, 15, 2, 19	1387	4	BRS19771	27	1, 1, 1, 9, 2, 10	380	†

* *Zone award.* † *Ineligible for placing.*

G3FPQ. "Propagation conditions in Montreal area extremely poor in spite of N7 reports from WWV."—W6AFJ/VE2. "The cream of DX contests. . . . Went QRX to watch Royal procession en route from Ikeja to Lagos . . . within 5 yards of Her Majesty . . . ten minutes later gave full details to G2TH who, by coincidence, was ex-ZD4AB!"—ZD2DCP. "Very few ZS stations . . . many foreign stations called me making things difficult."—VQ4AQ. "In 1957 B.E.R.U. we should see the sparks fly on 28 Mc/s as well as on 21 Mc/s."—G3AAE. "Quite often it was a hard job finding a B.E.R.U. station, particularly on the lower frequencies." — VE2YU (ex-G3BXN). "January may be a little too early. . . . As far as we are concerned the B.E.R.U. contest is the main event of the year. There are always the heart-warming surprises, a ZD2 on 80, a ZD6 on 40 (bless him—we waited years for just this), even once VR5PL came back to a 'Test BERU' call."—VO3X. "This year, competing as a G station, the going was much tougher than as DL2RO but all the more enjoyable on account of the fierce competition. . . . What a pity more stations did not try out 28 Mc/s, wide open for quite a long spell. . . .The most interesting and exciting contest in the world . . . one has to be really 'on one's toes' the whole time, prepared to make quick decisions as to frequency changing and rest periods . . . already planning for 1957."—G2DC. "Marred for many of us in Canada by deliberate QRM tactics of some W/K stations."—VE3AVS. "Could we not have inter-G working to balance the advantages of overseas stations? "—G3GNS. "When the TVI-proof transmitter is ready (it progresses through the years and is nearly there) shall be able to take part without QRTs from noon to midnight."—G6CJ (who even took a "breather" to knock off FY7YF!). "High local noise level from overhead power lines . . . made my first QSOs on 28 Mc/s and a new country ZD9AD! "—MP4BBE. "The January date is taking its toll in the Southern Hemisphere——the dice are loaded against us."—ZL3JA. "Had to work two eight-hour shifts and the XYL had a birthday during contest . . . even so, enjoyed it and will be back again next year."—VO6N. "Had it not been for 21 Mc/s would have had no entry at all."—GM2FHH. "Last year we struck a patch of good conditions, this year a very poor one . . . could B.E.R.U. occupy two week-ends as it did a few years ago? "—G3FXB. "14 Mc/s poorest compared with previous years . . . 7 Mc/s fair to good but QRM terrific from South American 'phone . . . no VKs heard on any band."—VP8AI. "25 watt input entails patience in the queues. It is essential for the low power man to move to each higher frequency band as it begins to open to ensure contacts before stations really pile up." — G5MP. "Hope enough support to ensure receiving section will be held next year."—B.R.S.19771. "A total of about 22 kW about 50 yards away . . . half jammed receiver . . . but would not be much of a contest if only the top three stations entered! . . . Could we have 'phone section back? "—ZB1ZR. "It took severe evasion tactics and several pointed remarks to U.S. stations in order to work into Canada."—ZE3JL. "The spirit and co-operation of other contestants were beyond praise . . . very helpful to me in this my first attempt . . . my sincere thanks to ZD2DCP for persuading me to enter . . . this wonderful contest."—ZD4BQ. "Tremendous Loran interference as well as time base radiation from television sets. . . . We overseas appreciate your efforts in sponsoring, improving and supervising this unique and satisfying contest."—VO1D.

DX CONTACTS FROM GREAT BRITAIN
(Based on a cross-section of B.E.R.U. Logs)

	JANUARY 28, 1956
00.00	(3·5) VO; (7) VQ4, ZD2, 6, VE1, 3.
01.00	(3·5) VE2, VP8; (7) VQ4, ZD2, ZS, VO.
02.00	(3·5) VE2, 3; (7) VO, VQ4.
03.00	(3·5) VE1, 3; (7) VQ4, 6, ZD4, VO.
04.00	(7) VQ4, 6, ZD4, VO.
05.00	(7) VP8.
06.00	(7) ZL3, VE1; (14) VQ4.
07.00	(7) ZL2, VE1, 2, 3; (14) VQ4, ZD2, MP4.
08.00	(7) ZL1, 3, VE1, 3; (14) VQ4, ZD2, ZL1, 2; (21) VQ4.
09.00	(14) VK3, 6, ZL1, 2, 3; (21) VQ4, ZD6, MP4.
10.00	(14) VK5, ZL2, 3; (21) VQ4, ZS, VS6.
11.00	(21) VQ4, 6, ZD2, 6, ZE, MP4, VS6, VU; (28) VQ4.
12.00	(14) VE2, 3, VO; (21) VQ4, 6, ZD2, MP4, VU, VK3; (28) VQ4, ZD6, ZE.
13.00	(14) VK2, VE1; (21) VQ4, 6, ZD4, ZS, VU, VK5, VE1, 2, VP6; (28) VQ4, ZD6, ZS, ZE.
14.00	(14) VK2, VO; (21) VQ4, 6, ZD4, ZE, ZS, VE1, 2, 3, VP6; (28) ZE.
15.00	(14) VQ4, MP4, VK2, 6, VO, VE3, 8; (21) VQ2, 4, ZD4, ZE, ZS, VE1, 2, 3, VP6.
16.00	(14) VQ4, 6, ZD6, VK2, 5, 6, VU, VE6, VO; (21) VQ2, 4, ZE, ZS, VE1, 2, 3.
17.00	(14) VQ4, ZD6, ZE, ZS, MP4, VO, VE3, 6, 7; (21) ZE, ZS, VE1, 3, 8, VP6.
18.00	(7) VQ4; (14) VQ4, ZE, ZS, VO, VE1, 2, 3, 7.
19.00	(7) VQ4, ZL4, VO; (14) VQ2, 4, ZD6, VO, VE1, 2, 3.
20.00	(7) VU, VO.
21.00	(7) VQ4, VU, VO.
22.00	(7) VQ4, VO.
23.00	(3·5) VO; (7) VO.
	JANUARY 29, 1956
00.00	(3·5) VE3; (7) MP4, VO.
01.00	(3·5) VO, VE3; (7) VO.
02.00	(3·5) VO, VE1, 3; (7) VO.
03.00	(3·5) VO.
04.00	(3·5) VO.
05.00	—
06.00	(3·5) VE1, 2.
07.00	(7) VE2, 3; ZL3; (14) VQ4.
08.00	(3·5) ZL3; (7) VE2, 3; (14) VQ4, ZD4, ZL1, 2, 3; (21) VQ4, MP4.
09.00	(14) ZL1, 3, VK4; (21) VQ4, ZD2, 6, MP4, VS6, ZS, ZL1, 2, 3.
10.00	(14) VE6; (21) VQ2, 4, ZD2, 4, MP4, VS6, VK2, 4, 9, ZL1, 2, 3; (28) VQ4.
11.00	(14) VE6; (21) ZD4, ZS, VS6, VU, VK3, 4, ZL3; (28) VQ4, ZS, MP4.
12.00	(14) VK2, ZL1, VO, VE3, 6; (21) VQ4, ZE, VU, VS6, VK3, ZL3, VP8; (28) VQ4, ZD6, ZE, MP4, ZS.
13.00	(14) VO, VE1, 2, 3; (21) VQ4, ZS, VK3, VO, VE2, 3, VP8; (28) VQ4, ZD6, ZS, MP4.
14.00	(14) VQ4, VE1; (21) ZS, VO, VE1, 2, 3.
15.00	(14) ST2, MP4, VU, ZL3; (21) VQ4, ZD2, ZS, VO, VE1, 2, 3; (28) VQ2, VE3.
16.00	(14) VQ4, VE8; (21) VQ4, ZD4, 6, ZS, ZE, VO, VE1, 2, 3; (28) VE3.
17.00	(14) VQ4, 8, ZD6, ZS, MP4, VO, VE1, 7; (21) VQ4, ZD2, ZS, VO, VP9, VE2, 3; (28) VE3.
18.00	(14) VQ2, 4, ST, ZS, VO, VE1, 2, 3, 7; (21) ZD2, VE2.
19.00	(7) VO; (14) VQ2, 4, ZD2, ZE, ZS, VO, VE1; (21) VP9.
20.00	(7) VQ4, VO; (14) ZD2, ZS, VP9.
21.00	(7) VO, VE1.
22.00	(3·5) VO; (7) VQ4, ZD2, VO, VE1.
23.00	(3·5) VO, VE1.

Note. Times are given to the nearest hour, e.g. 21.40 or 22.20 would be shown as 22.00.

Check Logs

Check logs from G3CXM, G3GSZ, G3GWO, G3ITG, G6AH, G6CJ, DL2WA, ST2NG, VO2S, VE2DR, VE2RL, VE3AVS, VE3BFF, VQ4BY, VQ4SS, VS6CO, VK2OW, VK3HL, VE8WN, ZB1CH and ZS6AJO are gratefully acknowledged.

Be QRV for the Twentieth B.E.R.U. Contests on January 26-27, 1957. And afterwards be sure to submit an entry or a check log!

Activity in Eastern Europe

SINCE amateurs behind the so-called Iron Curtain have been free to work stations all over the world again, lists of those active on 2m and 70 cm in Poland and Czechoslovakia have been received. In Poland 54 are known to operate on 2m while 29 are active on 70 cm. Czechoslovakia has nearly 170 v.h.f. stations, most of which are in the three letter "klub" category.

Contests Diary

1956

July 21–22	-	*Short Wave Magazine* All-European V.H.F. Contest[6]
August 18–19	}	Region 1 V.H.F. Contests[3] (organized by individual national societies)
August 19	-	144 Mc/s Field Day No. 2[4]
September 2	-	Low Power Field Day[1]
September 2	-	1250 Mc/s Tests[7]
September 8–9	-	European V.H.F. Contest[3] (organized by D.A.R.C.)
September 9	-	D/F National Final
September 9	-	420 Mc/s Contest No. 2
October 6–7	-	Low Power Contest
October 6–7	-	VK/ZL DX Contest (organized by N.Z.A.R.T.)[8]
October 13–14	-	VK/ZL DX Contest (organized by N.Z.A.R.T.)[8]
November 10–11		Top Band Contest No. 2
November 24–25		21–28 Mc/s Phone Contest[2]

Unless otherwise indicated all contests are arranged by the R.S.G.B.

[1] For rules, see page 532, R.S.G.B. Bulletin, June, 1956.
[2] For rules, see page 480, R.S.G.B. Bulletin, May, 1956.
[3] See page 285, December, 1955, and page 386, March, 1956.
[4] For rules, see page 34, R.S.G.B. Bulletin, July, 1956.
[6] For rules, see *Short Wave Magazine*, May, 1956.
[7] For rules, see page 532, R.S.G.B. Bulletin, June, 1956.
[8] For details, see page 538, R.S.G.B. Bulletin, June, 1956.

Second 144 Mc/s Field Day, 1956

RULES for this contest, including the mobile section, are similar to those published in the March issue of the BULLETIN for the first 1956 event, except for inclusion of the band-identification letter in report exchanges.

Changes are as follows:—

Amend Rules 7 and 13 (both sections) to include band-identification letter "A" in report exchanges between signal report and serial number, e.g., 599A001 5 NE Luton.

Amend Rule 10 to read: Sunday, August 19, 1956.

Amend Rule 15 to read: Monday, August 27, 1956.

Check logs from non-competing stations will be welcomed.

Edgware D/F Qualifying Event

ALTHOUGH the sky was overcast and threatening, the competitors in the second of the 1956 series of qualifying events were able to search for the hidden transmitter (G3BZG/P) in dry weather instead of the downpour usually associated with events organised by the Edgware and District Radio Society!

An excellent signal was received at the starting point on Harrow Weald Common, and of the nine competitors released at 14.05 by the starter, S. E. Fryer (G3ERO), all but two were successful in locating the transmitter. G3BZG/P was located in Harrocks Wood, north-west of Watford, and was so well concealed in a clump of rhododendron bushes that on one occasion one of the operators succeeded in losing himself in the thick undergrowth after returning to his car for additional gear. Operators of the station were D. A. Findlay (G3BZG) and R. H. Newland (G3VW).

First competitor to arrive was H. Drury (Romford) at 15.05, followed only half a minute later by P. J. Evans (B.T.H. Rugby). A period of nine minutes then elapsed before the next competitor, T. C. Reynolds (B.T.H. Rugby), broke through the bushes, with R. D. Charlton (B.R.S.20398 of Twickenham) half a minute behind. G. Walford (G3JLM, Grafton), arrived fifth at 15.17, after some delay entailed when the car in which he was travelling incurred slight damage in an encounter with another vehicle.

As Mr. Reynolds had already qualified for the Final in the previous event, Messrs. Drury, Evans, Charlton and Walford qualified for the National Final on September 9.

The transmitter was located by G. T. Peck (High Wycombe) at 15.24, and R. K. Seabrook (Southend) at 15.26. Unsuccessful competitors were A. W. Timme (G3CWW, Edgware) and J. N. Grant (B.T.H. Rugby).

After the event, competitors and their parties drove through a heavy downpour (which started two minutes after the last transmission) to meet for tea at the Chef Corner Restaurant in Watford.

New Amateur Publications

THREE booklets useful to the radio amateur have recently been published.

The Summer 1956 issue of the *Proceedings of the London U.H.F. Group* is a well-produced 26 page publication devoted entirely to technical articles.

The many articles include "The Wonder Box — A 2 metre Pre-amplifier" by C. E. Newton (G2FKZ), "A 70cm 25 watt Transmitter" by H. F. Smith (G2DD) and "Practical Application of the QQV03-20 at 420 Mc/s" by J. Hobbs (G3JQN). One article—"Series Valve Screen Feed Circuits" by G. M. C. Stone (G3FZL)—describes a simple system for correctly setting and maintaining the screen voltage of tetrode and pentode type power amplifier valves and should prove of considerable interest to all users of these valves, whether v.h.f. enthusiasts or not. A small error appears in the circuit accompanying this article; C3 should be connected to to the *top* of RV2 while the lead from the keying relay should be connected to the *slider*. G3EOH has also found it necessary to modify the 1250 Mc/s equipment described. A correction slip embodying all these alterations may be obtained by sending a stamped addressed envelope to G2FKZ.

Copies of the *Proceedings* may be obtained, price 2/3 post paid, from C. E. Newton (G2FKZ), 105 Underhill Road, London, S.E.22.

* * *

An Introduction to Amateur Television Transmission is the title of a new 30 page booklet by M. Barlow (G3CVO/T), published by the British Amateur Television Club, and believed to be the first Amateur TV Handbook. The material is largely a reprint of the series of articles on Amateur Television which G3CVO has contributed to the R.S.G.B. BULLETIN in recent years. A particularly useful feature is the list of references. So far as it goes, the booklet is likely to fill a real need and those interested in Amateur Television will find it well worth the modest price of 3/6. Copies may be obtained from the author at 10 Baddow Place Avenue, Great Baddow, Essex.

* * *

Short-wave listeners and B.R.S. members will find *The Art of QSL'ing* (1/-), published by the International Short Wave League, 86 Barrenger Road, London, N.10, a useful guide to the preparation of comprehensive listener reports. In addition, information is given on the various reporting systems used by amateurs and the operation of QSL bureaux.

Council Proceedings

Résumé of the Minutes of the Proceedings at a Meeting of the Council of the Radio Society of Great Britain, held at New Ruskin House, Little Russell Street, London, W.C.1, on Monday, May 14, 1956, at 6 p.m.

Present: The President (Mr. R. H. Hammans in the Chair), Messrs. W. H. Allen, C. H. L. Edwards, K. E. S. Ellis, D. A. Findlay, F. Hicks-Arnold, J. H. Hum, R. G. Lane, W. H. Matthews, W. R. Metcalfe, H. W. Mitchell, A. O. Milne, L. E. Newnham, W. A. Scarr, J. Taylor, and John Clarricoats (General Secretary).

Apologies for absence were submitted from Mr. H. A. Bartlett.

* * *

Membership

(a) *Resolved* (i) to elect 65 Corporate Members and 3 Associates; (ii) to grant Corporate Membership to 2 Associates who had applied for transfer.

(b) The Secretary reported that of the 667 members whose subscription became due on February 1, 1956, 72 became 3 months overdue on April 30, 1956. Of this number 10 were London, 44 were Country and 9 were Overseas Corporate Members and 9 were Associates. Of those overdue 5 London, 21 Country and 7 Overseas members held call-signs.

(c) The Secretary reported that 11 of the 72 members referred to in (b) above wrote to resign during the four weeks ended May 12, 1956. Of this number 7 gave no reason for resigning, 3 stated they had lost interest in Amateur Radio, and one had resigned for financial reasons.

Applications for Affiliation

Resolved to grant affiliation to the Burton Grammar School Radio Society and the Newark and District Amateur Radio Society.

Amateur Radio Exhibition

Letters were submitted from two members protesting against the decision of the Council not to organize an Amateur Radio Exhibition during 1956.

Resolved to receive the correspondence.

The Secretary was instructed to explain to the two members concerned that the decision not to hold an Amateur Radio Exhibition during 1956 was taken only after the most careful consideration of all the circumstances.

Consideration was given to an offer from the York T.R. to organize a National Convention and Exhibition in that city during 1957.

The Council's delegates to the forthcoming York O.R.M. were requested to discuss the offer with the York T.R. and Region 2 Representative.

News Bulletin Service

After consideration had been given to views put forward by the Regional Representatives, it was decided to introduce an additional Sunday service in the 3.5 Mc/s band at 12.00 BST (GMT) and to make certain other changes to the arrangements at present in force. (A statement dealing with the News Bulletin Service appeared in the May isue of the BULLETIN.—Ed.)

Mr. E. Brown (G3CSP), Sheffield

Mr. Metcalfe, in reporting on his recent visit to Sheffield (see Résumé of April Meeting Minutes), stated that the G.P.O. were entirely satisfied with the manner in which Mr. Brown's station is operated and that the Sheffield City Council had resolved to take no further action on complaints made by Corporation tenants regarding the operation of Mr. Brown's station.

Resolved to place on record the thanks of the Council to Mr. Metcalfe for visiting Sheffield and submitting a report.

Amateur Radio and the U.S.S.R.

Mr. Milne (QSL Manager) reported that a number of QSL cards addressed to Soviet amateur stations had been received at the R.S.G.B. QSL Bureau. Cards from Soviet amateur stations had also come to hand.

Yugoslav Convention

A letter was submitted from S.R.J. in which an invitation was extended to the Council to appoint a delegate to attend a Convention in Jugoslavia during July, 1956.

The President agreed to thank the S.R.J. for its kind invitation and to explain that no member of the Council is able to attend a Convention in Yugoslavia this year.

Society Blazer Badge

It was reported that two members of the Society had written to suggest that the wording of the motto used on the Society's blazer badge is incorrect.

Resolved to hold up the manufacture of further supplies of blazer badges until it is established that the suggested new wording is correct.

If it is established that the original motto is incorrect it was agreed to inform members that the Society is prepared to supply a new badge to anyone who has purchased a badge with an incorrect motto. (A notice regarding blazer badges appeared in the June issue of the BULLETIN.—ED.)

Visit of Messrs. Budlong and Huntoon to London

It was reported that the General Manager of the A.R.R.L. (Mr. A. L. Budlong) and the Assistant General Manager of the A.R.R.L. (Mr. John Huntoon) would visit London en route to the Stresa Conference.

Resolved to invite Messrs. Budlong and Huntoon to dine with members of the Council during their visit to London.

It was agreed that Council members attending would pay for the cost of their own meal.

Articles of Association

The Secretary reported that he and the Executive Vice-President had discussed with the Society's legal advisers certain difficulties which had arisen in connection with the operation of Article 28 of the Society's Articles of Association.

Resolved to set up an *ad hoc* Committee of five members of the Council to examine Article 28 (and such other Articles as may have a bearing on Council elections and on the constitution of the Governing Body) and to make recommendations (if thought desirable) to the Council.

The Membership and Representation Committee were requested to examine the Articles of Association which deal with the sponsorship of applications for membership and to make recommendations (if thought desirable) to the Council.

V.H.F. Conventions

It was reported that the Region 9 Representative had expressed the view that it would be possible to organize a V.H.F. Convention in Bristol during 1957.

I.E.E. Meetings

It was agreed to hold meetings of the Society at the Institution of Electrical Engineers, London, on the following dates:—October 26, November 30, 1956; January 25, March 1 and March 29, 1957.

It was also agreed to advise the Institution of Electrical Engineers that the Society is prepared to conform to general practice in respect to the period of time refreshments are available prior to the start of a meeting —namely 30 minutes. (Previously, refreshments were served for 60 minutes prior to the start of a meeting.—Ed.)

Midland Amateur Radio Society

Resolved to authorize the Secretary to accept an invitation extended to the President and to himself to attend the Annual Dinner of the Midland Amateur Radio Society in Birmingham on October 20, 1956, with their ladies.

" Practical Wireless "

A letter was submitted from a B.R.S. member in which he drew attention to a paragraph by " Thermion," headed " Wanted—a National Amateurs' Association " published in the June, 1956, issue of *Practical Wireless*.

Resolved to take no official action in respect to the paragraph in question.

Cash Account

Resolved to accept and adopt the Cash Account for April, 1956, as prepared and submitted by the General Secretary.

Reports of Committees

Resolved to receive, as a Report, the Minutes of a Meeting of the Contests Committee held on April 19, 1956. The Report contained no recommendations.

The Secretary drew attention to the fact that the Contests Committee had, at the request of the V.H.F. Committee, prepared a set of proposed rules for an annual Region I V.H.F./U.H.F. Contest. It was reported that the draft rules (a copy of which had been circulated prior to the meeting to each member of the Council) would be considered by the V.H.F. Committee at its next meeting and that if approved they would form part of an R.S.G.B. contribution to the I.A.R.U. Conference in Stresa.

Resolved to receive, as a Report, the Minutes of a Meeting of the Exhibition (Home Constructors' Section) Committee held on May 1, 1956. The Report contained no recommendations.

The Chairman of the Committee (Mr. Edwards) reported that the Radio Industry Council would not allow the Society to stage a demonstration of colour television at the National Radio Show, Earls Court. The Committee had decided that the main theme of the Society's stand should be to explain to the newcomer how to become a radio amateur. The Committee had agreed to make a short publicity film on Amateur Radio for display at regular intervals at the Exhibition.

Resolved to authorize the expenditure of £10-£15 on a publicity film.

Attention was drawn to the fact that the Committee had agreed to place on record its disappointment that no Amateur Radio Exhibition is to be held during 1956.

The meeting terminated at 8.55 p.m.

Correction

IN the Resume of the Minutes of the Council Meeting held on March 20, 1956, and published on page 481 of the May issue of the BULLETIN, the names of Messrs. J. H. Hum, R. G. Lane, W. H. Matthews, and W. R. Metcalfe were omitted in addition to the name of Mr. Hicks-Arnold.

" The Sound of Your Voice "

AMATEUR Radio plays an important part in the forthcoming Douglas Fairbanks Presentation *The Sound of Your Voice* on AR-TV (London Channel 9).

W8IVK in the U.K.

EARL F. Hart (W8IVK), 16073 Tacoma Avenue, Detroit, 5, Michigan, U.S.A., will be visiting Europe this summer and autumn and will be pleased to receive details of meetings he could attend.

R.S.G.B. News Bulletin Service

GB2RS 3600 kc/s

10.00 B.S.T. Sundays 12.00 B.S.T.

" Simple Wobbulator "

IN the article entitled " A Simple Wobbulator for the Alignment of Television Receivers," published in the January 1956 issue of the R.S.G.B. BULLETIN, the anode of V1A should have been shown by-passed to earth by a 100pF condenser.

City and Guilds Broadsheet

CITY and Guilds of London Institute is now publishing a periodical *Broadsheet* which reports the Institute's many activities.

Can You Help ?

● C. T. Fairchild (G3YY), 44 Hawkhurst Road, Coldean, Brighton, 6, who requires the circuit diagram and any other data for the ex-Army type A Mark III transmitter-receiver which uses type 7H7, 7Q7 and 7C5 valves and covers two bands ?

Society News

Subscriptions Paid by Bankers' Order

A YEAR ago last April the Council reported, through the medium of a notice in the R.S.G.B. BULLETIN, that about 800 members had failed either to amend their Bankers' Order to cover the increased subscription rates or to remit the balance due in cash. Up to that time the BULLETIN had been sent to the 800 members concerned each month.

The Council gave notice that as from May 1, 1955, the BULLETIN would not be sent to any member whose subscription was at that date, or became thereafter, three months in arrear.

A recent examination of Society records disclosed that no less than 457 of the 800 persons concerned had failed to cancel their Bankers' Order in spite of the fact that they had not received the BULLETIN for more than 12 months. In 187 cases the additional payments were no more than the amount which the persons concerned owed to the Society up to the time their membership became three months in arrear, but in the remaining cases the amount paid was in excess of that which they owed the Society when their membership became overdue.

As a preliminary measure to put matters in order Headquarters wrote to 167 persons whose subscription originally became due sometime between June and September each year asking them either to cancel their Bankers' Order forthwith or to complete a new Order.

After a period of three weeks had elapsed it was found that FOUR persons had sent a new Bankers' Order to Headquarters with a request for a refund of the balance outstanding, FIVE others had sent a new Bankers' Order and made no request for a refund, and a further FIVE had written to say they had now cancelled their Bankers' Order.

Thus only fourteen out of 167 persons written to took the trouble to reply to the letter from Headquarters.

Affiliated Societies

ACTING on the advice of the Finance and Staff Committee the Council has decided that in future the annual affiliation fee paid by Societies who can certify that at least 75 per cent of their members are members of the R.S.G.B. shall be 5s. (or 15s. if a copy of the R.S.G.B. BULLETIN is required).

The normal affiliation fee is 10s. 6d. per annum (or 21s. if a copy of the R.S.G.B. BULLETIN is required).

Headquarters Station

THE Council has received a further remittance in connection with the sale of valves, a crystal unit and other items from Headquarters station.

The various items realised £7 8s. 7d. from which amount the firm concerned deducted 33⅓ per cent. As, however, an allowance of 12½ per cent discount was made to R.S.G.B. members the gross profit accruing to the firm was only £1 3s. 2d. The nett amount paid to the Society was £5 2s. 5d.

National Radio Show

HEADQUARTERS will be pleased to hear from members willing to do stand duty at the National Radio Show at Earls Court from August 21, to September 1.

The theme of the Society's stand—No. 305—will be "An Introduction to Amateur Radio."

Printing Costs

HAYCOCK Press Ltd., printers of the R.S.G.B. BULLETIN, have notified the Society that, as a consequence of their acceptance of new wage rates which have been agreed between the Master Printers Federation and the Unions, they have reluctantly been compelled to increase their charge for printing the BULLETIN by a further 10 per cent over and above the 10 per cent increase demanded earlier in the year.

The effect of this decision will be to increase the cost of printing the BULLETIN by approximately another £450 per annum. This increase, with the previous increase of £450 per annum, means that BULLETIN printing costs will be about £900 a year more for the year 1956/7 than they were for the year 1954/5.

Bulletin Production

HEADQUARTERS much regret that recent issues of the BULLETIN have been considerably delayed in publication, due to the disruption of the normal production schedule caused by the dispute in the London printing industry. However, it is hoped that this and succeeding issues will appear on or about the 15th of the month.

The Late Commander Hippisley

LT.-Col. Sir Evan Y. Nepean, Bt., Royal Signals (G5YN/DL2YN) writing from B.A.O.R.39, draws attention to two mistakes in the obituary notice for Commander Hippisley published in the May, 1956, issue of the BULLETIN.

Sir Evan points out that the call WUX/G2FL was held by Mr. Willcox (not Willrop) and OBX by Mr. I. H. Bayldon (not Hayldon). Sir Evan knew both Commander Hippisley and Mr. Willcox when he lived in Warminster before the last war.

East Midlands Regional Meeting

NEARLY 50 members attended the East Midlands Regional Meeting at the Empire Hotel, Leicester, on May 27, 1956. After lunch, the Leicestershire County Representative, K. G. Chapman (G3AFZ), welcomed the visitors and Council Members present and introduced the Regional Representative, Dr. E. S. G. K. Vance (G8SA). Council was represented by the Executive Vice-President, D. A. Findlay (G3BZG), C. H. L. Edwards (G8TL) and W. R. Metcalfe (G3DQ), Zone A Representative, who answered many questions on R.S.G.B. affairs.

The meeting concluded with a vote of thanks to the organizers, K. Chapman (G3AFZ) and W. Mead (G5YY), T.R. for Leicester.

Cairo Broadcasting Station

A few weeks ago the Society wrote to the G.P.O. about interference in the 28 Mc/s amateur band by a harmonic of a Cairo broadcasting station working on 7056 kc/s.

Following observations by the Post Office Monitoring Station at Baldock a message was sent to Cairo requesting action to suppress the harmonic. No reply came from Cairo but subsequent observations by the G.P.O. showed that the harmonic radiation was no longer audible at Baldock.

Bulletin Index

The Index to Vol. 31 (July 1955–June 1956) will be published next month.

Regional & Club News

Bristol.—At the June meeting E. C. Halliday (G3JMY) lectured on " Oscilloscope Circuits and Applications ". On July 20 J. G. Downes (Pye Ltd.) will give a talk on " Industrial Television ". Full details of forthcoming lectures may be obtained from the *Hon. Secretary*, D. F. Davies (G3RQ), 51 Theresa Avenue, Bishopston, Bristol, 7, who will be pleased to hear from local members not already on the Group's mailing list.

Crystal Palace & District Radio Club.—The transmitting and listening contests for the " Ann " Cup and Trophy are to take place during television hours in October and will last for 9 days. The meeting at Windermere House, Westow Street, S.E.19, at 8 p.m. on July 21, will be devoted to demonstrations of mobile equipment including the ZC1. *Hon. Secretary:* G. M. C. Stone (G3FZL), 10 Liphook Crescent, Forest Hill, London, S.E.23.

Grafton Radio Society.—In the Top Band Contest for the " G2AAN " Cup H. Lassman (G3JZX) was first, followed by D. Howell (G3KRH) and P. Bernal (G3KQZ) joint second. Fourth was S. Legg (G3KNL). On June 9-10 the club operated two field day stations on Hampstead Heath. Many contacts were made on phone and c.w. on Top Band and 3.5 Mc/s while the station operating on 7 and 14 Mc/s worked 17 countries. The society closes for the summer recess on July 20 and will re-open on September 7. *Hon. Secretary:* A. W. H. Wennell (G2CJN), 145 Uxendon Hill, Wembley Park, Middlesex.

Ilford.—The T.R. has recently made an interesting analysis of attendance figures for the last few years. In 1951, 28 meetings were held with an average attendance of 16. The peak in the actual number of attendances occurred in 1953 when 1,041 attendances at 51 meetings were recorded—an average of 20.4. For the current year the average attendance is 22.52, an upward trend which has continued steadily since 1951. *Town Representative:* F. F. Ruth (G2BRH), 579 High Road, Ilford.

Leicester Radio Society.—The new club-room at 140 High Street, opened recently by the President R. J. Frisby (G2CFC), has facilities for constructional work and a complete station. Meetings are held on alternate Mondays, the next being on July 16. *Hon. Secretary:* J. Tranmer, 4 Grocot Road, Leicester.

Lothians Radio Society.—At the A.G.M. the following were elected: *President*, Ian Mackenzie (GM3FGJ); *Hon. Secretary and Treasurer*, Arthur A. Dewar (B.R.S.18777), 37 Calder Circle, Edinburgh, 11; *Librarian*, William T. Sutherland (GM3JWS); *Committee Members*, Eric Stewart (GM3HX), L. R. Richardson (GM3AKM) and John Good (GM3EWL).

Portsmouth & District Radio Society.—Recent activities have included a coach trip to the Isle of Wight with visits to Rowridge Television Station and Niton Radio. Visitors and prospective members are invited to visit the society at its headquarters at the British Legion Club, Queen's Crescent, Southsea. *Hon. Secretary:* L. B. Rooms (G8BU), 51 Locksway Road, Milton, Portsmouth.

Slade Radio Society.—At the meeting at Church House, High Street, Erdington, on July 20, J. A. Thomas of the Automatic Coil Winder and Electrical Equipment Co. Ltd. will give a talk on " The Universal Avometer ". The next meeting will be on August 31 when R. G. Hackel of Joseph Lucas Ltd. will speak about " Radio Interference Suppression in Automobile Electrical Systems ". The " Slade Net " will operate on July 27, August 10 and September 7. *Hon. Secretary:* C. N. Smart, 110 Woolmore Road, Erdington, Birmingham, 23.

South Manchester Radio Club.—Meetings at Ladybarn House, Mauldeth Road, Fallowfield, are arranged for July 27, August 10 (" Hints on Mobile Operation ". R.S.G.B. recorded talk by C. H. L. Edwards, G8TL) and August 24 (Junk Sale). *Hon. Secretary:* M. Barnsley (G3HZM), 17 Score Street, Bradford, Manchester, 11.

Spen Valley & District Radio & Television Society.—Recent activities have included visits to the R.N. W/T Station at New Wallham, near Grimsby, and to the workshops and laboratories of Marconi Marine Co. at Grimsby. Members were also shown over the *M/V Prince Philip*. *Hon Secretary:* N. Pride, 100 Raikes Lane, Birstall, near Leeds.

Torbay Amateur Radio Society.—At the meeting in June local R.S.G.B. members held an " inquest " on N.F.D. Several members are awaiting the results of the Radio Amateurs' Examination. *Hon. Secretary:* L. H. Webber (G3GDW), 43 Lime Tree Walk, Newton Abbot.

Thanet Radio Society.—Recent visitors to Thanet have included G. A. Bird (G4ZU) and his wife. Whilst there G4ZU gave an illustrated lecture on aerials. Holiday-makers in the Thanet resorts are invited to attend Society meetings which are held on Friday evenings at Hilderstone House. Although no meetings are held during August local amateurs will be pleased to see visitors who should first write to the *Hon. Secretary:* J. Barnes (G3BKT), 18 Grange Road, Ramsgate.

West Kent Amateur Radio Society.—At the A.G.M. the following were elected: *President*, W. H. Allen, M.B.E. (G2UJ); *Senior Vice-President*, L. S. King (G4IB); *Junior Vice-President*, G. A. Livesey (G3FIB); *Hon. Secretary*, H. F. Richards, 17 Reynolds Lane, Tunbridge Wells; *Hon. Treasurer*, F. J. Bowles; *Contests Organizer*, D. Mather; *Editor*, F. Barnard (G4FB); and *Assistant Editor*, F. R. Freeman G3AXV). At the recent Hobbies Exhibition in Tunbridge Wells the Society was awarded the Trophy for the best non-competitive exhibit. Meetings are held at Culverden House, K.E.C. Adult Education Centre, the next being on July 20 at 7.30 p.m. when there will be a " Radio Quiz " conducted by F. R. Freeman. On August 26 an Open Air Hamfest, Picnic and Cricket Match will take place.

Representation

THE following is an addition to the list of County Representatives published in the December 1954 issue:—

Region 10—Monmouthshire

G. A. James (GW8CT), 1 Hillside, Cefn Road, Blackwood.

* * *

The following are additions to the list of Town Representatives published in the December 1955 issue:—

Region 2—Co. Durham

West Hartlepool

L. G. W. Foden (G3CHJ), 207 Park Road.

Region 7—London South-East

Bexleyheath

C. J. Leal (G3ISX), 1 Deepdene Road, Welling, Kent.

Silent Key

JAMES E. CATT (G5PS)

To his many friends, the sudden death of James (" Hamish ") E. Catt (G5PS) at the age of 65, on June 5, 1956, closes the active record of one of the pioneers of Amateur Radio.

It is difficult to condense into a small space an account of his many accomplishments, for it is necessary to go back to before the days of the Wireless Telegraphy Act of 1904 to trace his practical interest in radio. With the passing of the Act, he obtained the call-sign CXD. It is of interest to recall that a wireless receiver built by him, and passed on to the late Mr. Leslie McMichael, started what later became the well-known manufacturing firm of McMichael Radio.

In his lifetime, Jimmy Catt held commissioned rank in the Army, the Navy and the Air Force. He also had official connections with the G.P.O., and latterly with the Ministry of Supply.

Having lived in 52 countries, and possessing a natural gift for learning languages, it is difficult to say just how many he could tackle, but he had been heard on the key or in conversation, using Russian, Dutch, German, Spanish, Italian, Hungarian, Arabic, Malayan and Chinese.

Methodical to a degree and demanding a high standard of proficiency, he had many hobbies and somehow managed to fit them into his day. Bee-keeping, gardening, hand-weaving, wood inlaying, and tennis were other activities. As G5PS he was active right up to the end.

At the funeral, Frank Fletcher (G2FUX) officially represented R.S.G.B. Headquarters and the London Members' Luncheon Club. " Hamish " was a founder member of the club, Colonel Bailey (G2QB) and Wing-Commander Craig (G6JJ) represented both the Society and the F.O.C.; G5PS was a Vice-President of F.O.C.

" Hamish " Catt's passing leaves memories and the inspiration of examples that few can emulate

To Mrs. Catt, herself an expert telegraphist, we offer our sincere sympathy.

A.M.H.F.

Forthcoming Events

REGION 1

Blackpool (B. & F.A.R.S.). — July 24, 7.30 p.m., 33 Clarence Avenue, Cleveleys.
Bury (B.R.S.).—August 14, 8 p.m., George Hotel, Kay Gardens.
Chester (C. & D.A.R.S.). — Tuesdays, 7.45 p.m., Tarran Hut, Y.M.C.A.
Crosby. — Tuesdays, 8 p.m., over Gordon's Sweetshop, St. John's Road, Waterloo.
Lancaster (L. & D.A.R.S.).—August 1, 7.30 p.m., George Hotel, Torrisholme.
Liverpool (L. & D.A.R.S.).—Tuesdays, 8 p.m., Room G, Wavertree Community Centre, Penny Lane, Liverpool, 18.
Manchester (M. & D.R.S.). — August 6, 7.30 p.m. Brunswick Hotel, Piccadilly. **(S.M.R.C.).** —Fridays, 7.45 p.m., Ladybarn House, Mauldeth Road, Manchester, 14.
Preston (P.A.R.S.).—Wednesdays, 7.45 p.m., 48 High Street, off Lancaster Road, Preston.
Rochdale (R.R.T.S.).—Fridays, 7.45 p.m., 1 Law Street, Sudden.
Southport. — Thursdays, 8 p.m., Sea Cadets' Camp, Esplanade.
Stockport (S.R.S.).—July 18, August 1, 15, 29, 8 p.m., Blossoms Hotel, Buxton Road.
Warrington (W. & D.R.S.).—July 19, August 2, 16, 7.30 p.m., King's Head Hotel, Winwick Street.
Wirral (W.A.R.S.).—July 18, August 1, 15, Y.M.C.A., Whetstone Lane, Birkenhead.

REGION 3

Birmingham (South).—August 3, 7.30 p.m., A Committee Room, Messrs. Cadbury Bros., Bournville Lane. **(M.A.R.S.).** — July 17, 7 p.m., Midland Institute. **(Slade).**—July 20, August 3, 7.45 p.m., Church House, High Street, Erdington.
Coventry.—July 20, 7.30 p.m., Priory High School, Wheatley Street. **(C.A.R.S.).**—July 23, 7.30 p.m., 9 Queen's Road. **(Courtaulds).** Wednesday, 5-8.30 p.m., Courtaulds, Ltd., Foleshill Road.
Malvern.—No meeting during August.
Redditch.—July 26, August 7, 8 p.m., "Scale & Compass," Birchfield Road.
Solihull.—No meetings in July and August.
Stoke.—July 25, 8 p.m., "Lions Head," John Street, Hanley.
Stourbridge.—No meeting in August.
Walsall.—July 25, 8 p.m., Technical College, Bradford Place.
Wolverhampton.—July 16, 30, 8 p.m., Nechell's Cottage, Stockwell End.

REGION 4

Alvaston. — Tuesdays, Thursdays, 7.30 p.m., Sundays, 10.30 a.m., Boulton Lane, Alvaston, Derbys.
Chesterfield. — Tuesdays, 7.30 p.m., Bradbury Hall, Chatsworth Road.
Derby (D. & D.A.R.S.).—Wednesdays, 7.30 p.m., Room 4, 119 Green Lane, Derby.
Ilkeston (I. & D.A.R.S.). — No meetings in August.
Leicester (L.R.S.).—Mondays, 7.30 p.m., Holly Bush Hotel, Belgrave Gate
Lincoln (L.S.W.C.).—No meeting in August.
Mansfield (M. & D.A.R.S.).—No meetings in July or August.
Newark.—August 5, 7 p.m., Northgate House, Northgate, Newark.
Northampton (N.S.W.C.). — Fridays, 7 p.m., Clubroom, 8 Duke Street.
Nottingham.—July 20, 7.30 p.m., Basford Hall Miners Welfare, Nuthall Road, Cinderhill.
Peterborough.—August 1, 7.30 p.m., 21 Hankey Street.
Retford.—No meetings in July or August.
Worksop.—No meetings in July or August.

REGION 6

Cheltenham.—August 2, 8 p.m., Great Western Hotel, Clarence Street. **(C.A.R.S.).**—Wednesdays, 8 p.m., Club Room, St. Marks Community Centre, Brooklyn Road.
Gloucester (G.R.C.). — Thursdays, 7.30 p.m., The Cedars, 83 Hucclecote Road.
Portsmouth. — Tuesdays, 7.30 p.m., British Legion Club, Queen's Crescent, Southsea.
Southampton.—August 4, 7 p.m., 1 Prospect Place, Above Bar, Southampton.
Stroud.—Wednesdays, 7.30 p.m., Subscription Rooms.

REGION 7

London (L.M.L.C.).—July 20, August 17, September 21, 12.30 p.m., Bedford Corner Hotel, Bayley Street, W.1.
London (U.H.F. Group).—August 2, September 6, 7.30 p.m., Bedford Corner Hotel.
Guildford & Woking.—July 22, August 26, 3 p.m., Royal Arms Hotel, North Street, Guildford.
Southgate, Finchley & District.—No meeting in August.

REGION 9

Bristol.—July 20, August 24, 7.15 p.m., Carwardine's Restaurant, Baldwin Street, Bristol, 1.
Exeter. — August 3, 7 p.m., Y.M.C.A., St. David's Hill.
Falmouth (W.C.R.C.). — Alternate Tuesdays, 7 p.m., Technical Institute
North Devon. — August 2, G3BO, Rosebank, Westcombe, Bideford.
Plymouth.—July 21, August 18, 7 p.m., Tothill Community Centre, Tothill Park, Knighton Road, St. Jude's.
Torquay. — July 21, August 18, 7.30 p.m., Y.M.C.A., Castle Road.
Weston-super-Mare. — August 8, 7.30 p.m., R.A.F.A.R.S., R.A.F. Locking, Somerset.
Yeovil.—Wednesdays, 7.30 p.m., Grove House, Preston Road, Yeovil.

REGION 10

Cardiff.—August 13, 7.30 p.m., "The British Volunteer," The Hayes.
Neath & Port Talbot.—August 7, 7.30 p.m., Royal Dock Hotel, Briton Ferry.

REGION 14

Falkirk & Stirling.—August 3, 31, 7.30 p.m., The Temperance Cafe, High Street, Falkirk.
Glasgow.—No meeting in July. New session commences August 31.

In order to avoid mistakes and misunderstandings details of meetings for inclusion in this feature can be accepted only from Regional Representatives or appointed Scribes.

Town Representatives and Honorary Secretaries of clubs affiliated to the R.S.G.B. should send details to the appropriate Regional Representative (whose address is on page 5 of this issue) so that they reach him not later than the 18th of the month preceding publication.

Items for *Regional and Club News* should, of course, be sent direct to the Editor.

Slow Morse Practice Transmissions

B.S.T.	Call	kc/s	Town
Sundays			
09.00	G3GYV	1900	Hartford, near Northwich
09.30	G3BKE	1900	Newcastle-on-Tyne
10.00	G6MH	1990	Southend-on-Sea
10.30†	G3DGN / G3GZB	1930	North London
11.00	G2FXA	1900	Stockton-on-Tees
12.00	G3LP	1850	Cheltenham
12.00	G3KAN	1850	Northampton
12.00	GI5UR	1860	Belfast
14.00	G5AM	1900	Witnesham, Ipswich
21.00	G2FIX	1812	Nr. Salisbury
22.00	G3ARM	1919	Guildford
Mondays			
18.30	G3KPJ	1970	Chelmsford
19.00	G3NC	1825	Swindon
21.00	G3BLN	1900	Bournemouth
22.15	G2BRH	1900	Ilford
Tuesdays			
18.30	G2FXA	1900	Stockton-on-Tees
18.30	G3KPJ	1970	Chelmsford
19.00	G2HDR	1860	Bristol
20.30	G3GDZ	1905	Kingsbury, N.W.9
21.00	G3EFA	1855	Southport
21.45†	G3ETP / G3JMX	1875 / 1860	Lowestoft
22.30†	G3IIR / G3GQK	1915	Norwood
Wednesdays			
18.30	G3GCY	1830	R.A.F., Dishforth
19.00	G3HUB/A	1902	Chelmsford
22.30	G3FBA	1910	Bath
Thursdays			
19.00	G3NC	1825	Swindon
20.00–†...	G2ABR / G3FCY	1919	Hull, Yorks.
21.00 ...	G3GWT / G3KTO		
20.30	G3JQM	1878	Barwick, Yeovil
22.30	G3ADZ	1940	Southsea
Fridays			
19.00	G3BLN	1900	Bournemouth
20.00†	G2FNI / G3EGX / G3ERB	1875	Wirral
20.30	G3ICX	1915	Sutton Coldfield
21.30†	G3KLZ	1860	Bradford
	G3INW (or G3KSS)		Bradford
	G3KEP		Bingley
Saturdays			
13.00	G2FXA	1900	Stockton-on-Tees
21.00	G3HWI	1987	Blackburn, Lancs.

† *Alternately.*

Slow Morse transmissions are organized by Mr. C. H. L. Edwards (G8TL), 28 Morgan Crescent, Theydon Bois, Essex. Members using the service are requested to send listener-reports to the stations concerned.

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10 EF50 (ex-Brand New Units) 5/- each	45/- ..
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DK96, DF96, DAF96, DL96	32/6 ..
6K8G, 6K7G, 6Q7G, 25A6G, 25Z5 (or 25Z6G)	37/6 ..
12K8GT, 12K7GT, 12Q7GT, 35Z4GT, 35L6GT (or 50L6GT)	37/6 ..
12SA7GT, 12SK7GT, 12SQ7GT, 35Z4GT, 35L6GT or 50L6GT	35/- ..

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10/- EACH

(complete with Technical Data and Circuits)

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Maximum collector voltage	— 5 volts
Peak collector voltage	— 5 volts
Maximum collector current	— 10 mA
Maximum emitter current	— 10 mA
Maximum power dissipation	25 mW

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A.C. 200/250. List price £14/13/-. Brand New.

£8/18/6 P. & P. 5/-.

MINIATURE TRANSMITTING STRIP "TYPE 81"

Size 7¼in. × 6in. × 3in. Complete with Valves Type CV415, CV309, 2-6AM6, 2-7D9 and Quartz Crystal, 4,860 kc/s. Fully wired with circuit.

£4/10/- complete.

B.S.R. RECORD CHANGERS

Very latest type "Monarch" in hammered gold finish. 3-speed with HGP37 crystal turnover pick-up. Plays mixed records. Brand new and guaranteed. Listed at £16/10.

£7/19/6, carr. paid.

MINIATURE I.F. STRIP TYPE "373" 9-72 MEG.

Brand new miniature I.F. Strip size 10½in. × 2½in. × 3in. high. Valve line-up: 2-EF92; 3-EF91 and EB91. With circuit.

Price (less-valves) 7/6, P. & P. 1/6.

This I.F. Strip is part of above equipment.

T/R 1196 RECEIVER

Complete with 6 valves: 2 EF36, 2 EF39, 1 EK32, 1 EBC23, 465 I.F.T., ideal for conversion. In absolute new condition. 27/6, P.P. 2/6, with circuit.

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COMPLETE TRANSMITTER RECEIVER with 24 v. power-pack in original transit case. 57/6, P.P. 5/-.

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Complete with 3BP1 C/R tube and screen 7 valves—2-6SN7GT, 2-6H6GT, 6G6, 2X2, 6X5G, volume controls, condensers, etc. Ideal for portable 'scope. In black crackle case size 15½in. × 9in. × 9in. BRAND NEW. 65/-, carr. FREE.

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Record Junior, 500 v., 20 meg. (Leather case 7/6 extra.)	£8 0 0
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TRANSMITTER RECEIVER "38" WALKIE TALKIE SETS

Special offer of above set, complete with 5 valves, 4-ARP12 and ATP4, with circuit. Range 7.4 to 9 Mc/s. These sets are not guaranteed but are serviceable.

25/-

Junction box, 2/6 extra.

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Crystal Holders for both Types **1/3** *each.*

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VCR97. Guaranteed full T/V picture (carr. 2/-)	£2 0 0
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