

THE T & R

BULLETIN

A JOURNAL FOR
RADIO EXPERIMENTERS

Vol. 16 No. 4 OCTOBER 1940 (Copyright)

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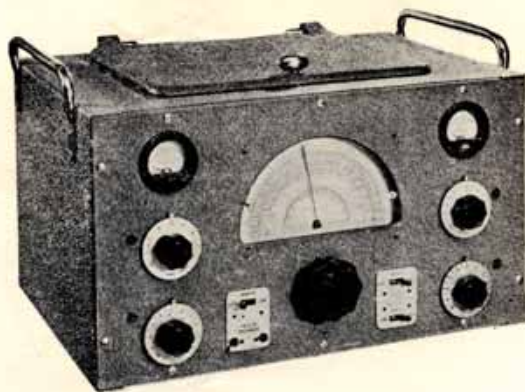
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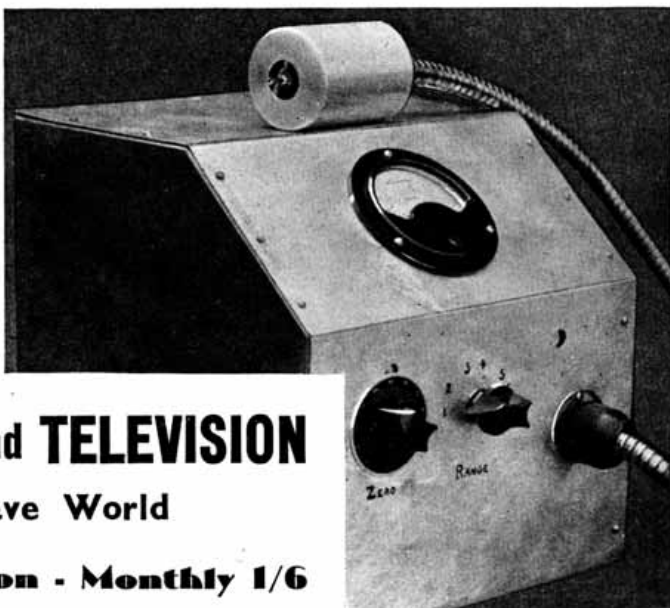
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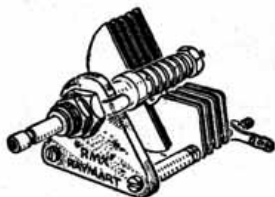
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OF THE
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MATHS. FOR THE RADIO AMATEUR

AT the risk of receiving a "dig in the ribs" at a future Convention we dare to suggest that a very goodly proportion of British amateur radio enthusiasts were, prior to the war, far better equipped to tackle a job practically than theoretically.

The high praise meted out even to junior constructors has, we must admit, been gratifying, but how few of them really *knew* precisely what they were doing in a mathematical sense.

The war, with its enforced rest from transmitter construction has enabled many of us to read more. Technical information, provided it is well presented, is entertaining but no one can hope to understand the theory of such a complex subject as radio without a sound background of mathematics.

Maths. to the average young man straight from school either appeals or appals. We fear that to the majority, the latter is the case, possibly because during his school life he has failed to appreciate the practical value of the subject. The average radio text book, with its "queer" practical problems, does not help him to assume a post school-days love for maths.

Bearing these thoughts in mind, and remembering that many of our members are now in branches of H.M. Forces where a knowledge of maths. is necessary, we have arranged for a series of articles to be prepared which should prove of considerable interest.

The author of the series, Mr. T. R. Theakston, will endeavour to present a difficult subject in a style which should appeal, paying especial attention to those fundamental problems and formulae which have a special application to amateur radio.

It is possible that some readers may wish to consult the author on matters connected with specific phases of mathematics. In such cases we must request that communications be addressed direct to him, together with a stamped and addressed envelope for his reply.

Suggestions for future articles in the series will be gladly welcomed by the author.

Remember the articles are an experiment. We believe they are needed—it is *your* privilege as a member to agree or disagree.

Tough Times

We cannot go to press on this occasion without expressing our sincere thanks to the Society's printers—*Sir Joseph Causton & Sons, Ltd.*, of Brettenham House, London, and Eastleigh, Hampshire—for the part they played in producing the September issue, and possibly this one as well, under extremely difficult conditions. The fact that publication took place only one day

(Continued on page 124).

"CONTRASTING WEATHER" AND 56 Mc. CONDITIONS

By H. W. PARKER, B.Sc. (2ADZ)

WITH greatly increased amateur activity on 56 Mc. during 1939, the writer decided to investigate more closely the coincidence of good radio conditions and "contrasting weather." Based on the results obtained, a theory is now advanced to account for reception during such weather conditions, but, as the writer has but a slight knowledge of physics and meteorology, many points will no doubt be open for discussion. The observations, which covered the period from February to August inclusive, proved especially interesting because facts in addition to those connected with weather became apparent.

Basis for Comparison

One of the most difficult tasks was to determine how best to estimate conditions. It had been intended originally to use the "2AAH formula,"* but a consideration of the station log books showed that this method was unsatisfactory, chiefly because "activity" of transmitting stations upsets the formula, apart from the fact that to use it really effectively the "standard" in any one direction must be ascertained. The "standard" can be defined as the maximum distance at which a station can be heard under normal conditions. Some four years ago the limit seemed to be about 15 miles, but as more stations became active the figure rose to about 50 miles east, 35 miles west, 30 miles north and 40 miles south. What might have been classed as "abnormal" reception four years ago, later proved to be normal reception. Because of these difficulties it was finally decided to assign a number by which existing conditions could be recognised. The numbers 1 to 7 were chosen, and on this basis 3 indicates normal conditions, 3+ improved conditions, 4 fairly good conditions, 7+ very abnormal conditions, etc.

Another difficulty was that of deciding what temperature to record, but this problem was settled by noting the average daily temperature at the writer's station.

At one time it was thought necessary to consider atmospheric pressure, but the relative humidity of the atmosphere brought in too many difficulties. Nevertheless, in any gas, temperature and pressure are interrelated.

Graphical Results

Having formulated a basis for recording results, it was now possible to compare the estimate for conditions, and the change in temperature from one day to the next. These results can best be expressed in the form of double graphs, a careful study of which shows that they are similar in most respects. Fig. 1, which covers the month of May, 1939, has been chosen as an illustration, as this is the best of the series. From this it will be seen that the curve is continuous except for two days.

The March curve was rather negative since reception was sporadic, and in any case weather conditions did not vary greatly. The best period that month was around the 13th. In June, July and August interference with the temperature effect was noticed, due possibly to Sporadic E reflection, a point which must necessarily be taken into consideration.

As a general rule it would appear that good conditions follow, although occasionally they precede, these large temperature variations. A really large change may establish good conditions over a few days, during which time the temperature may not change greatly. A study of temperature variations at various points over the country reveals that the more general the change the more general will become good conditions. Local temperature changes produce anomalous results.

When a sharp temperature change from hot to cold occurs, or vice versa, a cold or warm "front" has swept across the country. From recorded results a cold front (*i.e.*, a change to cold weather) is more effective than a warm front (*i.e.*, a change to hot weather). This point can be clarified by imagining a cold front sweeping across the country; then, due to its high density, it pushes the warm air upwards and above itself. Originally the hot and cold air densities would be very different, but as

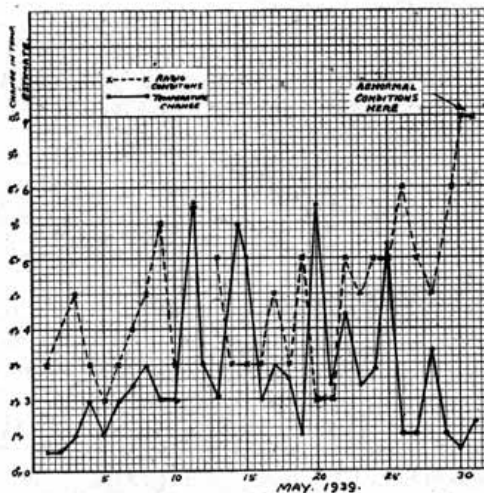


Fig. 1.

Graph for the month of May, 1939, illustrating the relationship between radio conditions around 56 Mc. and temperature changes. It will be noticed that the conditions curve follows closely the temperature change curve, except at the end of the month, when conditions were abnormal.

* For details of this formula the reader is referred to Vol. 15 (the 56 Mc. Band) of this Journal.

the former rises it is cooled down, which should increase its density, but through moving into a rare atmosphere it expands, so that its density remains around a constant value, *i.e.*, it is much less than the cold air next to the earth. Between the two densities there will be a sharp gradient.

Suppose now that one considers the action of light waves when passing through the media of varying densities and then applies these phenomena to the action of ultra-short wireless waves. If a light ray passes from glass (dense) to air (less dense) it will be bent or refracted according to well-known laws. If now the angle of incidence be increased, then a point will be reached when the ray of light is no longer refracted but is reflected. This angle of incidence is the "critical angle" which will vary according to the substance and its density. Since both radio and light rays are electro-magnetic it is conceivable that, as one covers the intermediate zone between the two, then radio waves will begin to show the properties of light waves and so follow their laws. There seems no reason why this should not take place at frequencies around 56 Mc. In effect the temperature change (contrasting weather) may be correlated with the presence of two media whose densities are different.

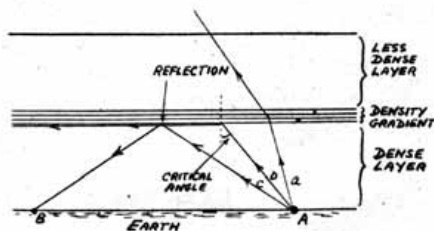


Fig. 2.

Illustrating the effect of varying the angle of radiation.

- (a) represents a high-angle wave lost in space.
- (b) a lower-angle wave which is trapped in the density gradient.
- (c) a low-angle wave which is reflected to a point B.

High and Low Angle Propagation

Consider now a transmitter located at a point A as shown in Fig. 2.

If a wave (a) is propagated at a high angle so that it is within the critical angle for air, then such a wave will be refracted, but not back towards the earth, *i.e.*, no signal will be received at B.

If a wave (b) is propagated at a lower angle so that it is at the critical angle of air, then such a wave will be reflected along the density gradient so that no signal will be heard at B. There is a possibility that the wave might later be refracted, or reflected to earth on meeting a layer of air of a different density.

If now a wave (c) is propagated at a very low angle so that it meets the density gradient at an angle greater than the critical angle, then this wave is reflected towards earth so that a signal is received at B. If the angle of propagation is again lowered then a signal could be received at greater distances.

According to the height of the density gradient layer the *minimum* distance for this improved reception will be fixed. This probably explains

why, under certain conditions "new" stations can be heard at distances up to, say, 120 miles, whilst regular stations located only 40 miles distant are no stronger, although conditions are regarded as "good."

The higher the density gradient layer the greater the minimum distance of improved reception and vice versa. During the summer, with hot days and cool evenings, the layer is likely to be low, *i.e.*, local signals will increase in strength for a short while. Since reception is also possible at a ground-wave distance, severe fading can occur, a condition which frequently happens.

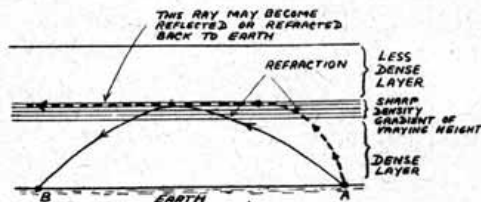


Fig. 3.

Illustrating the effect of a wave which is refracted in the density gradient.

Refraction in Density Gradient Layer

It seems possible that a wave striking the density gradient may be refracted in that gradient until it is at an angle either equal to, or greater than, the critical angle (see Fig. 3). Such a condition will result in reception at very unusual distances.

If these conclusions are correct then they could be confirmed by erecting an aerial system whose angle of propagation could be varied over a great range. It would be interesting to observe what differences, if any, would occur with this type of polarisation. Perhaps there is an optimum angle of polarisation!

Relationship between Temperature and Conditions

In studying the observations made, it appeared evident that, quite independent of the temperature changes, a law could be expressed very approximately governing the relationship between temperature and conditions, other things being equal. Although it seems certain that a high temperature is more favourable for propagation than a low

(Continued on page 124)

Month 1939	Conditions (C)	Temperature (T) Fahrenheit	Constant (K)
February	4.3	43.3	186
March ..	4.7	42.5	200
April ..	3.8	48.6	185
May ..	3.5	56.5	198
June ..	1.8	62.2	112
July ..	3.3	61.1	201
August ..	3.5	62.5	219

Table showing relationship between radio conditions and temperature.

CATHODE INPUT R.F. AMPLIFIERS

By I. J. P. JAMES (G5IJ).

THE purpose of the present article is to bring to the notice of readers an old, but little known, method of driving radio-frequency amplifiers which the writer believes can be applied with advantage to amateur transmitters. It is not intended to lay down any definite rules as to the operation and design of suitable circuits but rather to point out various schemes which it is hoped the more experimental reader will test and develop further in happier times.

In the normal radio-frequency amplifier a tuned input circuit is connected between the grid of the valve and the cathode, which is earthed, whilst the tuned output circuit is connected between the anode and cathode. Both the grid and anode of the valve have radio-frequency potentials on them and should the capacity between the anode and grid be large then the circuit is liable to oscillate. Oscillation is usually prevented either by interposing a screening grid in the valve between the control grid and the anode in order to reduce the capacity, or alternatively one of the well-known balanced neutralising circuits is adopted. By using the circuit shown schematically in Fig. 1 it is possible to build a radio-frequency amplifier which does not oscillate and yet uses a triode valve without any special neutralising arrangement.

Application to Single-Ended Stage

In Fig. 1 the tuned input circuit of the amplifier valve V is represented by the coil L_1 and condenser C_1 connected between the grid and cathode of the

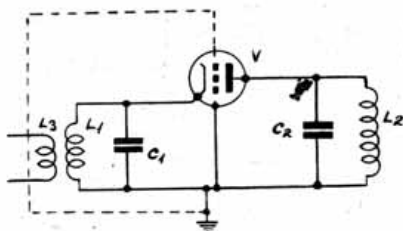


Fig. 1.

Circuit of a cathode-drive Triode Radio Frequency Amplifier which requires no special neutralising arrangement to prevent self oscillation.

valve, whilst the tuned output circuit $C_2 L_2$ is connected between the anode and grid. The driving power for the amplifier is supplied by means of the coil L_3 . It is to be noticed that this circuit differs from the normal amplifier in that the grid of the valve is earthed. The grid, therefore, acts as a screen between the anode and cathode of the valve and the tendency of the amplifier to oscillate, due to capacity coupling between the input and output circuits, is greatly reduced. By using a suitable valve in conjunction with a screen (as shown by the dotted lines) no difficulty should be encountered in this respect. The stability of the amplifier is also improved by

reason of the negative feedback which occurs, due to anode current flowing in both the input and output circuits.

It is interesting to note that in an ordinary amplifier the output potential is effectively 180 degrees out of phase with the input potential, whereas in the cathode drive type of amplifier the output potential is in phase with the input potential; in other words, when the cathode is made positive in potential the anode potential also becomes positive.

A Practical Cathode Drive Circuit

Fig. 2 shows a practical circuit which the writer has used very successfully, on 1.7 Mc. in conjunction with an indirectly heated valve (RK34). The grid bias is supplied to the valve by means of the

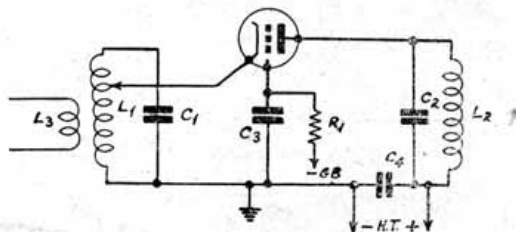


Fig. 2.

A practical cathode-drive R.F. Amplifier Circuit used on 1.7 Mc. in conjunction with an RK34 valve.

usual grid leak R_1 and the grid of the valve is effectively earthed by the condenser C_3 (about 0.002 μF). The condenser C_4 is the normal H.T. by-pass condenser and a suitable capacity value is 0.0002 μF . Additional anode decoupling by means of H.F. chokes can be employed if necessary. The cathode of the valve is not connected to the high potential end of the tuned input circuit, but is tapped on the coil L_1 . The reason for this is that the cathode circuit of the amplifier has a comparatively low input impedance. In order therefore to achieve the best results the tapping should be adjusted to suit the conditions obtaining in any particular amplifier. Link coupling to the driving stage is illustrated but, of course, any of the ordinary capacitive or inductive arrangements can be employed.

Cathode Drive Applied to Push-Pull Stage

The method of driving described can also be applied very successfully to a push-pull stage as shown in Fig. 3.

Whilst the cathode drive system is particularly applicable to triode valves, there is no reason why tetrodes, pentodes and other multi-electrode valves should not be used. The screening grids should be decoupled to earth and not to the cathode. Any of the usual keying methods, as for example, cathode keying can be employed.

In telephony transmitters the system is very useful, as anode modulation of triodes is much preferred to other methods, although grid, cathode and suppressor grid modulation can be used.

Using Directly-Heated Valves

So far the circuits have been described with reference to indirectly heated valves, but by suitable modifications directly heated valves can be utilised. The problem is akin to that involved in the application of electron coupling circuits to battery valves. Thus, one way of feeding the filament current to the valve is to wind the cathode coil in a bifilar fashion. Alternatively, if a copper tube coil is employed, the filament current can be conveyed to

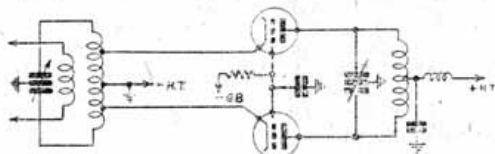


Fig. 3.

The cathode-drive method applied to a push-pull stage.

the valve, by means of an insulated wire running through the tube, the wire being passed through a hole in the tube at the tapping point. A third method is to pass the current to the filament by means of an H.F. choke in shunt with the input circuit.

U.H.F. Applications

Because the neutralising condenser and centre tapped output coil is not necessary with the cathode drive system the stray capacities are reduced, and the arrangement is extremely useful for operation on the very high frequencies, i.e. 56 and 112 Mc. A convenient constructional lay-out when a metal chassis is used is to arrange the cathode circuit under the chassis and the anode circuit on the top of the chassis, thus making the latter form a very effective screen between the input and output circuits. Should difficulty arise, with very large valves, in arranging the grid at earth potential due to the inductance of the grid lead, then the best course to adopt is to connect a condenser, and possibly some additional inductance, in the grid circuit to form a tuned acceptor circuit, this providing a low impedance to high frequency currents between the grid and earth.

Bibliography

The writer has recently noticed two interesting articles on cathode drive, namely, "The Inverted Amplifier," by C. E. Strong. *Electronics* (U.S.A.), July, 1940, pp. 14, 15, 16, 55 and 56, and "A Different Portable-Emergency Transmitter," by R. P. Austin. *Q.S.T.*, July, 1940, pp. 36 and 37.

Trade Notices

Bona fide dealers will welcome a new Leonard Heys publication entitled "Valve Comparative Charts and Price List," which is available to them on receipt of a 2½d. stamp. Those applying must enclose their trade card as reference.

Although it is not within the scope of the publication to furnish data regarding the characteristics of the valves listed, the charts are extremely well prepared. A useful table gives the type numbers of valves for which a G.P.O. permit is required. Many old friends of pre-war days appear including 6L6, 6V6, KT66 and PX25A.

The comparative tables themselves are based on *Tungram* and *Trio-tron* basic types, whilst a check list of *Philco* equivalents is also included.

Price lists of *Raytheon*, First-Grade and *National Union American* valves are given.

Communications should be addressed to Leonard Heys, Faraday House, Henry Street, Blackpool, Lancs.

Varley Dry Accumulators Ltd., By-Pass Road, Barking, Essex, have recently introduced a small home charger which although primarily intended for their own dry accumulators can be used quite successfully with any type of small 2-volt accumulator.

Housed in a bakelite case, familiar to users of Varley transformers, the unit comprises a step-down transformer, a dry rectifier, tapping points for charging at ¼ and ½-amp rates, and a bayonet socket for connection to a 200-250 volt A.C. supply.

When charging Varley type TU1 or TU2 torch cells, the + output clip is attached to the top stud of the cell and the negative connection is made by means of a specially designed ring into which the base of the cell is placed. For other types of cells

where the charging rate is ½ amp clips are connected to the appropriate terminals.

Useful advice is contained in a folder entitled "Care and Charging of Varley Dry Accumulators" obtainable from the address given above.

The Varley Home Charger at 17s. 6d. can be strongly recommended to all who need a reliable and efficient means for maintaining small 2-volt accumulators in trim.

Incidentally the TU1 Dry Accumulator is the same size as the popular U2 type of dry cell and has a charge rate of 0.2 amps for 12 hours.

J. C.

News from Dorothy W2IXY

It is always one of the bright spots in life at Headquarters to hear from Dorothy Hall, W2IXY, for so few of our erstwhile U.S.A. friends of peace time maintain regular correspondence.

According to W2IXY, the F.C.C. has extended the time limit for licence renewals to October 15, because of the heavy strain on various Government Depts. in looking up records of census. Even Dorothy herself had some difficulty in proving citizenship, but finally it came along. Accompanying her letter was a copy of a photograph of her own fingerprints which was taken by VK4HN during a visit to her station. Incidentally, VK4HN was operating from Papua for some time under the call PK6XX.

W2IXY sends good wishes to all her amateur radio friends throughout the British Empire.

Stray

Mr. H. Beadle, G8UO, 13 Chandos Street, Keighley, Yorks., will be pleased to correspond with members, and especially with those whom he had the pleasure of contacting before the war.

DESIGNING RECEIVER R.F. STAGES

By P. F. CUNDY (G2MQ)

IT is the purpose of this article to attempt to clarify the information already in existence on the subject of radio frequency amplifying stages for receivers. Nothing entirely new is given, nor is quantitative data offered, but it is hoped that readers will be enabled to appreciate the fine points of any particular design. The information applies chiefly to receivers of the superheterodyne type, operating on high frequencies.

The Purpose of an R.F. Stage

An R.F. stage, whilst not absolutely essential, is highly desirable in order to overcome certain

in earlier stages, and the less after, the better will be the overall result. It must, however, be remembered that an R.F. stage itself is liable to generate some noise, to be amplified in subsequent stages. To minimise this possibility, care must be exercised in the choice of the valve used—the objective at which to aim being maximum stage gain per unit cathode current. A "television" type of pentode (1851 or Z62) employed with input and output coupling as tight as stability permits is advised. The selectivity of such an arrangement, however, is too poor to avoid second channel interference.

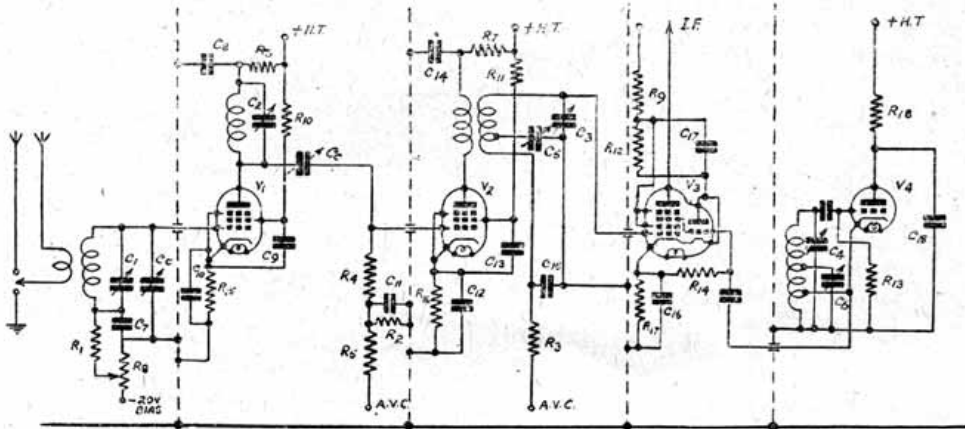


Fig. 1

Circuit diagram of H.F. and frequency changer stages of experimental superhet receiver built on lines indicated in text.

C_c, C_t	See text.
C_1-C_6	15 μF , tuning.
C_7-C_{18}	500 μF , by-pass.
C_{19}	50 μF .
R_1-R_3	$\frac{1}{2}$ megohm.
R_4	2 megohms.
R_5	1 megohm.
R_6-R_7	5,000 ohms.
R_8	20,000 ohms R.F. gain.

R_9	20,000 ohms.
R_{10}, R_{13}	30,000 ohms.
R_{11}, R_{12}, R_{14}	50,000 ohms.
$R_{15}-R_{17}$	500 ohms.
R_{18}	15,000 ohms.
V_1	ZA2 valve.
V_2	Z62 valve.
V_3	X65 (triode not used).
V_4	6W7 (triode connected).

disadvantages which occur when it is omitted. A frequency changer valve does not give any high degree of amplification in itself, particularly when operated at low input voltages. Additional amplification at an intermediate frequency, therefore, becomes necessary, thus increasing the level of hiss inherent in a frequency changer. Again, to avoid second channel interference, a high intermediate frequency must be chosen. At a frequency of 1,600 kc. for example, it is difficult to secure a "High Q" in the tuned circuits, and it is usually necessary to employ two I.F. stages in order to secure sufficient gain and selectivity.

Improving Signal to Noise Ratio

It is generally agreed that it is the frequency changer stage which produces most internal background noise, hence the greater the amplification

Avoiding Second Channel Interference

To obtain maximum selectivity neglecting special rejector circuits, it is necessary to ensure that the R.F. tuned circuits are of "High Q"—that is to say, they must possess a high ratio of inductance to resistance, the latter taking into account all sources of loss. It follows that one must employ low loss inductances, a high C/L ratio, and a valve which causes minimum damping.

The type which most satisfactorily fulfils the last function is one possessing high input and output impedances, such as an "acorn" pentode. If a valve of normal construction is used, it must be coupled weakly to the input and output circuits. Either of these designs will result in low gain per unit cathode current, a condition at variance with that previously deduced. With the "acorn" valve the gain to cathode current-ratio may be largely restored

by using a high L/C ratio for the tuned circuits and tight coupling, without reducing the selectivity to a point at which second channel interference occurs.¹

Suggestions for a Suitable Design

To combine the advantage mentioned above, and to avoid the disadvantages, a design has been evolved in which two radio frequency stages are employed, each of them approaching the divergent

control is brought out separately and is operated in a normal manner as one would a preselector.

The condenser, C_c in Fig. 1, calls for some comment. This serves partly to couple the two circuits together whilst acting as a trimmer across the output circuit of the "acorn" valve. More correctly, C_c , which is in series with the grid-earth capacity of the following valve, can be considered as a fixed capacity against which the variable grid trimmer C_t can be aligned.

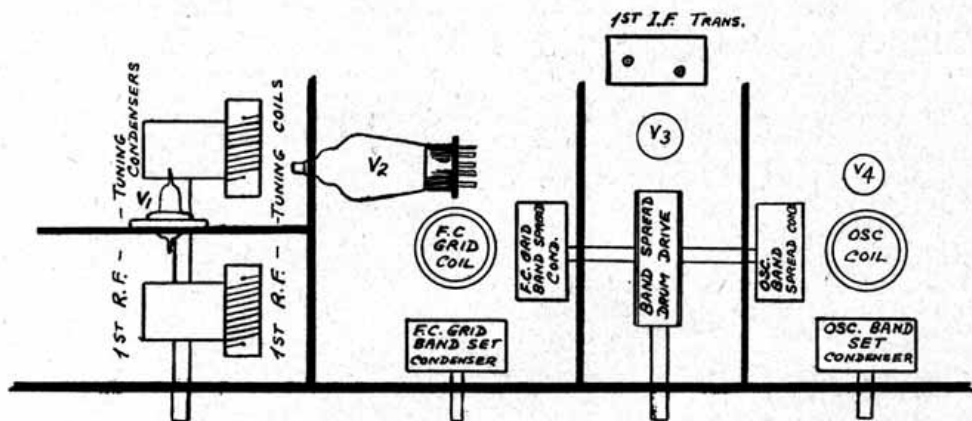


Fig. 2.
Block diagram of lay-out adopted in experimental receiver.

conditions outlined. When the control grid of a normal type of frequency changer valve is connected directly to the "top end" of the input tuned circuit, the latter is heavily damped and it will not be adversely affected if the output circuit of the previous (R.F.) stage is tightly coupled to it. This factor determines the position of the high gain television-type pentode. The "acorn" valve is employed in the first R.F. stage. The damping imposed by this valve in its associated circuits is very small, and high values of Q can, therefore, be secured in them.

Stray capacities across both the grid and anode circuits are kept small whilst tuning condensers of $15 \mu\mu\text{F}$ maximum and of very low minimum capacity are used. It thus becomes possible to include coils of comparatively high inductance ($6.5 \mu\text{H}$ on 14 Mc., for example). It is most essential to reduce to the lowest possible order all losses in the first stage and polystyrene insulation throughout helps in this respect.

Owing to the fact that the stray capacities across the input circuit of the frequency changer and the oscillator are totally different to those across the "acorn" circuits, no attempt has been made to gang these with the first H.F. stage. The input and output circuits of the first valve however, lend themselves to ganged tuning and this has accordingly been incorporated. This particular

The degree of damping placed across the output circuit of the first valve, by the low input impedance of V_2 is determined by the setting of C_c . If C_i is the input (grid-earth) capacity of V_2 , and R_i its input impedance, the effective tapping point on the coil will be:—

$$\frac{C_c}{C_c + C_i} \times 100 \text{ per cent.}$$

considered from the "earthy" end. The reflected damping, considered as a shunt resistance across the anode circuit of V_1 , will be:—

$$R_i \times \left(\frac{C_c + C_i}{C_c} \right)^2$$

It will be satisfactory to make C_c about one quarter of the value of C_i using, for the purpose, a small air-spaced trimmer condenser. The same type will be required at C_t . Values of R_i and C_i for various types of valves have been published.²

The circuit diagram and the sketch, Fig. 2, which accompanies this article should make other points clear.

Stray

Can any reader assist our District 6 Representative Mr. W. B. Sydenham, G5SY, Sherrington, Cleveland Road, Torquay, in his search for a good 4-gang condenser capacity $.00025-.0003 \mu\text{F}$? The size must not exceed 8 in. in depth.

¹ Pre-Selector Pointers. W2ADE QST May, 1939.

² "Valves for Short Waves," Henderson, *Wireless World* March, 1940.

MATHEMATICS FOR THE RADIO AMATEUR

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

Part I.—PURPOSE AND SCOPE OF THE SERIES

For the first time in the long history of this Journal we present a series of articles which have been planned to evoke more interest in the study of mathematics. The importance of the subject needs no stressing.

Introduction

ON innumerable occasions the amateur radio enthusiast, no less than the service operator, requires to know the size of some component or another which is to be employed in equipment under construction. This may be simply the capacity of a condenser or the value of a resistance, but to decide upon this unknown and much needed value is often a problem. There appear to be four alternative methods available:—

1. Use a text-book value.
2. Ask a friend what he uses.
3. Discover the value by "hit or miss" methods.
4. Interpret a general formula.

Unless one is very fortunate, the text-book seldom provides a case exactly similar to that under consideration; the second method seems a poor and weak procedure if generally adopted; whilst the third method speaks for itself, if time and accuracy are to be reckoned with.

In these articles, which let it be said at once are not intended for the expert, the writer will try to "persuade" the reader that, in addition to being the most rational method, Number 4 is by no means as difficult of interpretation as some may suppose. In using the word "reader" we do not refer solely to the beginner in amateur radio (in which class incidentally is the author), but also to those who look suspiciously at a formula because they do not know how it is obtained, and are afraid of trying to apply it to their particular requirements.

It is an unfortunate fact that many people fight shy of maths, because they think the subject is beyond them. Maths. *can* be difficult, but the demand which experimental work makes upon the calculating ability of the average amateur can, as a rule, be met by anyone sufficiently determined.

General formulæ can be learned by heart in parrot fashion, but in order to understand properly their application to particular cases it is also necessary to know *why* a formula takes a specific form. We propose, therefore, in this series to show how the formulæ commonly needed by amateurs are obtained and, more important still, to demonstrate how *your* figures can be inserted and a satisfactory result obtained. Thus the general formula will become your servant and will be made to interpret *your* needs.

Scope of the Series

The following is the projected scope of the series, which has been tentatively divided into three main sections. It should be observed, however, that this plan can and will be modified to meet any requests the writer may receive for special aspects of the general subject. Such requests will be very welcome.

Section 1. Commonly used Formulæ

This section will deal with the evolution and the practical application of those formulæ which are most frequently required by radio amateurs. These will include L/C ratios—number of turns—wire sizes—necessary capacity; optimum load; bias and bias resistances; frequency, wavelength, and length of aerials. In addition the basic calculations of current, voltage, resistance and power will be considered.

Section 2. Logarithms

This section will explain the use of logs. as a labour-saving device, and information will be given regarding the Slide Rule. Although the majority of readers will probably have some knowledge of both subjects, a refresher course should prove of some value.

Section 3. Trigonometry

The subject to be covered in this section may at first glance appear to have little bearing on Amateur Radio, but a moment's consideration will show that every experimenter should be able to calculate Great Circle distances, angles, and aerial directions. A knowledge of trigonometry will also provide a better appreciation of many formulæ, whilst Service members should find the information useful to them, especially if they are engaged in Signals duties.

The Approach to Section I

Mathematics is not a subject that can be tackled by glancing through a collection of formulæ from the comfort of an easy chair. Practice in manipulation is required and is essential, whilst practice in evaluating a formula will be found the only way of removing from it the bogey which appeared to make it so formidable. For these reasons we shall, whenever possible, set questions and defer the solutions until the following article, hoping that by that time they will have been worked out by all who are following the series. Let us then get out pencil and paper and our tables of logarithms, together with that other great weapon of attack—determination.

Three Fundamental Principles

As a start we will revise three fundamental principles by working out a few simple problems.

(1) A 0-1 milliammeter has an internal resistance of 50 ohms.

(a) What shunt resistance must be used in order to make it read currents up to 25 mA.?

(b) What series resistance is required so that the meter can be used as a 0-10 voltmeter?

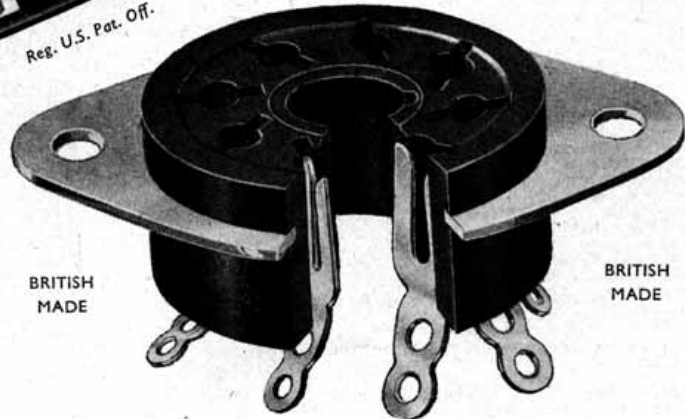
(2) When operating with plate and screen currents respectively equal to 36 and 9 mA., a pentode requires 13½ volts grid bias.

(Continued on page 105).

* "Westwood," Heslington Lane, Fulford, York.

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- (a) What should be the value of the cathode bias resistance?
 (b) A few resistances each of 200 ohms are available, and no others. How could some of these be connected to give the required resistance?
 (3) Two condensers, one of .0001 μ F, and the other of .001 μ F capacity are connected (a) in series, (b) in parallel. What is the resulting capacity in each case?

If you have answered these three questions it shows that you mean business. Keep up the good work by evaluating the following purely arithmetical examples either by means of log. tables or by ordinary methods:—

$$(4) \quad 10^6 \div 6.28 \times 3500 \times 10^3 \times .001$$

$$(5) \quad \sqrt{70.5^2 + 125^2}$$

(To be continued next month.)

“Radio at Ultra-High Frequencies.”

How often in recent months have we looked in vain for a book which gives in convenient and assembled form some of the essential contributions to ultra-high frequency radio engineering? *R.C.A. Institutes—Technical Press*, 75, Varick Street, New York, have filled the gap in yeoman style by collating a number of technical papers read by R.C.A. Engineers and others.

Entitled “Radio at Ultra-High Frequencies” this 450-page book brings to the reader a wealth of U.H.F. information seldom, if ever, before available in one volume.

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Twenty-three papers are published in full and thirty-one in summary form. Most are of recent date having appeared in *R.C.A. Review* or other publications during 1938 and 1939.

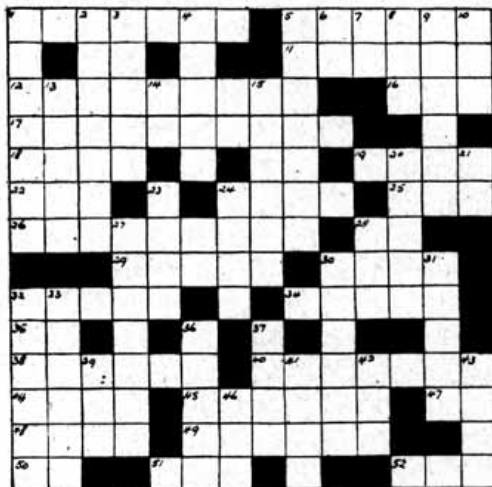
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J. C.

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CLUES

- ACROSS.**
1. Used extensively for H.F. work.
 5. G5NI is this for the National Co.
 11. A beam aerial desired by most.
 12. I? ?
 16. Edible providing it isn't a receiver.
 17. Science of signs as expressions of thought.
 18. HS.
 19. Military weapon necessary in final stage of TX.
 22. Beginning to irritate.
 24. Rough tool useful in initial stages of rebuilding.
 25. $\frac{1}{2}$ of a W6.
 26. Tile slate (anagram).
 28. ● — ● — ●
 29. Many arrays are spaced like this.
 30. EP-EQ.
 32. B.B.C. News Bulletins.
 34. What relation was Tom of the Bull to us?
 35. That is.
 38. Drive.
 40. CX.
 44. Necessary for gramophone motor.
 45. A Devonshire "Ham" will probably do this with cider after a DX contest.
 47. Land of the Midnight Sun.
 48. To load.
 49. River in Texas.
 50. Liberia.
 51. Type of insulator.
 52. A "Ham's" expression of gratitude.
- DOWN.**
1. First thing required in construction of receivers and transmitters.
 2. Well-known "Ham" dealer.
 3. Indian province whose principal town is almost a silver coin.
 4. The B.C.L. who writes to DJA for a QSL.
 5. Fragile in France.
 6. Peru in reverse.
 7. Prefix for the Azores.
 8. Often requires adjusting for smooth regeneration.
 9. East.
 10. A kind of grain.
 13. Province in CT1.
 14. Sudan.
 15. A coloured transparent stone.
 20. Telephones are for this type of work.
 21. Country in Oceania still operating.
 23. Britain still has many of these.
 24. Your keying is usually referred to as this.
 27. An obscuration, hows DX when this occurs.
 28. Can be effected by two carbon rods and an electric current.
 30. A good idea to do this for your gear.
 31. Khatmandu is the capital of this Kingdom.
 32. A type of 33 down.
 33. Some varieties rotate.
 36. Much used by "Hams."
 37. Employed as a protection.
 39. $\frac{1}{2}$ of OM.
 41. Gibraltar is too big for the TX but this isn't.
 42. Initials of famous journalist and playwright.
 43. Animals found in XU.
 46. Not an insect, but a component used for communication.

(SOLUTION NEXT MONTH)

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 SAVES TIME AT HEADQUARTERS**

THE RE-ACTIVATION OF VALVE FILAMENTS

By L. E. NEWNHAM, B.Sc. (G6NZ)

The suggestions made herein, although only of academic interest to most readers at present, may possibly offer scope to certain service members who are in a position to put them to practical test

It is well known that a thoriated filament which has lost its power of emission may often be restored to its former usefulness by suitable treatment. This usually takes the form of over-running the filament without voltage on either anode or grid, in order to form a new layer of active metallic thorium on the surface of the filament. However, with many valves the loss of emission seems intimately connected with a reduction in the degree of vacuum in the bulb. This may occur through oxidation of the thorium surface by the gases present, or by bombardment of the filament by positive ions formed in the low pressure gas by rapidly moving electrons.

The following experiments were performed on modern thoriated transmitting triodes which had lost a major part of their emission prematurely in normal use. The users stated that the rated figures had in no case been exceeded, indeed, in two cases they had been worked very much under their rating. The valves were of identical type and manufacture, being small foreign made power triodes purchased in the same season.

Results of Experiments

Valve 1.—When handed over for test, the anode current could not be made to exceed 40 mA. under any conditions of anode voltage and grid bias. The valve showed a very small R.F. output when used in the P.A. stage of a transmitter with normal voltages. It was also noted that with anode current flowing there was a patch of faint blue glow on the surface of the glass bulb, which appeared to spread very faintly within the bulb. This disappeared when anode current was reduced to near zero by any means.

In an attempt to restore the filament emission the filament was "flashed" at 16.5 volts A.C. for about 7 seconds; the normal filament voltage being 7.5. It was then run at 8.5 volts for 8 minutes, and then at 8 volts for a further 30 minutes. On test the anode current could now easily be made to exceed 90 mA. When placed in the transmitter and suitably biased, it was run at its former normal input of 50 mA. at 500 volts on 28 Mc and gave a normal output. The transmitter was left switched on, and after about five minutes the anode current began to decrease, the circuit being switched off when it had fallen to 30 mA.

In a second attempt at re-activation, the filament was flashed as before. But the baking process was too prolonged for 60 minutes at 8 volts. On test the valve behaved much as before, although the experiment was stopped when the anode current had fallen to 35 mA. It was noted in both tests that the blue glow effect persisted throughout.

These two attempts at re-activation seemed to show that the degree of vacuum had been so much impaired previously that the filament surface was being "poisoned" by the residual gas. (Some valve filaments are now carbonised to reduce this effect.) Gas may be released if the anode is overheated or the grid over-driven.

The filament was then flashed for the third time

and again baked for 45 minutes. On rapid test the emission was in excess of 90 mA. Since the valve contained a small amount of "getter," in the form of a silvery patch on the bulb, it was thought that the degree of vacuum could be improved by suitable treatment.

A getter acts in several ways in its task of reducing the gas content of a valve. Chiefly it is able to combine chemically with molecules of the residual gas and, if the vapour pressure of the getter is very low, a high degree of vacuum can be secured. This chemical combination is promoted by vaporising the getter inside the bulb, by induced eddy currents, the residue condensing on the cooler parts of the bulb. However, the process may continue for a long time by the getter adsorbing further molecules of gas. (See *Physics of Electron Tubes*, by Koller, McGraw-Hill.)

With these facts in mind, an attempt was made to improve the vacuum by re-vaporising the getter. To effect this, the valve was placed over a bunsen flame so that that portion of the glass on which the getter had condensed could be strongly heated. The getter was not easy to vaporise as with some valves, but eventually the rest of the bulb showed a slight darkening, as vaporisation took place.

Care must be taken not to soften the glass or the inevitable will happen!!!

The valve was then placed in a transmitter operating on 28Mc and the anode current under load brought up to 95 mA. at 700 volts. The normal rating was 750 volts at 75 mA. The transmitter was left on at this load for ten minutes without the slightest sign of valve deterioration whilst it was noted that the blue glow effect was no longer present, although the anode was showing dull red under the overload. The valve was then operated at this input on keyed morse for over a fortnight of intermittent operation and behaved excellently in every way. On being restored to the original user, it was used in the transmitter in which it had failed and after two months' operation at the identical power input used before the failure, it was reported as normal. Subsequent enquiries showed that it continued to give long and useful service.

Valve No. 2.—This was handed over with the complaint that the maximum anode current was 37 mA. under any conditions of drive, bias, or H.T. voltage up to a maximum of 500. The filament voltage was found to be correct, after which the filament was flashed and baked as before. The maximum anode current rose to over 100 mA. on momentary test, although the faint blue glow effect was present as in the previous example. The getter was then treated precisely as before, after which the valve was operated on 28 Mc in the test transmitter at 700 volts at 80 mA. and was found normal. It was then restored to the owner, who used it for over a year when it was still doing normal duty.

Valve No. 3.—This was sent with the usual complaint that the emission had "gone." On test this was found to be only 25 mA. and blue glow was

(Continued on page 124.)

Book Reviews

PRINCIPLES OF TELEVISION ENGINEERING. By Donald G. Fink. Published by McGraw-Hill. Price 33s.

This comprehensive practical engineering textbook comes from the pen of the Editor of the well-known American Journal *Electronics*. It probably represents the most complete account of the underlying theoretical principles and the engineering practice of television that has so far been published.

There is a refreshing absence of detailed description of systems of historical interest only, which have appeared so liberally in many books published in this country. Yet the approach to the modern practice is logical and clear. The work cannot be classed as elementary and yet the mathematics is nowhere beyond the standard normally required in A.C. calculations, while the physical explanations of such intricate devices as iconoscopes and orthiconoscopes are extremely lucid.

The book opens with an introductory chapter dealing with the basic principles of a television system and is followed by a dissertation upon image analysis and scanning methods. Reasons for the use of interlaced scanning and the choice of the number of scanning lines in the present American standard transmissions are discussed.

The chapter which follows on television camera action is perhaps one of the most interesting, in that it gives a more complete account of the functioning of camera "tubes" than has previously appeared in any textbook. The image dissector tube, the standard and image iconoscopes and the orthiconoscope are all described in detail and their performances compared. In this connection it is of interest to note that the author states that at the time of writing (January 1940), no experience of the image iconoscope in actual broadcasting had been obtained. The British version of this device, described under the name of "Super-Emission," by McGee and Lubszinski in a paper before the I.E.E. in October, 1938, was used by the B.B.C. for public transmissions in 1938. It is unfortunate that no reference is made to this British work, although references are given to other papers on the British television service.

In the section on synchronisation the difference between the American system with negative modulation and the British system with positive modulation is to be noted. Although the details may differ the basic principles remain unchanged.

A chapter entitled the "Video Signal," deals with Fourier analysis and the effects of amplitude and phase distortion upon television signals. The television engineer tends to express distortion in terms of change of wave-shape of the various pulses used in video signals rather than by defining the amount of frequency and harmonic distortion in the circuit. The question of phase distortion, which, apart from long cables, is of little interest to the audio frequency engineer, becomes of paramount importance in television.

The treatment of amplifier circuits for television circuits can be regarded as a specialised treatment of a known art in that basically such amplifiers resemble those used in other communication circuits, but the care with which the above mentioned phase distortion must be avoided and difficulties met with in obtaining satisfactory amplification over the

extremely wide frequency bands employed, are dealt with in great detail.

It is to be regretted that the subject of cable transmission and the use of radio repeating links is dismissed so summarily. The frequent "outside" broadcasts in this country up to the commencement of the war involved the very successful use of both these methods, singly and combined, and it would have been interesting to have been given details of American methods in this field of television broadcasting.

The design of television transmitters and aerial systems quite rightly occupies a large section of the book. That the technique of U.H.F. power generation is not so fully described as it might have been is perhaps forgivable owing to the fact that such technique is no longer a monopoly of television.

With regard to the account of the scanning methods employed for film transmission in the U.S.A. the reader cannot fail to observe how fortunate we are in this country in having a standard A.C. frequency of 50 c.p.s. which is so close to twice the standard cinema picture frequency of 24 per second.

The book appears to be very free from errors and is produced in the usual immaculate style which is always associated with this publisher's productions. It is quite safe to say that it will remain the standard textbook of the television engineer for some time to come.

H. A. M. C.

THE SUPERHET MANUAL. By F. J. Camm. Published by George Newnes, Ltd. Price 5s. nett.

Devoted exclusively to modern superheterodyne receivers this latest *George Newnes* publication will be found of especial value to those members who are preparing to enter one of the Radio Branches of H.M. Forces. It will also have a wide appeal for service engineers and students, to say nothing of the many radio amateurs who are finding that the war is providing an unexpected opportunity for rubbing up theory.

The author, in presenting his case, devotes an extensive opening chapter to a discussion of fundamental principles, before proceeding to deal with Selectivity Problems and Valves. Having cleared the path for his main attack, he describes the Principle of the Superhet, and General Design features. Aerial Design, Variable Selectivity, Noise Suppression, Automatic Volume Expander, Tone Control, and Servicing (by means of a C.R. Tube) are further chapters in this gold mine of information.

The text runs to some 130-odd pages, illustrated by 90 well-executed line drawings.

It would be difficult to criticise such an invaluable book but we look forward to seeing a reference in the next edition to Crystal Band-Pass Filters, which have recently come to be recognised as *le dernier mot* in all modern amateur communication receivers. J. C.

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COSTS MONEY AND WASTES
TIME AT HEADQUARTERS
PLEASE PAY YOUR SUBSCRIPTION
PROMPTLY WHEN DUE**

EXPERIMENTAL SECTION

Manager: A. M. H. FERGUS (G2ZC)

THE question is often asked, "What can we do now that our transmitting activities have been suspended?" To the keen amateur there are a hundred answers, but we will content ourselves with just two. First, we contend that an amateur who still has the time, and possesses the necessary facilities, should spare no effort in improving his measuring gear whether it be for low voltages or radio frequencies. Second, we contend that every amateur, no matter where he finds himself, should be doing all in his power to improve his technical knowledge.

Considering point one for a moment, the Editorial staff, appreciative of the need for sound advice in connection with measuring gear, have plans made to give readers informative articles during the next few months ranging from the description of a very modern frequency meter to a new idea in capacity-resistance bridges. Such material will, we believe, prove of considerable value to Experimental Section members, who can never hope to achieve accurate observations without the employment of accurate test gear.

Our second point needs very little emphasis. Living, as we do, in an age where radio plays an increasingly important part, it behoves us, as members of the premier amateur organisation in Great Britain, to keep abreast of technical development. By carefully planning our choice of literature, by sharing with others that which we do obtain, and by indulging on every convenient occasion in the art of discussion, we shall succeed in storing up for future needs a solid background of facts.

The facilities provided by the Society, whereby subscriptions to the A.R.R.L. and "Radio" can be accepted, coupled with the invaluable material available in *The Wireless Engineer*, *The Wireless World*, *Electronics and Television* and *Short Wave World*, the *Proceedings of the I.E.E.*, and other publications, should enable everyone to keep fit for the task ahead—the building up of a technical organisation second to none in the British Empire.

The R.S.G.B. will not let us down—let us see to it that we do not fail the R.S.G.B. G2ZC.

Aerial Group

The W3EDP Aerial.

In response to a suggestion made by GI3JP, we give herewith brief details of an interesting single-wire aerial which was designed some years ago by Mr. Siegal, W3EDP. The information is based on data published in the February and December, 1936, issues of this Journal, and contributed by Yardley Beers, W3AWH, and G. McLean Wilford, G2WD.

The aerial, which was developed as the result of experiment rather than theory, comprises an 84-ft. top with a counterpoise for 3.5, 7 and 14 Mc. operation, and without a counterpoise for 28 Mc. operation.

Initial tests were made on 7 Mc. with a 100-ft. length, and results carefully noted. The top was then reduced 4 ft. at a time until all reasonable lengths had been tried. Allowance was made for changing radio conditions.

Similar methods were used to find the best length for the counterpoise, and ultimately the following data was produced:—

3.5 and 7 Mc.	= 17 ft.
14 Mc.	= 6½ ft.
28 Mc.	= Nil.

The W3EDP is inductively coupled to the final P.A. by means of a parallel tuned tank circuit for all bands. This circuit is arranged to give variable coupling with the final P.A. coil so that it can be adjusted for maximum efficiency. The designer found that "low C" in the aerial circuit gave by far the highest efficiency, "high C" causing a high circulating current with negative results. The suggested capacity for the condenser in parallel with the aerial coil is .00025 µF, while coupling coil sizes are as follows:—

3.5 Mc.	... 21 turns 14 or 16 s.w.g. enamel,	2 in. diam. (turns spaced wire diameter).
7 Mc.	... 7 turns do.	
14 Mc.	... 5 turns do.	
28 Mc.	... 3 turns 14 or 16 s.w.g. enamel,	2 in. diam. (spaced about ¼ in. between turns).

These sizes are suitable for single-ended and push-pull P.A.'s. The aerial coil may be placed at one end of the push-pull P.A. tank coil.

The top length is measured from one side of the aerial coil, and the counterpoise from the other side. The top can be bent to suit available space, but it is important that the counterpoise shall be at right angles to the aerial.

Tests carried out last year by the present writer proved this aerial to be very efficient, and, as stated by the designer, it was found to be omnidirectional. The aerial in question ran due North-South for 60 ft., then entered the shack at an angle of 30° for the remaining 24 ft. The counterpoise was taken back into the operating room on stand-off insulators.

Using an input of a little over 9 watts, contacts on 14 Mc. were made with LU, PY, W, VE, ZS, and VU. On 7 Mc. contacts were made with consistently good reports, while the signal locally was very much reduced. GM3OM.

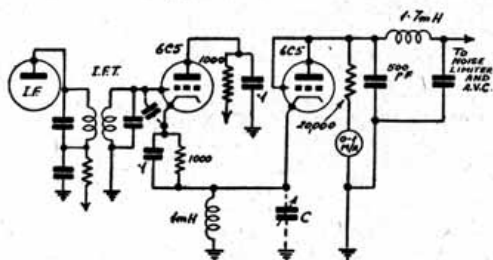
Receiver Group

The Group has been merged into one unit and the first Letter Budget to be circulated has been an outstanding success, returning "home" with no less than 57 pages. Members who are contributing are asked for their forbearance as regards the delay in sending out the letter budget on its second round, because the work entailed in joining together the information is very considerable.

An interesting detector circuit has been mentioned by H. N. Gant (BRS3759) and is shown in the diagram. It is claimed that the advantages of such a circuit are high input resistance, giving reduced damping on the preceding I.F. transformer, with low distortion. It is also capable of dealing with very high modulation percentages without introduction of distortion due to disparity of the A.C. and D.C. loads. Regeneration can be added by

the insertion of the variable condenser C if this is required.

In the receiver embodying this circuit the signal level is of the order of 10 volts. A 20,000 ohms resistance and a 0/1 mA. meter inserted in series across the diode, permits the voltage of the signal to be read directly at the detector.



Detector Circuit with high input impedance

Two points must, however, be watched when using the circuit:—

(1) In the case of a receiver with considerable gain, *i.e.* where the signal level at the detector is about 10 volts, the BFO injection must be made at the grid of the first 6C5, the injection being too small if made at the diode cathode.

(2) The usual types of noise limiter connected to the detector will not work because the circuit to be shorted has too low an impedance for effective results using an ordinary diode. The Griffin type of series limiter, as described in recent issues of "QST," works quite well and has the advantage of variable threshold.

When regeneration is used, it is found advantageous to connect a small condenser of some 5 to 10 μ F. from the grid to cathode of the 6C5 and to use a metal valve. The condenser C should be 100 μ F. and the I.F. transformer feeding the 6C5 must be very loosely coupled, or the application of regeneration will cause frequency drift. If the above points are watched, the control is very smooth and selectivity can be made extremely good, although not as good as when employing a crystal filter.

G5HF.

Cosmic Notes

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

THE data in these notes is chiefly for the period July 28 to August 17.

Solar Data

Sunspots were numerous during the second half of the period, the U.S. Naval Observatory recording 167 individual spots in seven groups on August 12. Solar data from Japan is scarce for this month, presumably due to cloudy weather.

Magnetic Elements

Moderate disturbances were recorded on August 3 and 9. The poor reception of transatlantic signals on these days was noted in last month's notes. The maximum K-index on these two dates was 4.5 in each case.

Radio Conditions

The following are the F2 layer critical frequencies (extraordinary ray) reported from Washington, D.C., at midday local time: July 31, 6,100 kc.; August 7, 6,300 kc.; August 14, 7,200 kc.

Observations on WGEA were somewhat irregular last month, but from reports received it appears that the opening days of September were below normal.

Contemporary Literature

By L. FRYER (G2FR)

THE ANODE-TANK-CIRCUIT MAGNETRON. Ernest G. Linder, Non-member I.R.E. Proceedings I.R.E., November 1939.

A new type of magnetron is described in which the split cylindrical anode is made approximately $\frac{1}{4}$ wave in length, the two segments being short-circuited at one end. The anode resonates and acts as a tank circuit. Thus difficulties due to inter-electrode capacitance and tube lead inductance are circumvented and a much greater heat radiating area is provided.

An output of 20 watts at 3,750 Mc. (8 centimetres wavelength) and an efficiency of 22 per cent. is obtainable. The theory of the anode tank circuit is developed, and expressions are given for wavelength, internal resistance, and logarithmic decrement.

MEASUREMENTS OF CURRENTS AND VOLTAGES DOWN TO A WAVELENGTH OF 20 CENTIMETRES. M. J. O. Strutt, Non-member I.R.E., and K. S. Knol, Non-member I.R.E. Proc. I.R.E. December, 1939.

The more common circuits in which diode voltmeters are used are discussed in Section 1. The properties of these circuits are analysed on the basis of the diode characteristics, with special reference to the input impedance. In Section 2, two devices are described for current measurements, a hot-wire air-expansion device and thermocouples of special construction. Consideration of the requirements in the calibration of these devices in the short-wave range is followed by a lay-out which is described in detail, and with which calibrations down to a 20-centimetre wavelength could be carried out with an accuracy of within 1 per cent.; one type of thermocouple proved exceptionally suitable for absolute current measurements.

In Section 3, it is shown how a diode voltmeter can be calibrated in the short-wave range with the calibrated current-measuring devices. Of the two arrangements described, one can be used down to approximately three metres and the other down to a wavelength of 75 centimetres. Diode voltmeters with diode of special design, exhibit at this wavelength a maximum deviation of 2 per cent. from the calibrated values obtained with longer waves.

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TEMPERATURE COMPENSATION TO AVOID RECEIVER DRIFT

THERE must be many readers who, like the writer, have been worried in regard to the rather serious frequency drift experienced with the National NC101X receiver. Tests of an exhaustive nature show this drift to exceed 40 dial divisions after a run of one hour, a state of affairs which is somewhat disturbing at the best of times.

Users of this type of receiver will be interested to hear of some tests carried out by W1KHE and W9HIF and reported upon in the "Hints and Kinks" column of *QST* (September 1940 issue).

The collaborators confirm that the drift varies under normal circumstances from 20 to 45 dial divisions, depending upon room temperature at the time the receiver is switched on.

They started their tests by connecting a *Centralab* 10 μF negative-coefficient condenser (type 913N) between earth and the grid leak of the R.F. oscillator, placing the condenser very close to the top of the 6J7. To compensate for the added capacity, the capacity of the air trimmer in the R.F. oscillator coil compartment was reduced correspondingly. Using a temperature controlled oscillator for checking the drift, it was found that the receivers so modified ran off calibration by only 2 to 3 dial divisions after a cold start and that within 5 to 8 minutes the calibration returned to the original and remained steady to within a dial division or two for periods of several hours.

Not content with this marked success the mixer and R.F. circuits were similarly treated and a further improvement in stability was immediately apparent. The compensating action was speeded up and from a cold start, the calibration deviated only about 1 to 1½ dial divisions, returning to the "nose" within 3 minutes. The more accurate maintenance of circuit alignment brought with it a noticeable improvement in receiver gain.

The third and final experiment consisted in the replacement of metal valves in the R.F. circuits,

with a set of three of the new *Hytron* GTX series. Some slight changes were necessary to suspend the compensating condensers over the glass valves which are taller than the metal shields. The change resulted in a further improvement in receiver stability. With the new valves it was found necessary to readjust the compensation, and this was achieved by reducing the compensating capacity in each circuit from 10 μF to 5 μF . As such small values are not generally available a pair of 10 μF units were connected in series.

By this time both operators had become supercritical in the matter of frequency drift. In observations over long periods of operation they noticed a slow drift upward in frequency which occurred after a run of 10-12 hours. Although this was only in the order of a dial division an hour, they decided to eliminate it if possible. After a lengthy investigation they came to the conclusion that this secondary drift was caused by a lagging rise in temperature in the coil chamber. To compensate for this, a negative coefficient condenser of about 7 μF (25 μF and 10 μF in series), was connected directly across the air trimmer in the coil compartment with the condenser mounted close against the coil with a dab of Duco cement. This completed the job and to quote W9HIF "I've become so used to being able to spot a certain signal, day in, day out, at the zero beat point on the dial; and after five minutes of warm up, always finding my 100 kc. frequency meter signal spotted at the same old dial division of the NC101X, that I take it all for granted now, and only, when I get hold of some other fellow's receiver, do I notice how unstable the best of them may be."

As negative-coefficient condensers are available in Great Britain we shall look forward to hearing from any readers who achieve success along the lines suggested above.

J. C.

The 28 Mc. Band

By NELLY CORRY (G2YL)

PRACTICALLY nothing was reported during the first half of last month, apart from a few commercial harmonics, but on and after September 19 the band re-opened for DX and a large number of western Hemisphere signals were heard.

As usual, nothing was heard from Asia, Africa, or Oceania, unless KC4USC can be included in the latter continent. This station, heard at 19.22 G.M.T. on September 20, was included in a very comprehensive log sent by G2RC and an SWL friend who find time for regular listening in spite of R.A.F. duties.

In Europe it is unlikely that any amateurs are now active on the band, and the only signals reported were commercial harmonics, viz., EAX, FYM, FYV, FZM, HAS2, IRJ and ODD.

Few amateur stations from South America were reported, but LSA on 31.5 Mc. was heard by G4MR, BRS3003 or BRS3825 on every day except September 1, 7, 8, 9 and 15. The same three

stations heard PY7VB on September 17, 20, 21 and 22, and BRS3003 also logged LU7AG and LU8AB on September 11 and 17 respectively Central American and West Indies stations were heard by G2RC, G5LT, 2BVU, BRS3003 and BRS3825 on August 31, September 19, 20 and 21, viz., NY4AD, TI2FG (c.w.), and K4's DIF, DJD, EIL, GTH, KB and YY.

W signals were logged daily from September 18 to 26, and were particularly good on the 20th, when stations in all districts were heard, many of them at excellent strength. G2RC reported W7 on September 19 and 20, and W6's September 18 to 21 inclusive. G4MR also heard a few W6 phones on the 24th, but c.w. stations in any district were almost non-existent.

Many thanks are due to G2RC, G4MR, 2BVU, BRS3003, BRS3821 and BRS3825 for their reports.

Editorial Note.—Just prior to preparing this report "Redholm" received Nazi attention. We are happy to record that G2YL and family escaped, which is more than can be said for the garden. As a VE soldier said when he saw the crater, "Boy!! Oh! Boy! were they lucky!"

THE ULTRA-HIGH FREQUENCIES

By CONSTANCE HALL (G8LY)

Home News

"HERE we are again!" thanks to G3YY, 2DXS, BRS1151 and 3766. BRS1151, who has the usual "growl" of nothing to report, managed short periods of listening, on 56 Mc., from August 29 to September 15; no signals were heard, background noise being normal except on September 6 at 12.55, 18.50 and 19.30. On September 11 it was normal at 16.40, above normal at 19.35, and back to normal at 20.15. September 20, above normal at 12.20, normal at 20.00 (G.M.T.). He has noticed that often the "above normal" periods coincide with sunset, and he wonders if it *might* be due to "man-made static"; but as he uses a battery-operated receiver, totally enclosed in a metal box, it seems unlikely, also because "back to normal" periods sometimes follow quite soon.

BRS1151 also draws attention to reports in *Wireless World* concerning "Dellinger Type Ionosphere Disturbances" (D.T.I.D.). On May 14 the effects seemed confined to S. American stations, but the one on May 17 affected most stations.

On this day G3YY reported a commercial harmonic on 54 Mc., whilst D.T.I.D. were logged on June 7, 8 and 13. He heard telephony on 56 Mc. on June 7, and on June 8 five signals between 50 Mc. and 54 Mc. BRS1151 reported IRX up to 19.45 on June 12, whilst another D.T.I.D. was reported as taking place on August 15, and BRS1151 reported background noise above normal on August 14. The latter concludes with the remark that "this may all be coincidence, but, as the monkey said when a time-bomb fell near by, there might be something in it!"

BRS3766 has reported because he is interested in what is becoming known as "G3YY's Moon Reflection" theory. He has made many tests and observations in this connection, but not yet on 56 Mc. On the high frequencies he has noticed good conditions coinciding with each full moon, the best being that of August, and gives details of his observations. He also remarks that it may be coincidence and not fact, but, as we have frequently stated, unless everyone reports what may only be coincidences we can prove nothing, and here is a perfectly good space waiting to report them. Any offers?

BRS3766, like many others, seems worried because "real" DX takes place in the U.S.A. on the Ultra-Highs, and not over here. Surely this is *only* due to the fact that they are fortunate in having a large expanse of land, populated by thousands of radio amateurs, whereas we are surrounded by water and a few hundred amateurs, with, therefore, less stations at suitable distances to contend with varying skip-distances.

G3YY thanks BRS1151 for his interest in his query concerning time lag of harmonics. He himself feels that the necessary apparatus will have to be very accurate and highly complicated. Anyway, we will see who is right—next spring!

Reflection of U.H.F. by the Moon

2DXS, in giving his ideas in answer to "G3YY's Moon Reflection" query, points out that he referred

to the possibility of reflection of U.H.F. by the moon in a letter published in THE T. & R. BULLETIN dated June, 1939. He writes: "Concurrent belief by others in the possibility was shown by an experiment made in the U.S.A. shortly afterwards. The experiment took advantage of the unusual propinquity of Mars." 2DXS has no record of date, frequency or call sign, but the power was 50 kW., and his own receiver, employing a high-angle receptor, was silent. Thanks to the courtesy, however, of Mr. Jones, F.R.A.S. (City Observatory, Cardiff), the minimum distance of Mars has been fixed as 36,034,000 miles, and the date given as July 27, 1939. "To regard the failure of the experiment as conclusive or to view the distance as excessive is to ignore the possibility that radiation in free space (outside the earth's atmosphere) may be less dependent on distance, and only affected by cosmic radiation." It is admitted that high-angle radiation at U.H.F. can pierce the various reflecting layers. In so doing, refraction is suffered at each layer. Even fanwise radiation, therefore, may miss the objective. If the objective is struck, reflection does not necessarily return the radiation to earth. If it does, the reflecting layers have to be contacted once again by incidence near to normal, in order to avoid further reflection. Ignoring all these difficulties, only one problem remains. Has the radiation suffered by its journey? If so, the limits of receiver sensitivity present a temporary obstacle. (So what! Editor.)

American News

Attention is drawn in QST for August to the fact that July had once again been the month to produce the one big night for U.H.F. DX. Every year during late July there seems to be a night when widespread ionisation occurs in just the right places to permit multi-hop work on 56 Mc. over extreme distances. American amateurs experienced such a night on July 23 this year, a night which seems destined to take its place at the top of a list of memorable nights on this band, more DX being accomplished over more territory than in any similar period in 56 Mc. history.

Regarding the 112 Mc. record of 255 miles reported in these notes last month, details now published show that this was no "fortunate accident," but the result of efficient equipment and a carefully prepared attempt to set up a record. W6KIN was operating at 4,336 ft., using an HK24 oscillator, R.C. superhet and a beam with four half-waves in phase with reflectors, power being supplied from a 500-watt gas engine generator. W6BJI, operating from a plane, used his home rig of 6V6G triode, 7 Mc. crystal, 6V6GT doubler, 6L6GX doubler and HK24 doubler final, power supply being a vibrator. At 5,000 ft. S9 two-way contact was established, lasting up to a distance of 220 miles from 6KIN. Later climbing to 9,700 ft., contact was maintained until they were 255 miles apart. After this distance signals from 6KIN were lost in the receiver noise in the plane, but 6BJI continued to transmit and was still audible, S5, at 265 miles!

BRITISH ISLES NOTES AND NEWS

DISTRICT 1 (North Western)

THE District Scribe (G6CX) is pleased to find that the recent Editorial concerning District Notes has borne a little fruit in this District and it is hoped that the following reports will encourage other T.R.'s to make an effort to send in some news from time to time.

Burnley.—G3IY in the R.A.F. and 8UA in the Pay Corps send their best wishes to all local members. 3KT is now busy radio servicing and 5ZN, who is engaged in A.R.P. service, will soon be with the R.A.F.

Cumberland.—2AYH writing from Carlisle reports that G3HJ (of that town) has joined the R.A.F. 2AYH is doing a little listening, some woodwork and a spot of courting! 6WR, 2AUM and 2DWG are still holding the fort in Whitehaven. 8RZ (who reports these activities) was in London on September 6, where he had the pleasure of meeting 3VV of Blackburn. 3BW is still somewhere with the Navy and to him and 6VZ we all send our best wishes.

Bury.—In the absence of the T.R. for Bury—Mr. T. C. Platt, G2GA, who has taken up a post as civilian instructor with the R.A.F.—Mr. Turner, 8NL, has submitted the following notes.

The last meeting held at the Elsinor Café, was in the nature of a farewell party, G2GA leaving the following day to take up duty as stated above, whilst 3YF is expecting to join the R.A.F. as a radio mechanic any day now. The following were welcome visitors: G3RI, 6GA, 6XG and VE3ARP; the rest of the party consisted of G3ZN, 8NF, 8NL, BRS3682 and 3693. The opportunity was taken to compare notes with the visitors about pre-war activities and altogether it was a most enjoyable evening. Since our numbers are now considerably depleted, 3WG serving as a Post Office operator many miles away, 8QS with the R.A. "Somewhere in England," and several other members serving in minor capacities, it is questionable whether regular monthly meetings will be possible in future. 8NL will be very pleased, however, to arrange for amateurs visiting Bury to meet the locals who still remain at home if they will either write to him at 4 Moreton Avenue, Whitefield, Manchester, or telephone.

Blackpool.—Our T.R., Mr. H. Fenton, G8GG, having been stationed near home recently, has had a chance to look up the locals. His report follows: G6VQ expects to leave for active service any day, 4IL and 8NU are still showing interest in U.H.F. 5MS, now a Sergeant in the R.A.F., is on a very interesting job down south. 8AK is instructing but hopes to return to the "ham game" soon. 4PY is due home for long leave. 2GA from Bury is employed in the town, as is believed to be 3DJ from Cleveleys.

G8GG has been attempting to organise a local R.S.G.B. meeting but without success. Members located in the neighbourhood of his town should write to him, c/o 25 Abbey Road, Blackpool.

G6CX.

DISTRICT 2 (North Eastern)

In the continued absence of news from our D.R. or the previous Scribe, we are pleased to publish the following notes from Mr. H. Beadle, G8UO, T.R. for Keighley, and others.

Keighley Area.—G8SJ who is an instructor at a Government Training Centre has recently constructed a super bug key, 3HA has joined the Home Guards and as a consequence has little free time, 2SU is training the local A.D.C.C. Squadron. 4GJ is in the Merchant Navy as operator, 8UO is busy copying commercials with a view to increasing his receiving speed. 2DM, 4JB and 6BX are believed to be following their civilian occupations.

Harrogate.—With the arrival in Harrogate of G2MI it is hoped to start up local meetings. Members in and around that town are asked to communicate with Mr. Milne at 1 Kent Drive, Harrogate.

York.—It is understood that M.S.M. Charlie Kirk, G4CL, ex ZB2A and T. R. Theakston, 2DBK, are endeavouring to organise local gatherings in the county town. A line to 2DBK at "Westwood," Heslington Lane, Fulford, will enable them to get busy.

We feel sure that every member in the District will join us in the hope that it will not be long before Capt. E. Shackleton, G6SN, of Ilkley, is released from Nazi hands. He was captured with the 51st Division at St. Valerie in May.

Special Note to Service Members

There are many service members in the county of broad acres. For obvious reasons we cannot give locations, but we would urge all those who wish to get in touch with fellow amateurs to write either to G2MI or G8UO, 13 Chandos Street, Keighley.

G6CL.

DISTRICT 3 (West Midlands)

Wolverhampton.—In the absence of news from the T.R., Mr. F. Wyr, G8RY, sends information concerning local members. G5IQ and 8FY are on full-time A.F.S. duties. 8BH continues to solve aerial problems, 2OG is in the R.A.F. and located near his home. 8BP is believed to be still in the R.E.'s but confirmation of this would be appreciated. 8RU (one of the "three musketeers") is doing civilian radio servicing, whilst 8RY is now located near Bedford and would like to hear from members in that area. He can be reached at "Windyridge," Highfield Road, Oakley, Bedford.

G8RY is, we understand, willing to prepare monthly notes covering his home town. Communications should be sent to 315 Stafford Road, Oxley, Wolverhampton.

G5VM.

DISTRICT 4 (East Midlands)

Mansfield.—The August meeting which was well attended was characterised by the attendance of G8NS, 8HX, 8OT and 2DTQ home on leave. The subsequent rag chew developed into an exchange of experiences. Apparently 8NS is so confident of an early return of licences that he is already designing his new station! September brought a further

reduction in civilian members as 2APT has been accepted as a radio mechanic. Several local amateurs attended an interview at the Admiralty and found a miniature Convention being held on the landing. The acting T.R., G8MR would very much like to see a return of support from members who have, in the past, been the life blood of the Society. What about it O.T.'s?

Nottingham—The T.R. still complains of lack of reports from members. If you are one of the "sinners" make sure to send him a line in time for next month's notes. Lots of us are wondering what you are doing and where you are now.

Leicester.—Friday meetings still continue to find the old gang able to draw up on their store of memories of the days when a key was part of their daily life. A recent surprise visitor was VS2AR who is back in England on leave, he returns shortly taking with him a wife. Congratulations and the best of luck O.M. G6IM reported for duty as an R.M. in the R.A.F. on October 1, whilst 2HBG has had five days leave on completion of his course.

Forthcoming Events.

- | | |
|---------|--|
| Oct. 20 | Scotland "A" District, 2.45 p.m. in the Y.M.C.A. Residential Club, 100 Bothwell Street, Glasgow. |
| Nov. 10 | Third R.A.F. gathering, 2.30 p.m. in N.A.A.F.I. Canteen, No. 2 Wing, No. 2 E. and W. School. |
| " 16 | Northern Ireland District, 5.30 p.m. at Thompson's Restaurant, Corn Market, Belfast. |
| " 17 | District 12, 3 p.m. at G6CL, 16 Ashridge Gardens, N.13. |

S. Archer (2DWZ) is in Ward 6, City General Hospital, Leicester, after having a very gruelling time at Dunkirk. His feet are in bad shape, but his hands are O.K. for replying to letters, he asks particularly about Nottingham members.

Many requests have been made for items to include in these Notes and to those of you who derive some pleasure in reading of your friends the D.R. would say in all seriousness, "what do you do about it? maybe there are those who like to read of you!" A postcard a few days before the end of the month is all that is required, make it part of your regular routine and address it to 90 Romway Road, Leicester. Cheerio es 73. G2R1.

DISTRICT 6 (South Western)

The D.R. has received two short reports, one from Plymouth and the other from N. Devon. This is all very encouraging, and we hope that these areas, and all others, will provide material regularly in future. Thank you, Plymouth and N. Devon!

Plymouth.—The T.R., G3TX, states that informal meetings are still being held at his QRA on Saturday evenings. 2AGL and BRS3182 are considered regular visitors, and there are usually one or two of the local members home on leave. 8HF, another regular, has recently built a 100 and 1,000 kc. oscillator. Plymouth members send 73 to G6RF,

8PN, and 2HLS. They would like to get into touch with 2DYM if he is still in the area.

N. Devon.—Things are very quiet here, but most members find something in the radio direction to keep them interested. After all the fuss is over, most of us should have really good receivers! The T.R., G3BO, reports that G3AM is the first in the group to join up, and is now an A.C.2 in the R.A.F.

Torquay.—The D.R. has received visits from a few members during the past few weeks. Among these were 2FNY, home on leave with many a tale to tell, 2BMZ prior to joining up in the R.A.F. (Good luck, O.M.); BRS3444 and 3171, also home on leave. The D.R. looks forward to many more such visits. G5SY.

DISTRICT 7 (Southern)

Croydon.—Thanks to the good offices of BRS3003 we are able to publish notes from this area. Local members are asked to send any material suitable for inclusion in these columns to Mr. L. C. Blanchard, 122 St. Andrews Road, Coulsdon. Now that "QRX" has been unavoidably suspended it should be possible to keep 3003 well supplied.

G8TB looking much better after his ordeal over on the other side of the Channel is with the R.A.F. in southern England. Congratulations to 2CRD who is now an LAC. 2FWA has taken up photography. 2FI and 3IG are very busy these days doing jobs of national importance. 3179 has changed from 28 Mc. listening to Signaller in the R.C. of S. 3003 finds 28 Mc. rather quiet.

Guildford and District.—Rumour had it correctly—Spenny, G6NA, was married on September 28. It has now been discovered that Reg. Neale, G6GZ, took a similar step some while ago. Congratulations to both of you. G5WP spends sleepless nights dreaming of the New Rig!

Just a word to No. 7 TR's.—If you did not read last month's Editorial please have a look at it now, there is not much we can add to it except to say that in this case the DR has a little time for District Notes and is only too willing to forward the material to HQ. A little reflection and you cannot fail to see the Notes from your home town would eagerly be read by the chaps in the Services. (Thanks "Rusty."—ED.) G5WP.

DISTRICT 8 (Home Counties)

During the month the D.R. has had welcome visits from a number of Service members stationed in the District. We need hardly add that we shall be pleased to meet any others who may be in the vicinity from time to time. Ring Cambridge 54644.

Cambridge.—G2XV tells us that his friend G2UT, late of Norwich, has had a very pressing invitation for his family to go to W4ECF for the duration—a fine example of ham friendship. 5JO seems to be busier than ever on war work. 5DR, now working for the Air Ministry, has recently returned from GM, and has also been in GW. 2DT has been spotted in the town, but he was travelling too fast to be hailed! 5DQ, now in a Signals section, was recently home on a short leave. Congratulations to 8FF upon his marriage. Among recent visitors to 5BQ were 6BI (Egham), 8NS (Mansfield), and a G3 from Slough, whose call we have unfortunately forgotten, also Norman Druce (BRS2600), of Croydon.

We regret to have to record the passing of Mr. S. Histed—for some time an enthusiastic member and a judge in our local contests.

St. Ives.—G4AZ is shortly changing QRA, but remains in the District. 5RL, who is due to join the R.A.F. is still at home at present. 8ST was recently home on leave, and cycled from Hemingford to say *Au Revoir* before going overseas. (Good luck OM.) 5OV sends 73 to the boys, and will see us "when the war is over."

Peterborough.—G2NJ, who has been unwell, is now progressing favourably. 3DY has no news, and 2UQ has recently had a medical for joining the R.A.F. No news of the twins, 3WW and 3BK this month. G2NJ has also had a visit from 8NS, who was able to give him news of G8ON, a former resident of Peterborough.

Bedford.—Will someone in this area please establish communication? It is now many months since we heard from this part of the District.

DISTRICT 9 (East Anglia)

Well! Everyone has had at least ten days in which to read and digest G6CL's Editorial in the September issue—but no one has sent in even a postcard. Are we therefore to presume you have all joined up? or is the postage too heavy? Anyway, those of you who are still at home please remember that our pals scattered about in H.M. Forces are most anxious to hear how the rest of us are progressing. G5UD is a case in point. He wishes to be remembered to all old friends and he wants to know where everyone has got to. G2XS.

DISTRICT 12 (London North and Hertford)

The first of our "fireside chats" had not taken place when this issue went to press, but we hope all who attended enjoyed the opportunity provided for a "ragchew." The next meeting will be held at G6CL on Sunday, November 17 at 3 p.m. Members from other Districts, and especially those in the Services, will be welcomed. Here is your chance to see how Headquarters is being run under war-time conditions!

One Saturday recently our D.R., together with G6CL and the present writer, met in the congenial surroundings of "Ashridge," Chase Road, Southgate, where G5QF was given an opportunity of seeing the Signals equipment of the Southgate A.D.C.C. Squadron.

Activity reports from members are scarce, but perhaps with the coming of monthly meetings it may be possible to live up to the ideals of last month's Editorial. A postcard to G5FA, 35 Torrington Gardens, N.11, by the 1st of each month will be appreciated. G5FA.

DISTRICT 15 (London West, Middlesex and Buckinghamshire)

Only seven members attended the September meeting but it is anticipated that those who were not there either found that duty prevented them or that the *Bulletin* arrived too late for them to make arrangements. Two of those present were air raid wardens and were apparently so tired that they succumbed to the comfort of the arm-chairs and went to sleep during the meeting. Several letters were read but unfortunately the list has been lost and mention of their calls cannot appear. However,

we remember G3HT, 4FS (who is a service engineer with the Air Ministry), 5ND, 2BRF and BRS3754. To the others we apologise.

We understand that G4OX narrowly escaped a bomb recently. We wonder how many have had their homes damaged and hope that where it might be necessary other members will come forward and offer accommodation. Again we suggest that those who might find themselves in trouble should not hesitate to contact some other local amateur and seek assistance. We know they will get every consideration.

G8DG has gone to Herefordshire, while 6RW has entered the G.P.O. on radio work in connection with the war effort. Many members of the district are engaged daily on work connected with the war and even the D.R. has taken a job at the bench in the hope that he can help in some small measure.

It is regretted that due to circumstances beyond our control, the venue for our monthly meetings is not now available. The D.R. will be pleased to hear from any member who can offer hospitality for future meetings. G6WN.

Scotland

As is now becoming quite customary, news is very scarce, consequently it is exceedingly difficult to make these notes of real interest. We would welcome any news from other districts in Scotland.

"A" District.—There was a better attendance at the September meeting when Mr. David Niven, 2CHN, gave a very interesting talk on a battery superhet receiver. A talk on a 100 kc. frequency substandard will be given at the October meeting by GM6ZV. It is hoped that members will continue to support the monthly meetings throughout the coming winter, which will be held as during last winter on the third Sunday of the month at 2.45 p.m. in the Coffee Room of the Y.M.C.A. Residential Club, 100, Bothwell Street, Glasgow. Once again a cordial invitation is extended to members of the Society, who find themselves in Glasgow and district to come along and attend our meetings.

P/O Harry Jefferies, R.A.F.V.R., wishes to be remembered to all his friends in the district. GM6ZV.

District Notes

To the Editor, THE T. & R. BULLETIN

DEAR SIR,—Having read the Editorial in last month's issue I agree you have a legitimate grouse about District Notes. They get less and less as month succeeds month. Apathy has certainly been prevalent ever since the "great close down." It would seem that now amateur radio is QRT (pro tem) all the friendships made over the air, and by personal contact, are quite forgotten. We can get news of our friends in the services through that fine article "Khaki and Blue," but the only way we can obtain news of fellow amateurs still in civilian life is through District Notes. Surely it is not too much to ask that all such members should drop a card to their T.R., D.R., or Scribe, as the case may be, giving some information on their present activities.

As T.R. for my town I know it was like getting blood from a stone trying to get reports from members in pre-war days, but in war time when we have no contact by radio, reports would be doubly interesting. With a small effort from members,

Continued on Page 124.

K H A K I A N D B L U E

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

"Shack" is safe! After months of suspense, news has now been received that the author of "Workshop Practice," Capt. E. Shackleton, G6SN, R.C. of Signals is a prisoner of war. No details are yet available, but his message read "I am well and well looked after, will send address as soon as possible."

* * *

Friends of 2nd Lieut. E. J. G. Tucker, GI5DX, will be pleased to hear that he returned safely from France last May. He tells us that apart from being made responsible for BCL requirements in the Mess he had to forget about radio and become a cable enthusiast, while with the B.E.F. His section were particularly proud of their efforts in laying three pairs of D8 under a famous French river by row boat and small motor boat. In spite of theory, speech was very good over these submarine lines. GI5DX has recently had the pleasure of meeting Fred Miles, G5ML.

* * *

Friends of Larry Richards, G3YM, will be glad to know that he is now in an O.C.T.U. and doing well. He will be pleased to receive letters *via* his new home QRA, The Cricketers Inn, Epsom Common, Surrey.

* * *

Just before sailing for a distant land L.A.C. Harry Willets, 2FPI, sent us a photograph taken last spring in the Maginot Line. He wishes to convey special greetings to G3AC, 6PO, 2ABF, 2ABT, 2BTO and 2DVO. Letters can be sent *via* his home address, 1 Moorfield Grove, Tonge Moor, Bolton.

* * *

"William the Conqueror" otherwise Sig. Cecil Bradbury, BRS1066, tells us that two old non-member friends of his, R. Stellig, GW4CK, "Romir," Victoria Road, Prestatyn, and C. E. Spillane, *ex* BRS1060, "Woodside," Meliden Road, Prestatyn, will be pleased to see any hams who visit their town. Cecil sends 73 to G5JF, 5YY and BRS3416.



Harry Willets, (2FPI,) one of the "Early Birds," has now left for another overseas destination. This snap was taken in the Maginot Line.

Cpl. E. Wilson, G3OI, R.A.F., whose home is at 5 Ashfield Grove, North Shields, is now in Northern Ireland where he is in touch with Cpl. Halligey, G8PI. G3OI will be glad to hear from any of the old No. 1 E. and W. S. "gang" including G6TV and 8PF.

* * *

Cpl. D. R. Aston, G8DR, who is with the R.A.F. in Perthshire, sends greetings to District 12 members. Letters are welcome and may be forwarded *via* R.S.G.B. or call book QRA.

* * *

L./Bdr. R. Bullock, R.A. (2HHX), of Newlands, Glasgow, writing from "somewhere in Essex" expresses his pleasure at reading news in a recent issue of Sgt. Eadie, GM4JO, Ian McDermid, BRS2689, and Ken Peattie, 2FQG. Ralph sends greetings to his GM friends and says he is yearning for the day when some of the delightful equipment under his ken turns up on the disposal market—shades of 1919!

* * *

G. M. Hindle, BRS3692, writing from The Vicarage, St. Wenn, Bodmin, Cornwall, tells us of his fortunate escape from death when the ship he was serving with as a sea-going radio officer was sunk by the surface raider "Narvik" on July 13. As he naively puts it "I almost figured in the silent key columns and I think the main reason why I didn't go down was because I knew that you were unaware of the whereabouts of your humble member, and I hated the thought of sinking unknelled, unconfined and unknown"!

Among the few belongings he was able to salvage was his Society membership certificate, but this was later seized from him at pistol point by a German officer who promised to return it "when we sign the treaty in London." Being optimistic we have replaced Mr. Hindle's certificate!

* * *

Sig. J. Cleghorn, GM3BZ, who is now stationed in Glasgow is anxious to receive news from G3BA and GM3HX. Letters should be sent *via* his home address 37 Dundee Terrace, Edinburgh.

* * *

Another Signalman, W. Bartholomew, G8CK, of Watford, now located at a seaside resort in Suffolk, makes enquiries about two old friends, G3NR and 8TK. He sends 73 to both and also to all in District 12. He is at present "nursing" a low power rig.—input 1½ kW!

* * *

Writing from Jubbulpore, India, H. G. Baker, VU2BM (R.C. of Signals) tells us that Jack Drudge Coates, VU2FO is now holding a commission in the same Corps and is serving in the Lucknow District.

* * *

We had a telephone call recently from Sgt. Jimmy Watson, G6CT, who has left the R.A.F. station in Staffs., to which he had been attached since the early days of the war. He is now living in the Watford area and hopes to meet all the locals—at the local! Jimmy sends greetings to his ham friends everywhere.

Writing from Fifeshire, L.A.C. Ernie Baker, better known to Kentites as G5OQ, of Tunbridge Wells, tells us of the exciting and adventurous life he has been leading for the past 12 months. For some time he acted as wireless operator on his A.O.C.'s machine besides flying as op. in a service machine. He has 87 flying hours to his credit.

There are several hams at his present station, including G6SJ and G4IB. We believe him when he says, "No radio set is safe from our itching hands, and our hut often is awakened by CQs from the Yanks on 7 Mc."

He pays a tribute to THE BULL. by recording that "Our Signals Officer usually grabs it as soon as anyone leaves it lying about, and so does the Sergeant."

Ernie sends greetings to all old friends, especially to Bert Allen, G2UJ.

One of our newer members, P./O. J. M. S. Adams, BRS3835, writes from an R.A.F. station in Scotland to advise us that several amateurs, including Mr. A. R. Blair, BRS2724, L.A.C. H. J. Miller, 2CVX and Cpl. Beattie, GM8AT, are with him.

We learn that F./Lt. Jack Sutton, GW2NG, is now in Malta and that S./Sgt. Harry Biltcliffe, G5HB, is in the land of the Pyramids. Good luck to you both should you see this note.

Congratulations to R. D. Racine-Jaques, 2CFW, who has been promoted to the rank of F./Lt. R.A.F.V.R., after serving earlier in the war as a Signaller in the 54th Division Signals. He can be reached *via* his home address at The Packhorse Inn, Staines, Middlesex.

Messrs. McMinn, GM3YN, and Morton, G4KZ, have, we understand, been granted commissions as pilot officers from the ranks.

Tel. H. V. Prince, G3UF, writing from H.M.T. "Northern Princess," tells us that whilst listening on 600 metres last winter, he heard the U.S.S. "Tamaroa" working CLP, Cuba, at S5. The "Tamaroa" was in distress many thousands of miles away. American, Canadian, Egyptian and Turkish fixed stations were frequently logged on 600 metres at the same time of year.

A.C.2 J. Payton, G2JB, who is at present at an R.A.F. station in East Anglia, finds himself billeted in a house with G3KI and 4BY. G4HH and GM8RJ are among the other radio mechanics at the station. Paul Carment, G5WW, who is still a civvy, had to show his pass when G2JB was doing a spot of guard duty!

G3OJ was visited recently and although the house was found empty, a large collection of junk and old wireless books was discovered in a deplorable state in a shed at the rear of the house.

All the foregoing wish to be remembered to old friends.

W. D. Johnson, G8NS, writing from an R.A.F. station in Hunts., informs us that G6BI and 2CQJ are associated with him in his present duties, whilst G4HW and 4IY (R.C. of Signals) have been located. They have also contacted G5OV, who is a civilian R.M. on their station, and recently had the pleasure

of visiting Stan Granfield, G5BQ (our Home Counties D.R.), 4AZ and 8ST.

G8NS asks who is the ham-cum-gardener who is now using his 8JK feeders for a lawn edging?

Harold Collard, 2CVA, writing from another R.A.F. station, this time in Yorkshire, reports having the company of G3VG and 6KN. Until recently the party was even stronger with ham representation but G6AZ, 6YR and 5GZ have left for another destination. Members who know 2CVA will be distressed to hear that his home has been bombed, necessitating a removal to Buckinghamshire.

He wishes to be associated with the sympathies officially extended to the parents of John Buchan, G4QA, whose death is recorded below.

A.C.2 H. G. Chandler, G6BP, now located in Lancashire, sends greetings to all who worked his station. He can be reached *via* his new home QRA, 35 Highfield Gardens, Aldershot, Hants.

V. J. Bartlett, GW5BI, who is now in the R.C. of S. and stationed at a famous Yorkshire camp, is searching for fellow hams. He has so far located one member—G4GD, of Twickenham. Both wish to be remembered to old friends.

Silent Keys

JOHN BUCHAN (G4QA), R.A.F.V.R.

It is with deep regret that we record the death of A.C.1 John Buchan, G4QA, late of Westcliff. Although a non-member of the Society, G4QA was well known to many C.W.R. members who were associated with him in France.

We understand Mr. Buchan succumbed to injuries received when the *Lancastria* was sunk off St. Nazaire.

We extend our sympathies to his relatives and friends. J. C.

F/LT. E. J. ALLWAY (G5AU) R.A.F.V.R.

We deeply regret to announce the death, due to a flying accident early in September, of Flight-Lieut. E. J. Allway, G5AU, whose home was at Epsom.

Mr. Allway had a great deal to do with the development of the Overseas Service of the B.B.C. and his activities in this direction prevented him from doing much amateur work. Nevertheless, he had the movement very much at heart and showed real "ham spirit" in all he did. His technical ability particularly in aerial design, was of a high order and his death, at the age of 36, represents a real loss to the nation.

For several years Mr. Allway contributed to *The Wireless World* under the pen-name of "Ethercomber."

On behalf of fellow amateurs we extend our deep sympathy to his parents, wife and friends. J. N. W.

ON ACTIVE SERVICE

THIRTEENTH LIST

WE publish below our thirteenth list of radio amateurs on active service. Additional details and corrections should be advised to Headquarters as early as possible. The present list contains information received up to October 2, 1940.

Rank and Name	Regiment or Branch	Pre-war Call or B.R.S.
L.A.C. W. H. Abraham	R.A.F. ..	GW3AX
A.C.2 R. Allen ..	" ..	2DSP
Cpl. W. C. Barnes ..	" ..	G3JO
Sig. V. J. Bartlett ..	R.C. of S. ..	GW5BI
L.A.C. R. C. Beardsmore*	R.A.F. ..	2CSN
Bdr. H. T. Betteridge ..	R.A. ..	3860
A.C.2 G. A. Blackburn	R.A.F. ..	2CCB
A.C.2 C. N. Blatherwick	" ..	G3VU
P./O. L. G. Blundell ..	" ..	G5LB
A.C.2 F. Boardman ..	" ..	3803
A.C.2 D. T. Boffin*	" ..	G3HS
Pte. P. J. Broom ..	Suffolk Regt.	G5DQ
A.C.2 W. E. Brown ..	R.A.F. ..	3750
A.C.2 J. Byrne ..	" ..	3710
A.C.2 W. G. Cadman ..	" ..	G4BV
Sig. F. H. Chambers ..	R.C. of S. ..	2FYT
A.C.2 H. G. Chandler ..	R.A.F. ..	G6BP
L.A.C. F. H. Cooper ..	" ..	G2QT
A.C.2 G. A. Courtenay ..	" ..	G8HW
A.C.2 R. Cowell ..	" ..	G3WX
A.C.2 H. W. Darvill ..	" ..	3856
A.C.2 R. E. Drewery ..	" ..	G6OY
Cpl. G. Edwards ..	" ..	3855
A.C.2 J. W. B. Evans ..	" ..	GW3GL
L.A.C. R. M. Evans ..	" ..	G6CU
— J. T. Fox ..	" ..	G3MB

Rank and Name	Regiment or Branch	Pre-war Call or B.R.S.
A.C.2 F. Green ..	R.A.F. ..	G3OS
Sig. H. F. Hamilton ..	R.C. of S. ..	3179
Lt. K. A. Craddock-Hartopp.	R.N. ..	BERS
A.C.2 W. C. Hodson*	R.A.F. ..	477
A.C.2 J. Huschman ..	" ..	2CWH
A.C.2 J. S. Johnson* ..	" ..	GM6HZ
2nd/Lt. D. Aliaga-Kelly	2nd Field Signals Coy. (Eire).	G3KB
		3036
A.C.2 F. Knight*	R.A.F. ..	G4MC
L.A.C. R. H. Lander ..	" ..	3850
A.C.2 J. M. Lowe ..	" ..	2DFP
L.A.C. A. H. Lunn ..	" ..	G5LL
A.C.2 J. O. Mathews ..	" ..	3641
2nd/Lt. D. S. Matthey ..	R.A. ..	2CHM
L.A.C. B. W. Montague	R.A.F. ..	2ANR
L.A.C. L. C. Nash ..	" ..	G DA
L.A.C. A. C. A. Newman	" ..	2FIX
Cpl. A. R. Nicholson ..	R.C. of S. ..	2BOA
Pte. F. R. Rawson ..	E. Yorks Regt.	3407
A.C.2 J. Sagar ..	R.A.F. ..	3858
L.A.C. F. E. Scales ..	" ..	2FNS
Pte. A. G. L. Schofield	R.A.P.C. ..	G3TS
Sgt. H. W. Skinner ..	R.A. ..	2008
A.C.2 G. H. Smith ..	R.A.F. ..	402
A.C.2 H. A. Spashett ..	" ..	G3RK
Sig. G. A. Spencer ..	R.C. of S. ..	G2KI
L./Cpl. N. E. White ..	" ..	3701
Tel. N. D. Whitehead ..	R.N. ..	G4HL

* Non-Members.

"The Early Birds"

It is with pride and pleasure that we publish a list of those amateurs who were included in the first draft of R.A.F. Civilian Wireless Reservists to reach France two days after the outbreak of hostilities. In addition to the names listed we have a record of 18 others who were not pre-war licence holders.

The party was in charge of F./O. (now F./Lt.) C. S. Goode, G2OH, of Leicester, and the Senior N.C.O. was F./Sgt. L. A. Ballingall, well known to many members as an operator of MQI. An account of the journey of the party from England has already been recorded in the July, 1940, issue of this Journal.

It is gratifying to record that several of those included in the original draft have now been granted commissions, and that two at least have recently taken parties abroad.

The suggestion has been made that a device, on the lines of "Hamthusla" the G.O.M. of *Amateur Radio*, should be employed after the war on QSL cards used by "The Early Birds"! It has also been suggested that an annual get-together should be held on September 5—the anniversary of the date the party arrived in France.

In giving publicity to the list we have to record our thanks to Messrs. Coupland and Fenton both having obtained access to a copy of the nominal roll.

List of Licensed Radio Amateurs included in First Draft of R.A.F. Civilian Wireless Reservists to reach France after the outbreak of hostilities—September 5, 1939.

Rank and Name	Call	Rank and Name	Call
F./O. C. S. Goode ..	G2OH*	A.C.2 M. A. Newman	G3DZ*
Sgt. S. L. Hill ..	G8KS	" J. Pollard ..	G3IY*
A.C.2 W. H. Allen ..	G2UJ	" B. L. Radcliffe	G2ZY*
" M. A. Brookes	G5OI	" J. E. P. Raven	G3HG
" E. S. Champman	2FMV*	" V. C. Rayner ..	G6FZ
" N. Coleman ..	2DHL	" D. Robertson ..	GM6GQ
" L. J. Coupland	2BOC	" F. J. Rutter ..	2FMF
" A. H. Davies ..	G4JY*	" D. Skipworth	2FFD*
" E. R. Dolman	2DCG	" F. I. E. Starkey	GW6KY
" J. A. Easterbrook	2FNY	" P. Stein ..	G8NV
" H. M. Fenton	G8GG	" R. F. Stevens ..	2BVN
" V. J. Flowers ..	G8QM	" G. T. Sturtard	G2MB*
" L. M. Gunnell	G8HB	" F. M. Trier ..	G8VH
" V. G. Hammond	G4NL*	" V. F. West ..	2DYW*
" A. E. Howard	G4FZ*	" T. S. White ..	G4DS
" R. W. Hunter	G3FL	" J. D. Wightman	G3AH
" D. J. G. Legge	G3MP*	" H. Willets ..	2FPI
" R. O. Marriss ..	2BZQ	" B. W. Wynn ..	G8TB
" G. F. Mason ..	G5BR		

* Non-Member, R.S.G.B.

CANADIANS ON ACTIVE SERVICE

THIRD LIST.

MR. FRED SAXON, VE3SG, 302 Lee Avenue, Toronto, Canada, in sending this the third list of Canadian amateurs on active service, advises us that to date the names of 309 VE's have been recorded as being with the colours. Mr. Saxon also reports that Mr. G. H. L. Norman, exG5VN, is now a F./O. in the R.C.A.F.

Additional names and corrections should be sent to Mr. Saxon, and not to R.S.G.B. Headquarters.

Rank and Name	Regiment or Branch.	Pre-war Call. VE
A.C.2 E. V. Allard ...	R.C.A.F. ...	5AHS
A.C.2 W. A. Amendola ...	" ...	3ARR
A.C.2 L. A. Appelt ...	" ...	4AEZ
F/O. H. C. Ashdown ...	" ...	2IO
A.C.2 D. J. Bain ...	" ...	1LZ
A.C.2 C. G. Baker ...	" ...	4FM
A.C.2 G. F. Baker ...	" ...	5BL
F/O. G. E. H. Brandon ...	" ...	3PR
Tel. G. E. Brown ...	R.C.N. ...	1EV
A.C.2 O. D. Brownfield ...	R.C.A.F. ...	4FO
A.C.1 H. T. Byrne ...	" ...	4AGC/3AQQ
A.C.2 C. J. Campbell ...	" ...	3ANF
A.C.2 G. S. Cardwell ...	" ...	4ADS
A.C.2 J. Canfield ...	" ...	5AHV
Tel. J. N. Clements ...	R.C.N. ...	5ACA
Cpl. E. G. Coombe ...	R.C.C.S. ...	3 (?)
A.C.2 D. A. Cooper ...	R.C.A.F. ...	3JH
L.A.C. S. D. Cowan ...	" ...	3JB
L./Cpl. J. S. Davies ...	R.C.C.S. ...	3AMD
A.C.2 H. J. Dollard ...	R.C.A.F. ...	4AMC
A.C.2 R. Ducey ...	" ...	4TU
A.C.2 H. Dyson ...	" ...	4BW
A.C.2 J. Edmundson ...	" ...	4UA
A.C.2 L. M. Ferguson ...	" ...	3AFK
A.C.2 W. F. Gribble ...	" ...	3ANV
A.C.2 J. L. M. Hall ...	" ...	5AHJ
A.C.2 H. F. Hannay ...	" ...	4AFJ
Tel. J. Harker ...	R.C.N. ...	5LX
Sig. W. Harrington ...	R.C.C.S. ...	3JR (2nd op)
Cpl. R. Holly ...	R.C.A.F. ...	4NE
A.C.2 E. A. Holmes ...	" ...	4YO
A.C.2 W. Honer ...	" ...	3AYX
Sig. C. Horn ...	R.C.C.S. ...	4AB
A.C.2 G. F. Howell ...	R.C.A.F. ...	1HB
Lt. T. Hunter, jr. ...	R.C.C.S. ...	3CP
A.C.2 J. L. Hutchison ...	R.C.A.F. ...	2EN
A.C.2 E. A. D. Hutton ...	" ...	3AX
L.A.C. A. W. Ironside ...	" ...	3AUA
A.C.2 D. Jenkins ...	" ...	4AHN
A.C.2 W. E. Johnson ...	" ...	3ABB
A.C.2 S. T. Jones ...	" ...	5MJ
Sig. J. Jordan ...	R.C.C.S. ...	3AID
A.C.2 H. A. King ...	R.C.A.F. ...	ex5MP exNC5AD

Rank and Name	Regiment or Branch	Pre-war Call. VE
Sig. D. Lauctot ...	R.C.C.S. ...	5NS
A.C.2 J. M. Lazowski ...	R.C.A.F. ...	3AGB
A.C.2 G. M. S. Lee ...	" ...	5AGA
A.C.2 B. J. Lemieux ...	" ...	ex4AEE
F/O. D. J. H. Leitch ...	" ...	4FS
F/O. D. W. Leonard ...	" ...	1KH
A.C.2 J. H. Lymburner	" ...	2IC
Pte. T. G. Lynch ...	R.C.C.S. ...	5CS
A.C.2 J. A. McCallum ...	R.C.A.F. ...	4AMQ
A.C.2 E. T. McLaughlin ...	" ...	ex3AIP
A.C.2 G. E. McLaughlin ...	" ...	ex4AX
A.C.2 D. E. McNeil ...	R.C.A.F. ...	3PK
A.C.2 I. M. Macdonald	" ...	1EN
Tel. J. R. Matthews ...	R.C.N. ...	4APT
A.C.2 G. W. Maylam ...	R.C.A.F. ...	ex5DR
A.C.2 K. Moir ...	R.C.A.F. ...	1CP
A.C.2 J. H. Morgan ...	" ...	ex3VR
Sig. W. T. Mowbray ...	R.C.C.S. ...	4DV
A.C.2 A. B. Nash ...	R.C.A.F. ...	ex3PI
F/O. R. O. Norman ...	R.C.A.F. ...	5ID
A.C.2 F. T. Oates ...	" ...	3ARX
A.C.2 A. R. O'Brien ...	" ...	ex1JH
A.C.2 E. G. Ogren ...	" ...	4ABN
A.C.2 E. H. Pattison ...	" ...	5ADK
Cpl. J. W. Pye ...	R.C.C.S. ...	5AIV
Cpl. R. M. Pye ...	" ...	5ATV
L.A.C. L. R. D. Pynn ...	R.C.A.F. ...	3AIP
A.C.2 G. K. Reid ...	" ...	3AJP
Sig. L. L. Reid ...	R.C.C.S. ...	5SM
A.C.2 M. C. Riley ...	R.C.A.F. ...	4AKV
A.C.2 R. D. Robertson ...	" ...	1AQ
Sig. I. Rossiter ...	R.C.C.S. ...	5WC(2nd/op)
A.C.2 F. M. Routledge ...	R.C.A.F. ...	4ZN
A.C.2 R. C. Roy ...	" ...	1JR
A.C.2 H. R. Sanderson ...	" ...	3AHW
A.C.2 G. E. Sargenia ...	" ...	4AJO
A.C.2 G. E. T. Scarrow ...	" ...	3AEO
A.C.1 P. Shepherd ...	" ...	3HI
A.C.2 H. D. Skelthorne ...	" ...	4APT/5ABG
A.C.2 F. G. Spafford ...	" ...	3IF
A.C.2 J. W. Spence ...	" ...	5AES
A.C.2 W. R. Storey ...	" ...	3WI
Sgt. J. A. Streater ...	R.C.C.S. ...	5KZ
Tel. D. A. Sutherland ...	R.C.N. ...	4FK
Sig. C. F. Taylor ...	R.C.C.S. ...	5AB5
A.C.2 F. S. B. Thompson ...	R.C.A.F. ...	ex4AAP
A.C.2 W. C. Trenholme ...	" ...	1EC
A.C.2 F. M. Tucker ...	" ...	1KD
A.C.2 W. N. Veale ...	" ...	4OQ
F/O. J. S. Vincent ...	" ...	4PB
F/O. R. N. Walker ...	" ...	3SM
A.C.2 S. W. Walker ...	" ...	3LG
A.C.2 J. H. Williams ...	" ...	3AAO
Tel. R. D. Wilson ...	R.C.N. ...	4FG
L.A.C. S. Yearron ...	R.C.A.F. ...	3SY

AUSTRALIANS ON ACTIVE SERVICE

SECOND LIST

MR. ERIC TREBILCOCK has kindly sent a list of Australian amateurs serving in the Royal Australian Navy. Although the list is far from complete it provides a record of yet another branch of the British Dominion Fighting Forces, which has benefited by the service of radio amateurs.

Mr. Trebilcock tells us that the information appended is the result of enquiries made by VK2EO (at a land station) and VK2FF (serving on a warship).

Additional names and corrections to this list should be sent to Mr. Trebilcock, 784, Hare Terrace, Moonta Mines, South Australia.

Rank and Name	Pre-war Call. VK
War./Tel. F. Tregurtha ...	2FT
P./O. Tel. D. Duff ...	2EO
P./O. Tel. L. Bracken ...	2FF
P./O. Tel. R. Winch ...	3OA
Ldg./Tel. J. Williams ...	2ADI
Ldg./Tel. W. Harriss ...	2AIF
Ldg./Tel. G. Free ...	2IT
Ldg./Tel. J. Stewart ...	3PC
Ldg./Tel. A. Bromell ...	3YI
Tel. F. Piermont ...	2NQ
Tel. N. Thugge ...	4NO
Tel. F. Lubach ...	4RF
Tel. A. Sharland ...	4SD
Tel. A. Taggart ...	4AEB

73.

WE would direct the attention of those sending in lists of calls for inclusion in this feature to the fact that no useful purpose is served by referring to Continental and foreign call signs other than U.S.A.

To avoid any further misunderstanding we have drawn up the following simple rules:—

1. Lists must be set out in strict alphabetical order of call sign.
2. The style must adhere exactly to the example given below:
3. Lists of Calls *must* be sent to Headquarters on a separate sheet of paper or postcard and be very clearly written.
4. Only British Isles, British Empire and U.S.A. calls may be included.
5. Not more than 12 calls may be included in any one list. Lists which fail to conform to the rules will not be published.

* *Service members will give their regiment or home address only.*

G6SO (10 Sydney Street, Scarborough), to G2CP, 3FQ, 3MI, 4FO, 4HK, 6LN, 6QF, 8KU, 8TI, 8TK, 8UL, W9DXX.

G4NX (135 Hollywood Lane, Hollywood, Birmingham), to G2NV, 3BO, 3DV, 4DH, 5GJ, 6FK, 8CP, 8FU, 8PR, 8WI, 2BKS, 2FGA.

G4FO (G. E. Cockroft, Tudor Drive, Oadby, Leicester), to G2AA, 2FX, 3HK, 3KB, 3UC, 5UQ, 6IM, 6SO, 8JO, 8ND.

G8UO (13 Chandos Street, Keighley, Yorks.), to GILP, 3PJ, 3TO, 5IV, 5RX, 8DI, 8IJ, 8RB, 8TJ, 8VP and the local 1-7 Mc. Group.

2HHX (66 Earlsparke Avenue, Newlands, Glasgow), to GM2KP, 3AR, 4JO, 6ZV, 8CH, 2FZT, BRS2689.

2CNC (late Jersey, now at 26 Selwyn Avenue, Hatfield, Herts.), to G2CN, 2ZC, 3GS, 3XN, 4GT, 6IF, 2AOU, and all Jersey hams in this country.

G8IT (Seafield, Offington Lane, Worthing), to G2ZV, 3YK, 4BO, 5CP, 5FA, 5LT, 5RR, 6BW, 8AC, 8CP, 8DF, G18PA.

G8DR (R.A.F.), to G2CV, 2LF, 2NS, 2RF, 3JO, 5UM, 6KQ, 6ZO, 8FF, 8QM, 8TK, WIAPA.

G4BV (R.A.F.), to G3GY, 3KP, 3PV, 3SR, 4KH, 8CK, SUISG.

G3FS (96 Woodford Crescent, Pinner), to G2FX, 3II, GM3LO, G3LT, 3NA, 4CH, 4HV, 4LI, 6BO, 6KQ, 8PD, 8SW.

2FUC (R.A.F.), to G2TM, 2HW, 4CJ, 4KT, 6WH, and all members of the Blackburn Group.

G2NJ (52 Park Road, Peterborough), to G3IP, 4LM, 5DQ, 5LP, 5TT, 6LX, 6PD, 8AK, 8GA, 8GI, 8ON, 8VN.

G3OS (R.A.F.), to G3SI, 3UD, 3WB, 3XW, 3ZI, 5UA, 6AK, 8AP, 8CI, 8KH.

G3YK (32 Emerson Avenue, Middlesbrough), to G2RX, G13JP, 3KB, 3ZI, 4BW, GW5OC, G5TZ, 6BW, G18PA, SUJ, E17M, 2CHQ.

2HLP (c/o 11 Maldon Road, Colchester), to G3GW, 3OJ, 3WP, 4HC, 5LS, 5US, 6AB, 8RR, G18TS, 2FSK, VE5OR.

G5SY (Sherrington, Cleveland Road, Torquay), to G2FP, 3AM, 3HW, 3ID, 5QI, 6JL, 6RF, 8PN, 2CWR, 2FNY, BRS3171, 3444.

G2VV (27 Riverdale Gardens, St. Margarets-on-Thames, Middlesex), to G2KI, 2ZQ, 5LT, 5OQ, 6GS, 6HB, 6LK, 6PK, 8LV, 8MK, 8SM, ZL2OQ.

G3HB ("Two Ways," Anson Street, Rugeley, Staffs.), to G2YV, 2ZR, GW3CF, G3IP, 3LP, GW4CK, G4CN, 4CP, 2BGM, 2CSN, 2CWH, BRS3788.

G5BQ (47 Warren Road, Cambridge), to G2FX, 2HK, 2UF, GW3CR, G3DJ, 5FO, 5ZJ, 8KP, 8LT, VE1DQ, VK3HG, VU2DR and all District 8 members serving with the colours.

G8DZ (17 Newstead Avenue, Mapperley), to G3AA, 3MP, 3NB, 3ZG, 4LY, 4NU, 5NS, 5TN, 5VU, 8DI, 8JN, 8JV.

2CMR (R.A.F.), to G2OI, 3YJ, 4IO, 5YD, 8DI, 8NL, BRS3841 and all members of the N. Manchester S.W. Radio and Television Society.

G6AC (Apt 1, 4217 Western Avenue, Westmount, Montreal, P.Q. Canada), to G3GH, 6GH, 6GM, 6JG, 6LH, 6MN, 6QW, 6TV, 6WN, 6YP, 8PI and VS6AH.

G4AB (Burleigh, Glos.), to EI5P, G2KQ, 3JR, 5LO, 6WY, GM8AJ, G8IL, 2AOU, 2FJM, 2FRO, BRS195 and all who attended the last N.F.D. at Reading.

G3RY (R.E.), to G2LK, 3JB, 3YB, 6GX, 8UO, 2AAM and 2FJS.

An R.A.F. MEETING

WILL BE HELD ON

Sunday, Nov. 10th, 1940

In N.A.A.F.I. CANTEN No. 2 WING
No. 2 E. and W. SCHOOL

ASSEMBLE 2.30 P.M.

Technical Talks. Informal Discussions.
Tea. All service members in the
above area are heartily welcomed.

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Don't forget that your radio receiver is more important than ever—keep it at maximum efficiency. The valve is one of the most important components—do not try to operate on worn out or unsuitable types. There is a large range of OSRAM VALVES to meet every purpose—from efficient short-wave types to high power amplifiers.

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Valves**
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We are also seeking to purchase for cash, good modern American Communication Receivers, especially National. Why not let us make you an offer? A fair and square deal assured.

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CLIX

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"I am now a Telegraphist in the Royal Navy . . . I find I have greatly benefited from the course and it has been put to the practical test much sooner and more thoroughly than I had expected."—E.L.

"I am making very good progress with the course which is most interesting and clever, and I wish you every success."—C.W.

"I think the Junior Code Course a very sound idea, and would commend it to anyone who is thinking of taking up any form of communication in the forces or government service."—E.M.C.

"My CW is now better than ever it was and can manage to take 16-17 w.p.m. Have just received lesson 5. If the improvement continues at the present rate, I'll be doing 30 w.p.m. by the time I get lesson 10."—W.G.

"I have been making steady progress with the Course. I am now, with a little concentration, able to receive code at a speed of 20 to 22 w.p.m. My sending speed is about 20 w.p.m."—A.T.

"Congratulations, and my very best wishes to the new student, he is taking the right road to success."—D.R.

"I am very pleased with the way I am progressing with the Junior Course. My time for practice is limited, but I can send a steady 8 to 10 w.p.m. and read 5 to 6, which I think very good in only four lessons."—V.D.F.

"I am satisfied that your Course is good and if your advice is followed faithfully the result must be a good trained operator."—W.W.

"I have heard the Candler system for learning morse highly praised by many of my friends in the morse world."—C.S.H.

"Perhaps you may think it a little strange wanting to study this as I am already a radio op., but I met one or two other sea-going ops. who had greatly improved themselves and who recommended the Candler course."—J.H.M.

(Original letters of above can be seen on request.)

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Candler System Co., Ashville, North Carolina, U.S.A.



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CRYSTALS**
Frequency Sub-standards

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A longitudinal mode 100 kcs. crystal, ground to within 25 cycles of the nominal frequency and supplied mounted in a fixed air gap mount, of the plug-in type. Temperature co-efficient 5 parts in 10⁶ per degree Centigrade change.

PRICE, including mount £1 : 12 : 6

TYPE AT/1,000

For frequency standards operating at 1,000 kcs. the AT/1,000 is recommended. The grinding and calibration accuracy is 0.01%, and the temperature coefficient is approximately 5 cycles at the fundamental frequency per degree Centigrade change. Supplied mounted in a fixed air gap mount, 1½ in. in diameter, standard ¼ in. pin spacing.

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Sales Department Items

There is still a steady demand for Sales Dept. items. For the benefit of members who wish to place orders we give below the current *post free* prices :—

	s.	d.
Emblem Lapel Badge	1	6
Emblem R.E.S. Badge	1	6
Emblem B.E.R.U. Badge (Tie Pin)	1	9
Car Plaque, Emblem Type	3	6
Car Plaque, Emblem Type (with call sign)	4	6
Emblem Call Sign Badge	2	6
Call Sign Brooch	2	6
Members' Note Paper—		
Per 100 sheets	3	0
Per 200 sheets	5	9
Rubber Stamp of Emblem	2	0
Kilocycles to Metres Pocket Conversion Tables	1	6

Delivery of Call Sign badges is usually made within 14 days of the receipt of order. All other items can be delivered from stock.

**"The Helping Hand to Amateur Radio"
and**

"How to Become a Radio Amateur"

Headquarters are frequently asked whether supplies of these two popular pre-war publications are available. The answer is in the affirmative, and the price is 6d. *post free* in both cases, or 9d. *post free* for the pair.

HEADQUARTERS CALLING

Headquarters Return Thanks

To the large number of members who have, during the past few weeks, written letters of good wishes for our well-being and have frequently offered their congratulations to us for our efforts in carrying on under somewhat difficult conditions.

It has been impossible to reply to every letter individually but we are sure our correspondents will accept this expression of our warmest thanks in lieu thereof.

The Television Society

Since the closing down of our main office in Victoria Street, the Council of the R.S.G.B. has, through the courtesy of the Television Society, met each month at their premises, 17 Featherstone Buildings, Holborn.

The news that serious damage had been caused by enemy action to the Television Society's headquarters was received by the Council with deep regret, which will be shared by all readers. We are happy to record, however, that the valuable collection of museum pieces and books, together with much of the Society's equipment, has been undamaged.

The Lecture-Secretary, Mr. G. Parr, 68 Compton Road, London, N.21, well known to hundreds of our members, states that the library facilities will be restored as soon as repairs have been completed, although the opening date of the 1940 session must be unavoidably delayed.

Every R.S.G.B. member interested in Television would be doing that Society a good turn at the present time by joining at once. Mr. Parr, as well as Mr. J. J. Denton (Hon. General Secretary), 17 Anerley Station Road, S.E.20, will supply full details.

A D— Bomb near "53"

Members who have enjoyed a ragchew at "53" will be sorry to hear that a "D— bomb" has caused damage to the building. The walls and ceilings of the room which was used as the general office have been shored up with timbers and all windows have gone, but the old original QSL pigeon-hole file still remains *in situ* as a reminder of happy days gone by.

The store room which houses Society furniture and old records is undamaged, except for cracks across the ceiling.

American Publications

The following are the current rates for American publications and subscriptions handled by the Society:—

	s.	d.
A.R.R.L. (1940) Handbook ..	8	6
A.R.R.L. Antenna Handbook ..	4	0
A.R.R.L. (QST) (per annum) ..	17	6
Radio (per annum) ..	21	0
Radio (two years) ..	35	0

Members are reminded that these prices are subject to alteration without notice, and that all orders have to be passed to America for execution. A delay of several weeks is unavoidable.

Members on active service are advised, in their own interest, to arrange for American publications to be despatched to their permanent home address. Failure to take this advice will probably cause losses, for which the Society can accept no responsibility.

Back Issues of The T. & R. Bulletin

Back issues of certain issues can still be supplied, price 1s. each. A very limited number of the 12 issues which comprised Volume 15 (July, 1939—June, 1940) are available at the special price of 10s. the set, post free. Recently elected members may like to avail themselves of this opportunity of obtaining a full set of war-time issues. Act promptly.

Technical Books

Headquarters will be glad to obtain copies of technical books published by the leading publishing houses. Members availing themselves of this service must send cash with order, plus postage.

Sgt. John Hannah, R.A.F., V.C.

Every radio amateur will have read with more than ordinary interest the announcement that H.M. The King had conferred the Victoria Cross on Sgt. John Hannah, an 18 years' old Wireless Operator—Air Gunner. This, the highest service award, is the first to our knowledge which has been made to a wireless operator, either during this war or in the Great War.

New Members

HOME CORPORATES

- E. W. TAYLOR (G3FK), 48 Benhill Wood Road, Sutton, Surrey.
 J. S. JOHNSON (G3KB), 12 Selbourne Terrace, Shipley, Yorks.
 W. H. COLCLOUGH (G3XC), 95 Highview Road, Ealing, W.13.
 L. C. NASH (G4DA), 16 Charles Street, Weymouth, Dorset.
 L. G. BLUNDELL (G5LB), 113 Tower View, Croydon, Surrey.
 A. J. PECK (G5PK), 31 Reginald Road, Forest Gate, E.7.
 B. W. MONTAGUE (2ANR), Onega, Chipstead Valley Road, Chipstead.
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EDITORIAL—(Continued from page 95).

late is, we consider, a fine tribute to the men behind the presses at Eastleigh.

We are certain that all readers will understand and appreciate that delays in production, no less than in the postal and transport services, are unavoidable at present. The membership may, however, rest assured that both our printers and Headquarters staff will spare no effort in order to keep the Bull. going.

J. C.

"CONTRASTING WEATHER" AND 56Mc CONDITIONS (Continued from page 97).

temperature, more data is required before the true relationship between temperature and conditions can be discovered. Unfortunately the war has, for the time being, hindered further investigation of this phenomenon; therefore it is with some trepidation the following law is put forward.

The law propounded states that "conditions are inversely related to the temperature"

$$CT = K,$$

where C = Estimate of Conditions, T = Temperature, K is a Constant. Actual figures based on the writer's observations appear in the table.

From this table it will be seen that K was reasonably constant with the exception of the month of June, when conditions were abnormal.

Many side issues have been omitted from this article, but the writer will be pleased to forward his notes to those who are interested in fuller details.

Mr. F. C. Marchant, 2ACU, is thanked for his helpful criticisms and in the collection of data.

THE RE-ACTIVATION OF VALVE FILAMENTS—(Continued from page 106).

again in evidence. The valve responded to the same treatment as before and was replaced in service at 800 volts H.T. and with anode currents up to 90 mA. After nearly a year of amateur use it still appeared normal.

Conclusions.—It seems fairly certain that the loss of emission was in all cases due to the liberation of gas, caused, perhaps, by an unnoticed and very temporary overload. In each example the blue glow effect accompanied the fall of emission and promptly disappeared after treatment. These experiments seem to show that such gas can be "fixed" by the method described above, at least in respect of the type on which the tests were performed. No doubt many similar valves have been discarded, when with such treatment they would have given a new lease of life.

CORRESPONDENCE—(Continued from page 115).

District Notes could be made as interesting from the civilian, as "Khaki and Blue" is from the service, point of view. So I would say "How about it chaps?"

Yours faithfully,

13 Chandos Street, H. BEADLE (G8UO).
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STOP PRESS

Mr. J. Sang (G16TB), our Northern Ireland representative, telegraphed Headquarters on October 1 to the effect that the GI Notes had been posted that day. Up to October 9 the Notes had not arrived, due presumably to censorship delays. We extend our regrets to Mr. Sang and to Mr. Robb for the omission of their news.—G6CL.

Later.—The Notes arrived at 11 a.m., October 11.

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