

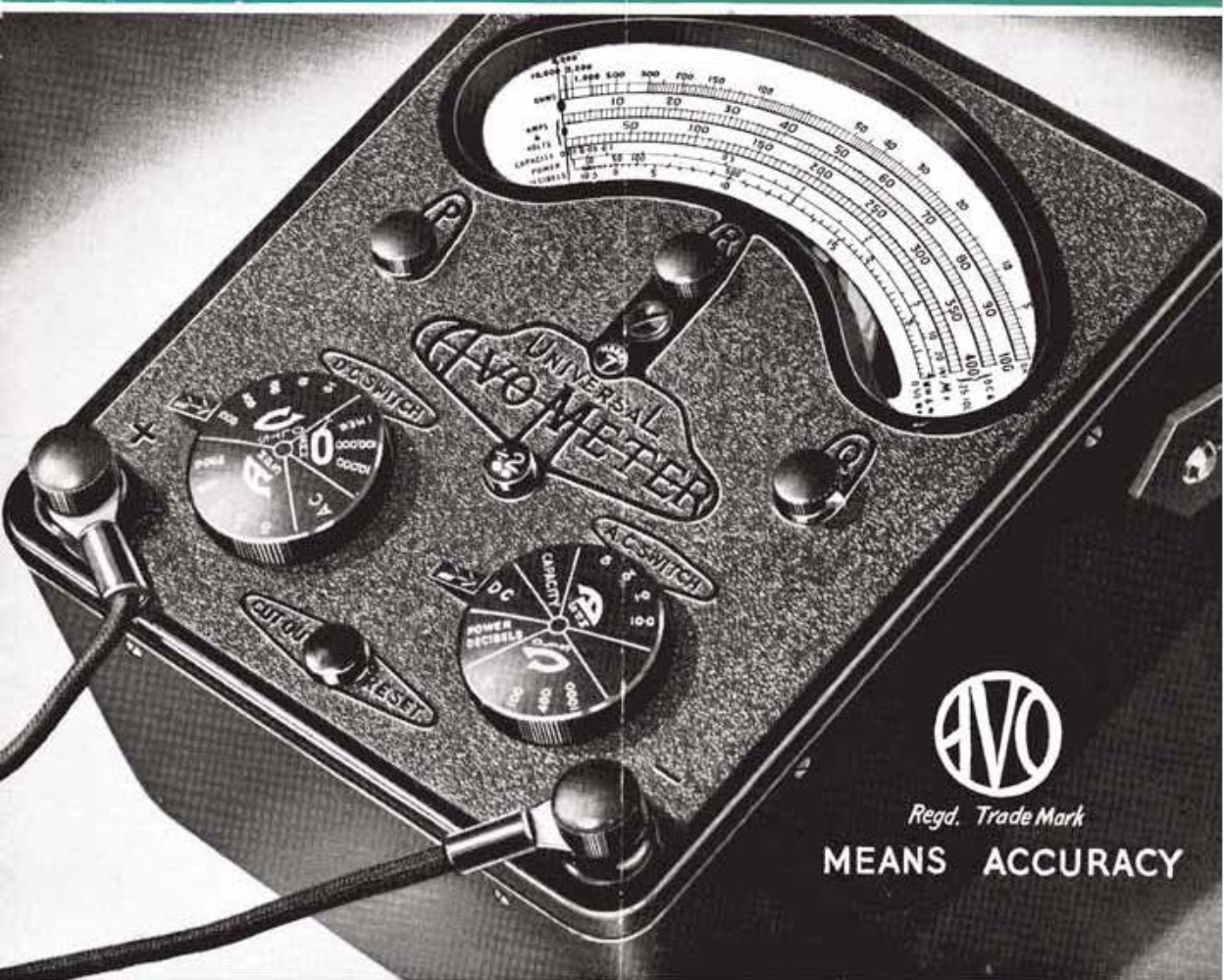
R·S·G·B

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APRIL 1944

BULLETIN

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN



Regd. Trade Mark

MEANS ACCURACY

- EXPERIMENTAL WORKSHOP CENTRES
- THE LOAD LINE
- MEASUREMENTS IN RADIO EXPERIMENTAL WORK
- R.F. OSCILLATOR AND HETERODYNE
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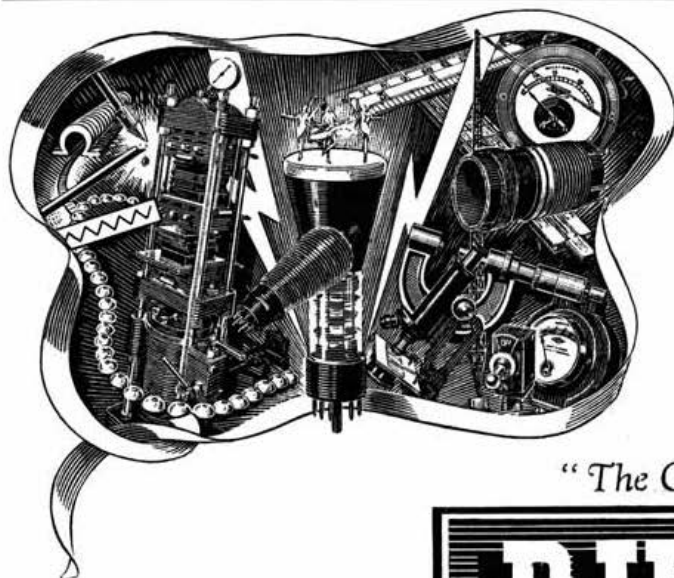
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No. 10

EXPERIMENTAL WORKSHOP CENTRES

A Suggestion for the Future

LAST year, whilst at Cranwell, we were given an opportunity of visiting the workshops used by the young wireless apprentices who form the present-day R.A.F. Amateur Radio Society. Two things in particular impressed us, first the extremely high degree of workmanship attained by the trainees, many of whom were under 16 years of age, and second, the enormous advantages gained by providing the lads with a properly equipped experimental workshop centre. Here were all the necessary impedimenta required for the construction of radio receivers, amplifiers and the like. Here, too, were tools, soldering-irons, screws, wire, test-meters and a vast array of components—in fact, a veritable paradise for the keen amateur experimenter.

Since returning from that visit we have often thought about this workshop centre and have wondered whether the idea has any practical value from a Society point of view. After due consideration we believe that it has.

Week in, week out, letters are received at Headquarters from members, who describe in varying detail, weird and wonderful devices and circuits. Most of these "plans on paper" come from Service members stationed abroad, who in their off-duty periods allow their imagination to run riot with the aid of a pencil.

The fortunate few may have found opportunities to do a little private experimenting along amateur lines, but the majority have nothing but a Service knowledge of the equipment used for the transmission, reception and measurement of radio frequencies. Some, perhaps, have built simple receivers from "produce," but many have never heard an amateur signal nor operated an amateur radio station.

It is to be expected that most of the "bright ideas" that reach us, are but modifications of arrangements that have already been put to practical test, but the more ingenious are based on new devices (not new principles) which have come to the forefront in recent years.

Service equipment, in spite of the criticism that it is designed to provide a margin of safety far in excess of requirements, has however, demonstrated to all who care to learn the lesson, that reliability can only be achieved by careful disposition of components, a sound layout and robust design. Long association with Service equipment will undoubtedly have left its mark in the minds of many of our younger members who aspire one day to become fully fledged amateurs. Fortunately they have no knowledge of the hay-wire

amateur stations that brought cold-shudders to the professional engineer in pre-war days. It is our duty to help them to avoid practices, many of which were positively dangerous.

It would be unjust to suggest that *all* pre-war stations were untidy—far from it—but unquestionably many "old-timers" refused to recognise that more satisfactory results could be achieved, and certainly a better impression created, if a neat and tidy layout had given way to contraptions which were frequently spreadeagled all over the operating room.

Last summer, when post-war planning was discussed at a London meeting, several speakers advocated the establishment of a separate work bench for the construction of experimental "hook-ups". The point was made, and it is a good one, that the amateur station used for communication purposes, should at all times present an orderly appearance to the visitor, whether he be a fellow enthusiast or an interested member of the public. The attainment of this ideal—and it must be so regarded—is dependant upon the amount of space available in the home for amateur activities.

Unfortunately when the war ends, housing problems will become even more acute than they are to-day. Many hundreds of keen young men, with an urge to take an active part in amateur radio will find themselves unable, fully, to pursue the art because only an odd corner of their bedroom or living room will be available for their experiments. For their benefit in particular we make the suggestion that they should co-operate in the establishment of local Experimental Workshop Centres. At these centres, if our suggestion can be carried into effect, they would find every facility provided for conducting bench experiments, thereby reserving their limited space at home for fully-operational equipment.

The possibilities offered by such a scheme are endless, whilst the economies effected would be quite considerable. For example, metal, wire, solder, screws and even components could be purchased in bulk, and one good test-meter would be sufficient for the needs of many.

Obviously the establishment of Experimental Workshop Centres throughout the British Isles would require more than mere words to bring them into being, but we do suggest that the idea is worthy of consideration by District and Town Representatives.

The problem of finding suitable accommodation should not prove too difficult, bearing in mind that after the war many Cadet Units will have workshop facilities available. By mutual arrangement those who organise the centres could take under their wing, cadets training

(Continued on page 160.)

THE LOAD LINE

By S. R. DEARDS (G5PA).

ALTHOUGH the majority of radio amateurs are undoubtedly familiar with the theoretical principles governing the operation of the amplifying valve, it is considered that a brief explanation of the "load line" may be of general interest. It is not until a "load line" is plotted on the plate characteristic curves of a valve that any useful operational information can be derived from them.

The Load Line

From Fig. 1 it is an easy matter to transfer the available information to a graph showing plate current plotted against plate voltage. This is shown in Fig. 2 where the curves will now be seen to represent grid voltage. Now suppose that a resistive load of 10,000 ohms is inserted in the plate circuit. It is clear that where there is no plate current, the voltage

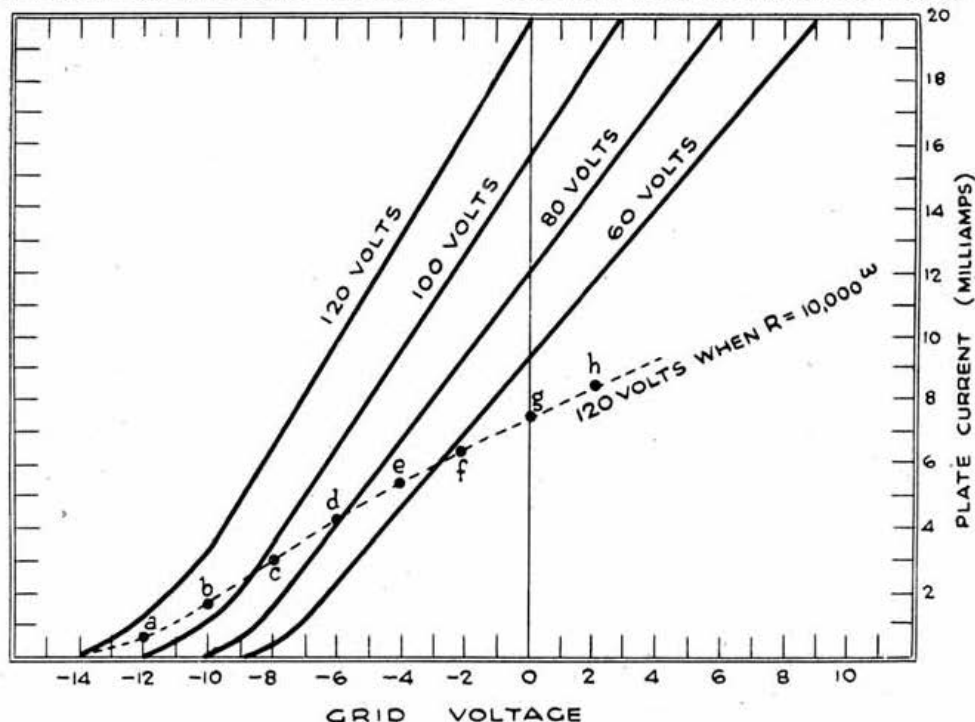


Fig. 1.
Static characteristics of a triode valve.

The Static Characteristics

Fig. 1 shows the static characteristic curves of an imaginary triode, which, no doubt, would fall within the category of a general purpose valve. An imaginary triode was necessary since the writer had no available valve data or information to use as a guide.

Four curves are shown, representing different values of plate voltage and for any value of grid bias the plate current can be easily determined. Although this information is true when the valve is not actually functioning as an amplifier, it is of little use when it is really put to work, since the plate voltage is not constant (as is assumed in Fig. 1), but varies in accordance with the magnitude of plate current flowing through the plate load. It is proposed to show in the following paragraphs how to examine the behaviour of the valve under dynamic conditions.

Assuming the correct working value of grid bias to be -6 volts, Fig. 1 shows that a current of 10 milliamps will be allowed to flow across the valve when the potential at the plate is 120 volts. Further inspection reveals that, over the straight portion of the 120 volts curve, a change of 1 volt on the grid will produce a change of 2 milliamps in plate current, indicating the valve has a mutual conductance of 2 milliamps per volt.

at the valve plate will be that of the supply. Supposing this to be 120 volts we can represent this condition at A on the graph of Fig. 2. Conversely, if the current flowing through the load resistor is sufficient to produce a potential difference between its ends, equal to that of the supply, the voltage at the plate will be zero. From Ohm's law this current will be

$$I = 120/10,000 = 12 \text{ mA.}$$

This fixes point B on the graph and the line AB can be drawn. This line is called a "Load Line" and in the case in question represents a load of 10,000 ohms. The plate current admitted for any value of grid bias can be read off where the line intercepts the grid volts curves. It was stated earlier that under dynamic conditions the actual voltage at the valve plate varied, due to the variation of plate current in the load. This variation of voltage is now shown along the plate volts abscissa by following down the points where the load line intercepts the grid volts curves. Since it was assumed that the correct working grid voltage is -6, the mean plate current will be seen to be 4.1 milliamps. This is somewhat less than was shown on the mutual characteristics of Fig. 1 since the plate voltage is no longer equal to the supply, but is the supply less the voltage dropped across the load. Fig. 2 shows this new voltage to be 79. Clearly

then, the voltage to the right of point X represents that developed across the load resistor and the voltage to the left of point X represents the voltage actually at the plate of the valve.

The Dynamic Characteristics

Sufficient information is now available to modify the plate volts curves of Fig. 1 in order to comply with the new conditions produced by the insertion of the plate load, so that dynamic operation can be studied. Reading off the values of plate current from the load line of Fig. 2 for progressive values of grid voltage, new curve points can be plotted on the graph of Fig. 1. Reference to Fig. 2 will show that the plate

The straight portion of the characteristic curve limits the portion of the characteristic on which it is permissible to allow the valve to operate.

Suppose that a signal of 4 volts peak is applied to the grid, since this value will meet with the above requirement. This means that during one cycle of alternation the mean grid bias will be varied between -2 volts and -10 volts. Examining the load line on Fig. 2 it will be seen that when the grid voltage is swung to -10 volts, the plate current will drop to 1.4 milliamps producing a rise in voltage at the valve plate to 106. When the grid voltage is swung positive to -2 volts the plate current will rise to 6.4 milliamps and since this increase of current occurs also in the

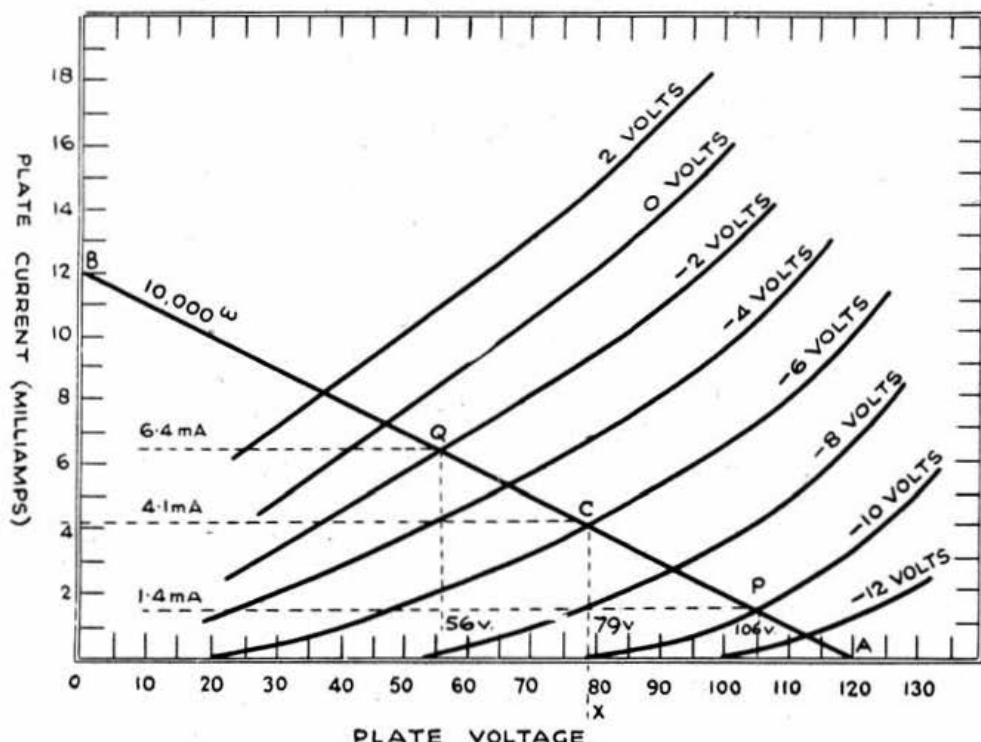


Fig. 2.
Shows how a Load Line is plotted on the plate characteristic curves of a valve.

current admitted with a grid voltage of -12 is 0.7 milliamps. This fixed point *a* on Fig. 1. Similarly points *b*, *c*, *d*, *e*, *f*, *g*, *h*, can be plotted. Joining these points produces the dynamic curve appropriate to a plate load of 10,000 ohms and it will be seen to have a considerably lower slope, hence a lower mutual conductance than given by the static curves. Inspection shows this to be approximately 0.7 milliamps per volt. Due to the presence of the load the plate voltage will rise as the current decreases and fall as the current rises, as indicated by the new dynamic curve.

The Signal

The signal applied to the grid must not be of such an amplitude as to allow the grid voltage to trespass into the positive region, thus drawing grid current and damping the input with resultant distortion. Further it must not expand sufficiently negative to wander into the curved portion of the characteristic thereby eventually shutting off the plate current, again producing distortion of the plate current waveshape.

load, the voltage available at the valve plate will drop to 56. This means that for a grid swing of 8 volts a swing in plate voltage of 106 - 56 or 50 volts is produced due to the presence of the load resistor.

But the choice of the load has an important effect upon the fidelity of the amplified waveform delivered by the valve and it is desired to produce as nearly as possible an exact replica of the waveshape of the signal voltage applied to the grid. The purpose of the amplifier is to magnify the voltage applied to the valve.

Further inspection of Fig. 2 will show that with no signal input the voltage at the valve plate will be 79, being that value around which the amplified voltage will oscillate. Since the signal input to the grid, swings the mean grid bias potential 4 volts in either direction, it is required to swing the plate voltage an equal amount above and below its mean value of 79 volts to achieve a waveform similar to that at the grid. It will be seen in Fig. 2 that the plate is swung 27 volts towards maximum and 23 volts towards minimum.

(Continued on page 153)

MEASUREMENTS IN RADIO EXPERIMENTAL WORK *

PART II

By R. L. SMITH-ROSE, D.Sc., Ph.D., D.I.C., A.R.C.S., M.I.E.E.
Honorary Member

IV. Some Applications of Measurements

In this concluding section it is proposed to give one or two examples of the application of certain types of measurement at radio frequencies to problems associated with communication and direction finding.

(a) The Effect of the Earth's Electrical Properties on the Propagation of Waves

As a result of many years' study of the manner in which radio waves are propagated over the earth's surface it has become clear that the electrical properties of this surface are of primary importance in determining the attenuation of the waves and thus of the distance over which communication can be effected by means of these ground waves. Except at the shortest wavelengths, the electrical properties of the earth's surface exercise a far greater influence on the range of ground wave communication than the fact that the earth is spherical in shape. The relatively high conductivity of sea-water accounts for the generally much greater signalling ranges over sea than over land, under conditions in which neither the upper nor lower atmosphere play an effective part.

While several field methods of estimating indirectly the properties of the earth's surface have been developed and used with success, it is clearly desirable that, if possible, these properties shall be determined directly without assuming a knowledge of the mode of wave propagation along the surface. It was such considerations that gave rise some years ago to an investigation by the author of the electrical properties of samples of the earth's surface by a method which could be used in the laboratory.

If a simple fixed air condenser is filled with the material under examination, and its resistance and capacitance are measured directly at a radio frequency, the results give immediately the values of the conductivity (or resistivity) and dielectric constant (or permittivity) of the material. In order to use the method effectively for the determination of the electrical properties of soil, care must be taken to ensure that the density of packing of the soil in the container sufficiently simulates the condition of the soil in its original undisturbed natural state, and also that the moisture content of the soil has remained unaltered during the experiment. Special condensers of the type illustrated in Fig 4 were used in an extensive study of the properties of soil in this manner over a wide range of frequencies, up to 100 Mc/s. Samples of soil extracted from various representative sites all over the United Kingdom were examined in the above manner, the moisture content of the sample being determined concurrently with the electrical measurements. The results have been fully described elsewhere,¹³ and it will suffice here to give in the table above, a generalised summary of the properties of different materials encountered in the investigation arranged in order of conductivity from sea-water to granite.

*Electrical Properties of the Earth's Surface :
Average values for high radio frequencies for ground of
the nature described.*

Description.	Conductivity c.s.u.	Resistivity ohm-cms.	Dielectric Constant.	Reflection Coefficient for normal incidence at 100 Mc/s.
Sea-water ..	4×10^{18}	22	80	0.95
Moist clay ..	10^8	10^3	40	0.75
Moist chalk ..	10^7	10^4	20	0.65
Fibrous loam ..	10^6	10^5	15	0.55
Moist sand ..	10^5	10^6	10	0.5
Granite ..	10^4	10^8	5	0.4

Having determined the properties of the earth's surface in this manner it seems desirable to attempt a check on the results by another and independent method. Two or three such checks have been made from time to time, and it will suffice here to refer to one which depends upon the effective reflection coefficient of the ground, which quantity depends upon the electrical properties of the ground and the frequency in use. One method developed and extensively employed at the National Physical Laboratory, by J. S. McPetrie¹⁴ consists in carrying out a measurement of the standing wave field pattern set up between an elevated transmitter with a horizontal aerial and the ground beneath. By using wavelengths in range 0.5 to 5 metres, the transmitter can be placed at a height sufficiently large compared with the wavelength, to enable the field at the receiving aerial beneath to be estimated from simple ray theory considerations. If the receiving aerial is moved vertically up and down in the space between the transmitting aerial and ground, the magnitude of the received current will be proportional to the field intensity, which passes through a series of maximum and minimum values depending upon the height.

A typical set of experimental measurements carried out in this way is reproduced in Fig. 5, which also shows the theoretical curve calculated for the values of the dielectric constant and conductivity of the ground in question, as determined by the method described above. The validity of the measurements has been confirmed by an extensive investigation over ground of widely differing properties, and also by artificially improving the reflective properties of the ground either by covering it with a screen of wire netting, or by soaking the surface with a solution of salt water. In this way, the reflection coefficient of a surface of common loam or grass for waves at normal incidence can be raised from about 0.5 to practically unity for frequencies corresponding to the wavelengths referred to above.

Having thus verified the values of reflection coefficient for one angle of incidence, the corresponding values at all other angles can be calculated with considerable confidence, and this knowledge is now regularly applied to methods of calibrating field strength measuring equipment, and determining overall sensitivity of communication receivers at various frequencies.

* Read before the Society at a meeting held on Dec. 18th, 1943, at the Institution of Electrical Engineers, London.

(b) An Experience in Radio Direction Finding

The second example has been selected as illustrating how the carrying out of careful and systematic measurements in radio direction finding led to a somewhat unexpected result; it is also perhaps of interest to the present reader in so far as the investigation and its results were described by R. H. Barfield and the present author in a paper¹² read before the Society over twenty years ago (October, 1922).

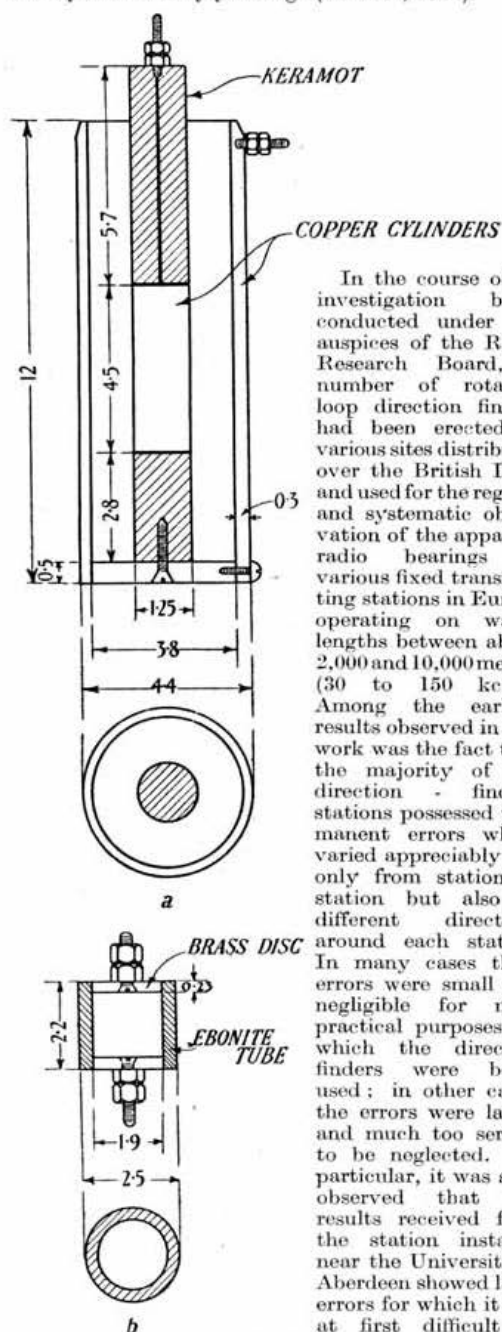


Fig. 4.

Diagrams of condensers used for soil measurements: (a) Large container used for frequencies up to 10 Mc/s.; (b) Small container used for frequencies of 10-100 Mc/s.

In the course of an investigation being conducted under the auspices of the Radio Research Board, a number of rotating loop direction finders had been erected at various sites distributed over the British Isles, and used for the regular and systematic observation of the apparent radio bearings of various fixed transmitting stations in Europe operating on wavelengths between about 2,000 and 10,000 metres (30 to 150 kc/s.). Among the earliest results observed in this work was the fact that the majority of the direction finding stations possessed permanent errors which varied appreciably not only from station to station but also in different directions around each station. In many cases these errors were small and negligible for most practical purposes for which the direction finders were being used; in other cases, the errors were larger and much too serious to be neglected. In particular, it was soon observed that the results received from the station installed near the University of Aberdeen showed large errors for which it was at first difficult to

account. These errors were found to remain reasonably constant in the day-time for several months in succession, to be practically independent of the wavelength, and to vary with the true bearing of the station from the direction finder in the manner shown in Fig. 6. The nature and magnitude of this variation was shown at the time to be similar to that given by the quadrantal error curve of another direction finder of the same type installed in a ship.

A superficial examination of the site of the Aberdeen station failed to reveal anything above ground in the nature of metalwork, trees or overhead wires of sufficient magnitude to account for the errors observed. After the curve plotted in Fig. 6 was available, however, the author's suspicions were aroused by the discovery of two sewer manholes at opposite ends of the field, the line joining these corresponding in direction to the point at which the D.F. error curve crossed the zero axis: the sewer between these manholes passed almost directly underneath the hut containing the direction finder. Additional experiments carried out on the site with a portable direction finder elicited the fact that the errors in question were definitely related to the vicinity of the sewer and thus indicated the presence of a metallic object several hundred feet in length and of comparatively small width, and with its length coinciding with that of the sewer. Enquiries made of the local authorities were at first discouraging in so far as we were informed that the sewer was of simple brick and concrete construction, with no metalwork; but on persuading the surveyor to refer to the actual plans, it was discovered that the section of the sewer crossing the field in question was of special construction owing to its proximity to the surface, and that this section was supported on a strip of expanded steel 6 ft. wide by 300 ft. long and buried 8 ft. below the surface.

This experience served to indicate the importance of systematically surveying by a radio method the prospective site of a direction finding station before the installation is carried out.

References

1. L. Hartshorn: "Standards of Electrical Measurements," *J.I.E.E.*, 1942, 89 Part I, 526-535.
2. H. V. Griffiths: "Frequency Measurement," *R.S.G.B. BULLETIN*, 1942, 18, 66-69.
3. J. E. Thwaites and F. J. M. Laver: "The Technique of Frequency Measurement and its Application to Telecommunication," *J.I.E.E.*, 1943, 89 Part III, 139-165.
4. L. Essen: "A Precision Frequency-Meter of Range 0 to 2,000 Mc/s.," *Proc. Phys. Soc.*, 1940, 52, 616-624.
5. J. A. Fleming: "The Principles of Electric Wave Telegraphy and Telephony" (Book), 1910, 201-203.
6. H. M. Turner and P. C. Michel: "An Electrodynamometer for Use at Frequencies from One to One Hundred Megacycles," *Proc. I.R.E.*, 1937, 25, 1367-1374.
7. E. B. Moullin: "Radio Frequency Measurements" (Book, second Edition), 1931, 168-183.
8. M. J. O. Strutt and K. S. Knoll: "Measurements of Currents and Voltage down to a Wavelength of 20 Centimetres," *Proc. I.R.E.*, 1939, 27, 783-789.
9. T. I. Jones: "Measurement of Current at Radio Frequencies," *Phys. Soc. Reports on Progress in Physics*, 1938, IV, 231-244.
10. (a) L. Hartshorn and W. H. Ward: "The Measurement of the Permittivity and Power

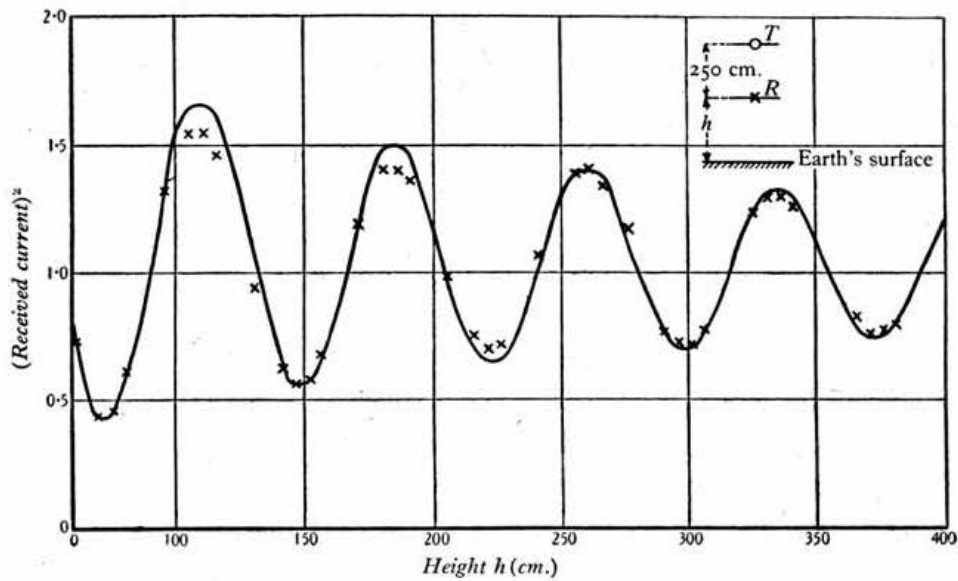


Fig. 5.
Shows relation between square of current in receiving aerial and its height above the ground.
xx Experimental values obtained July 27, 1933, Grass, $\lambda = 1.5$ m.
— Theoretic curve calculated for $\kappa = 10$ $\sigma/f = 3$.

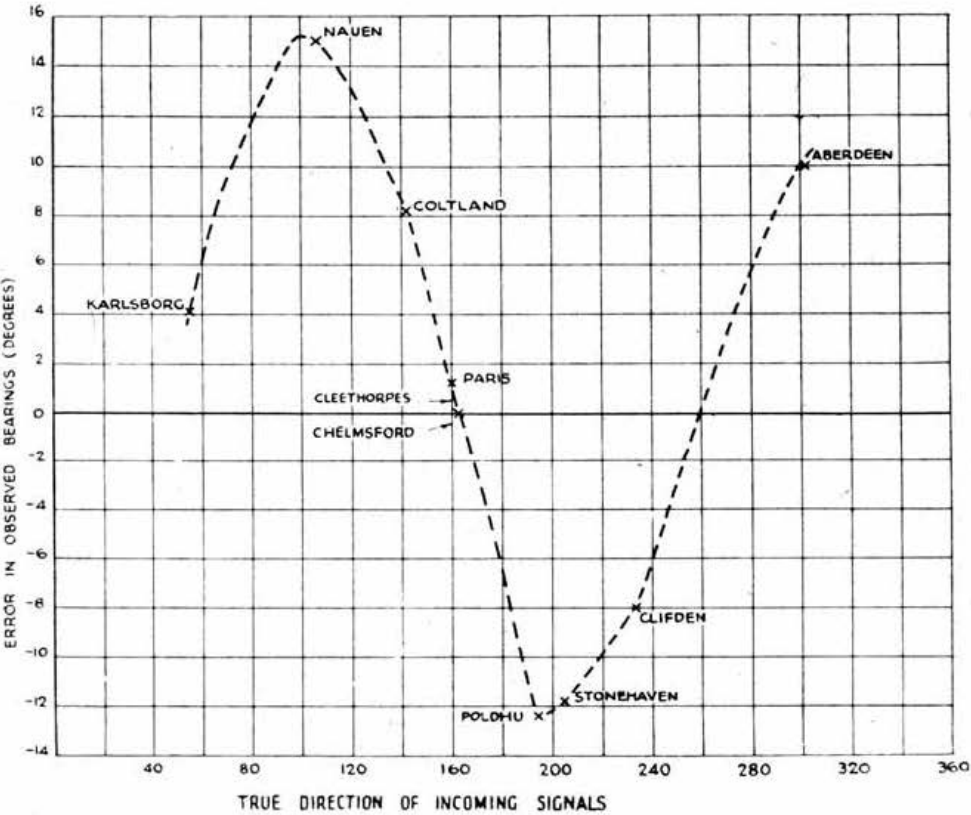


Fig. 6.
Curve illustrating errors in apparent radio bearings of rotating-loop direction finders.

- Factor of Dielectrics at Frequencies from 10^4 to 10^8 Cycles per Second," *J.I.E.E.*, 1936, 79, 597-609.
- (b) T. I. Jones: "The Measurement of the Characteristics of Concentric Cables at Frequencies between 1 and 100 Mc/s.," *J.I.E.E.*, 1942, 89 Part III, 213-220.
11. L. Hartshorn: "Radio Frequency Measurements by Bridge and Resonance Methods" (Book), 1940.
12. (a) F. M. Colebrook and A. C. Gordon-Smith: "The Design and Construction of a Short-Wave Field Strength Measuring Set," *J.I.E.E.*, 1939, 84, 388-398.
- (b) J. S. McPetrie and B. G. Pressey: "A Method of Using Horizontally Polarised Waves for the Calibration of Short-Wave Field-Strength Measuring Sets by Radiation," *J.I.E.E.*, 1938, 83, 210-215.
- (c) J. S. McPetrie and J. A. Saxton: "Theory and Experimental Confirmation of Calibration of Field-Strength Measuring Sets by Radiation," *J.I.E.E.*, 1941, 88 Part III, 11-14.
- (d) F. M. Colebrook and A. C. Gordon-Smith: "A Method of Calibrating a Field-Strength Measuring Set," *J.I.E.E.*, 1941, 88 Part III, 15-17.
13. (a) R. L. Smith-Rose: "Electrical Measurements on Soil with Alternating Currents," *J.I.E.E.*, 1934, 75, 221-237.
- (b) R. L. Smith-Rose: "The Electrical Properties of Soil at Frequencies up to 100 Mc/s.," *Proc. Phys. Soc.*, 1935, 47, 923-931.
14. (a) J. S. McPetrie: "A Determination of the Electrical Constants of the Earth's Surface at Wavelengths of 1.5 and 0.46 Metres," *Proc. Phys. Soc.*, 1934, 46, 637-648.
- (b) J. S. McPetrie and J. A. Saxton: "The Determination of the Electrical Properties of Soil at a Wavelength of 5 Metres," *J.I.E.E.*, 1943, 90 Part III, 33-35.
15. R. L. Smith-Rose and R. H. Barfield: "The Effect of Underground Metalwork on Radio Direction Finders," *Journal R.S.G.B.*, 1922, III, 87-93.
16. R. L. Smith-Rose: "Chairman's Address: Wireless Section, I.E.E.," *J.I.E.E.*, 1943, 90, Part I, 29-38.

A DIRECT READING PRECISION TUNING DIAL

By R. C. HARRIS (2BAB)*

WHILST planning the construction of a new T.R.F. receiver the writer realised that something better than the normal tuning dial was needed. It was decided therefore, to employ a dial that would satisfy a number of fairly exacting requirements. Briefly these were:—

- Ability to tune quickly to any part of the dial.
- Slow motion tuning at any point on the dial.
- Ability to read to 0.1 of a degree.

In the light of these requirements various types of dials were examined, but it was obvious that unless precision machining could be carried out, a satisfactory job was not possible. Consequently something more simple had to be devised.

It was finally decided that the "Utility" Micro-dial offered the best solution for requirements (a) and (b), but a slight modification would be needed in order to meet the last requirement.

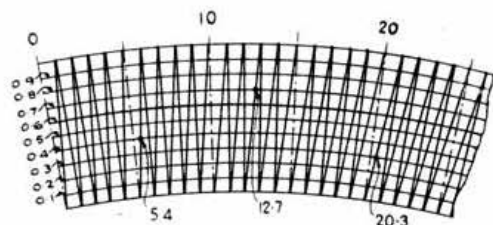
Making the Scale

In order fully to meet requirement (c) a semi-circle measuring 11 ins. in diameter was drawn on a sheet of thick white Bristol board, and this was divided into 180 divisions. It can be appreciated that even with a dial of this large diameter it is not easy to mark off the $\frac{1}{2}$ degree points accurately, consequently points between any two divisions must be estimated. To achieve the required degree of accuracy the following little-known principle, as used in the manufacture of laboratory sub-standard instruments, was adopted. Ten semi-circles, each equally spaced a distance of two millimetres, were drawn below the existing semi-circle. The marked divisions were then extended from the top to the bottom semi-circle, and the end of each division joined to the beginning of the next. The method can be seen from the accompanying sketch.

Reading off parts of a Degree

If we start with the hair line pointer at zero, and move it until it reaches the intersection of the second semi-circle and the vertical line, a reading of 0.1 degree is obtained. When the hair line reaches the next intersection the reading is 0.2 degree and so on. To facilitate quick reading every fifth degree is inked in red.

The completed dial, which is a precision job, will hold its own against many commercial types, whilst production costs are very modest. It has been found a great asset and adds pleasure to the logging of stations. To all who can exercise a little patience in marking out the divisions, they will find the effort well worth while. Curiously enough the original dial was purloined by another enthusiast who was not content with estimation but wanted accuracy!



The cursor on this dial has rather a small radius. To overcome this limitation, it was cut off near its base, leaving a small lip for the cementing on of a new one. From a piece of celluloid, a tapered cursor—having a hair line running its full length—was cut and fixed to the small lip, by means of "Bostock" No. 2 cement which proved to be by far the best of several types of cement tested.

* 9, Queens Drive, Finsbury Park, London, N.4.



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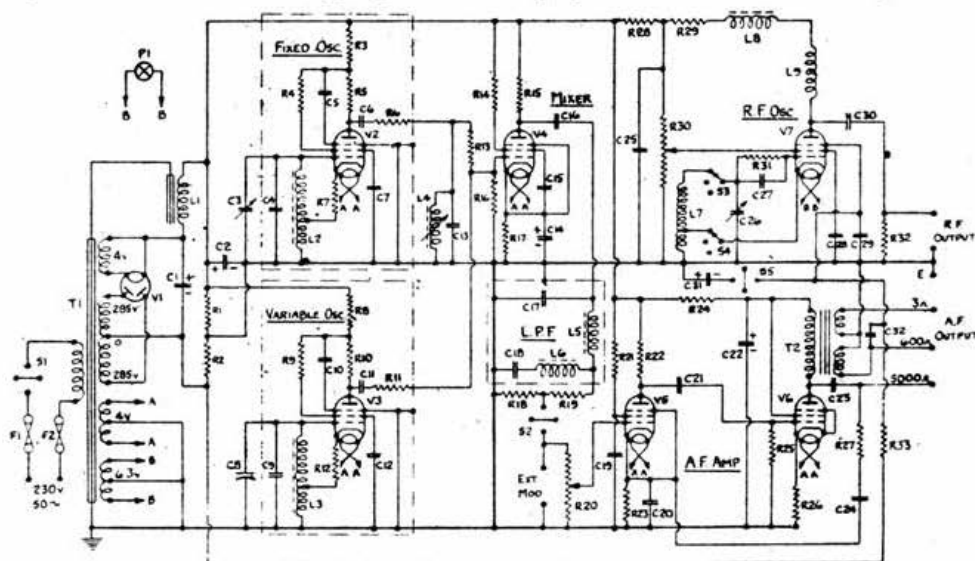
A COMBINED R.F. OSCILLATOR AND HETERODYNE A.F. OSCILLATOR

By E. H. NORMAN (BRS6748)*

THE development of a circuit which would combine an R.F. oscillator with an A.F. oscillator was undertaken with a view to affecting a saving in space and to avoid the use of two separate power supplies. It was also planned to use the audio frequency source as a modulator for a signal generator.

(C30) and is developed across a 1,000 ohms resistance (R32). This low value ensures almost constant output over each wave-band.

The R.F. oscillator is modulated by the A.F. heterodyne oscillator, suppressor injection being employed. When no modulation is required, the hum-



CIRCUIT DIAGRAM OF R.F. OSCILLATOR AND HETERODYNE R.F. OSCILLATOR.

Condensers (C)

1, 2, 22, 23	8 μ F
3	15 μ F
4, 9, 13	0.01 μ F
5, 10	0.1 μ F
6, 7, 11, 12, 30	0.006 μ F
8, 26, 29	500 μ F
14, 31	25 μ F
15	5 μ F
16	4 μ F
17	636 μ F
18	616 μ F
19, 32	25 μ F
20	0.09 μ F
21	1 μ F
24	0.007 μ F
25	2 μ F
27	100 μ F
28	1,000 μ F

Resistances (R)

1	25,000
2	500
3, 8	40,000
4, 6, 9, 11, 13, 22	160,000
5, 10, 20, 31	50,000
7, 12	750
14	100,000
15, 19, 29	10,000
16, 24	5,000
17	600
18	2,000
21	250,000
23, 32	1,000
25	1 megohm
26	150
27	5 megohm
28	20,000
30	250,000
33	15,000
Pilot (P1)	6v 0.3 A
Switches (S)	
1, 2, 5	S.P.S.T.
3, 4	S.P. 6 way

Inductances (L)

1	15H at 40 mA
2, 3, 4	2.5 mH
5	125 H
6	41 H
7	See text
8	3 mH
9	23 μ H

Transformers (T)

1.	P230v 5285v-0-285v at 40 mA
	4v at 2.5 A
	4v at 5 A
	6.3v at 1 A
2.	P 5,000 turns (20 H)
S1	1,400 turns
S2	100 turns

Valves (V)

1	AZ2
2, 3, 4, 5, 6	SP41
7	EF50

Fuses (F)

1-2	1A
-----	----

General Circuit Features

The power supply arrangements shown in the circuit diagram are quite conventional, an output of 40 mA at 300 volts being obtained from the components specified. The negative side of the input is earthed through a resistance to develop a negative bias for the suppressor of the R.F. oscillator valve. The latter (an R.F. pentode) is used in a standard E.C.O. circuit, the amplitude of oscillations being controlled by means of the screen-grid potentiometer (R30). The anode is connected to H.T. + through two chokes (L8, L9) and a resistance (R29). The R.F. output is taken from the anode through a condenser

level may be reduced by connecting, by means of the switch (S5), the 25 μ F condenser (C31) between suppressor and earth.

The B.F.O. employs two R.F. oscillators, one fixed at about 100 kc/s. and the other variable from about 84 kc/s. to 100 kc/s. The frequency of the fixed oscillator is varied over a range of 300 c/s. in order to enable "zero-beat" to be obtained. The E.C.O. circuit is again employed, using a resistor in the cathode lead. This resistor should be of such a value that the bias on the valve enables it to work under "Class A" conditions, the degree of feed-back being adjusted to permit the circuit to oscillate at low amplitude. If this is achieved harmonics are reduced. The output from the fixed oscillator is developed

* 52 Melton Road, West Bridgford, Notts.

across a tuned circuit (L4 C13) to ensure purity of wave-form. To provide a pure R.F. output these oscillations should be fed to the mixer valve at a lower amplitude than those from the variable oscillator. The mixer must of course be operating under correct conditions.

The oscillators are constructed in steel cans, made as nearly identical in size as possible, so that they both "drift" by the same amount when warming-up.

The mixer valve (an SP41) requires 250 volts on its anode, a 600 ohms bias resistor (R17) and a 100,000 ohms screen dropping resistor (R14). The screen and suppressor circuits are returned to cathode and not to earth. Various other methods of mixing (modulating) were tried, but the arrangement described and shown in the circuit produced by far the best results. Screen and suppressor injection, for example, gave very low output and poor wave-form.

The following table gives the peak input voltages obtained from the two oscillators, the oscillator not concerned being stopped by shorting its grid to earth.

Fixed oscillator	1.6 volts
Variable oscillator	0.4 volt
Total peak	1.8 volts

The anode of the mixer is supplied with H.T. through a 10,000 ohms coupling resistance (R15) whilst the A.F. output is fed through a 4 μ F condenser (C16) to a low-pass filter (C17, L5, L6). This filter, which eliminates the high frequencies present at the anode, has input and output impedances of about 10,000 ohms and passes freely all frequencies below 25 kc/s. Higher frequencies are suppressed.

The output from the filter is fed to an audio amplifier of usual design, negative voltage-feedback being employed in order to render the output independent of small variations in load impedance.

The output transformer (T2) is wound for both 3 ohms and 600 ohms output impedances. A 5,000 ohms output can be obtained direct from the anode of V6 via the condenser C23.

The negative feedback circuit compensates for the very high and very low audio frequencies, the latter being attenuated by the 4 μ F condenser (C16) feeding the low-pass filter. The higher frequencies suffer loss due to output transformer capacities, etc.

Tests have shown that the audio output into a 5,000 ohms non-inductive load is within 0.5 db from about 30 c.p.s. to about 16 kc/s. An output of about 250 mW is catered for; if greater power is required an external power amplifier should be used.

Coil Data

R.F. Oscillators

65—180 kc/s.	12 mH
200—600 kc/s.	1.8 mH
650—2,000 kc/s.	180 μ H
1.6—6.5 Mc/s.	18 μ H

The centre-tap which is not critical is best placed about one-third of the total turns from the earth end.

The values quoted are only approximate and depend upon the tuning condenser capacity.

Beat Oscillator

Inductance 2.5 mH permeability tuned with 0.01 μ F condenser to 100 kc/s.

Tuning Coils

Coils covering the frequency range 70 kc/s. to 6.5 Mc/s. have been constructed. These follow standard formulae and data. To overcome the effects of distributed inductance and capacity, a one inch length of wire, taking the place of a coil, has been used for frequencies between 30 and 100 Mc/s.

Author's Note

The frequency response claimed for the B.F.O. was obtained with the connection to the suppressor grid of the EF50 removed. The R.F. by-pass condenser connected to this electrode causes a considerable falling-off of response at high audio frequencies. This is of small importance when the B.F.O. is used as a modulator as the modulation frequency is usually fairly low. It is suggested that means be provided for disconnecting the lead to the R.F. oscillator when the flat response is required.

THE LOAD LINE—(continued from page 147)

It is agreed that the human ear will forgive a certain amount of distortion—a tolerable value being a second harmonic content of 5 per cent. It is said that when the quantities CP and CQ on the load line of Fig. 2 are in the ratio of 9 : 11, a second harmonic content of 5 per cent. is reached and must not be exceeded. Our example fulfils this requirement.

If now it is required to offer this magnified voltage for further amplification it is only necessary to apply the voltage developed at the valve plate to the grid of a further valve by one of the many available methods. When this is done it is usual to arrange the valve load to produce a maximum voltage swing without consideration of the magnitude of the attendant current, since only the voltage swing is made use of.

Output

When the valve is required to work a power-operated device, such as a loudspeaker, consideration of both the voltage and current is necessary, since it is the product of these which decides the available power. According to Fig. 2 the power output of the valve under static conditions, as indicated at C, is 79 volts \times 4.1 milliamps or 324 milliwatts, but the dynamic power output is the product of the R.M.S. values of the swinging voltage and current. It was shown that the maximum voltage swing at the plate is 50, and in a similar manner the plate current swing will be seen to be 5 milliamps. Since the positive and negative peak values are not exactly equal it is necessary to divide both of these values by 2 to determine the effective peak values. So then the product of the R.M.S. values will be given by

$$\frac{50}{2} \times \frac{1}{\sqrt{2}} \times \frac{5}{2} \times \frac{1}{\sqrt{2}} = \frac{50 \times 5}{8} = 31 \text{ milliwatts.}$$

Subscriptions to "Radio"

Until further notice no further subscriptions to the American monthly publication *Radio* can be accepted by the Society.

Applications for Membership

Members who sponsor applications for Corporate Membership are requested to insert their call sign or B.R.S. number after their signature in the space provided on the application form.

OUR FRONT COVER

NOTHING much of real experimental worth in radio can be accomplished without accurate measurement. The Model 7 Universal AvoMeter is a 50-range B.S. first grade combination measuring instrument giving direct readings of A.C. and D.C. voltage, A.C. and D.C. current, Resistance and Capacity. Audio-frequency power output and Power Level readings also provided for. It is but one of the comprehensive range of "AVO" high-grade electrical measuring instruments—a range which includes something to meet the needs of every amateur, service engineer and serious experimenter. At the present time, however, the manufacturers are only able to accept orders which bear a Government Contract Number and Priority Rating. Fuller particulars obtainable from The Automatic Coil Winder & Electrical Equipment Co., Ltd., Winder House, Douglas Street, S.W.1.

BRITISH ISLES NOTES AND NEWS

DISTRICT 1 (North Western)

D.R.: H. W. Stacey (G6CX), "Sandless," Eddisbury Road, West Kirby, Cheshire. Hoylake 337.

Ashton-under-Lyne.—A meeting of the Ashton-under-Lyne Radio Society, held on March 19 at the home of BRS5043, was attended by G3PM, 5PX, 6DV, 2HAP, 2AJP, 2FXW, 2HBX, BRS4581, 5043 and 4567, Sgt. Amies, R.A.P.C., and Mr. J. Chadderton. BRS5043 and Y.L. very kindly provided refreshments. A raffle of radio components, given by 5043, realised the sum of £1 for the R.S.G.B. P.O.W. Fund.

A debate, "Theory v. Practice," followed; the forthcoming P.D.M. was also discussed. (via G5PX.)

Bolton.—Local members are emerging from their winter hibernation; news is also to hand from some of those who are abroad.

4795, after a silence of 18 months, recently weighed in with a letter enclosing a snapshot of himself with two celebrated ancient monuments in the background; he sends best wishes to all. 5542 (Prestwich) has now passed out as Telegraphist and has left the "Land of tail-less cats." 6084 (Colne) has also changed his QTH. Old-timer 2BDA removed to Wallasey last month and was presented with a Book Token as a farewell gift from local members. (Hope you can support the Liverpool Meetings O.M.—G6CX.) (via 2DVQ.)

Liverpool.—The meeting held on March 25 left no doubt in the minds of those present that interest in amateur radio has by no means fallen off—the contrary it is very much alive. A list of the twenty-five members who attended (some from quite far afield) is appended for the benefit of those who are serving overseas or in other parts of the country. It was especially gratifying to welcome SP1RH and to hear him join in the discussions, also the Liverpool T.R., Mr. H. Caunce, G6KS, home from the Falklands.

A number of members have responded to the D.R.'s appeal for short informal papers on specified topics which are of particular interest to other members. Anyone who is prepared to give a paper will help to make future meetings equally successful. Papers so far promised cover Quartz Crystals, Receptor Circuits, Electrolytic Condensers, Cathode Ray Tubes, Audio Amplifiers, Aerials and Valves. Papers on fundamental principles are needed, particularly one on "standing waves."

The next meeting is to be held on Saturday, May 20 (see "Forthcoming Events"), when it should be possible to announce a complete programme for the rest of the year. It is tentatively suggested that a meeting shall be held once every two months as such an arrangement will not make too great a demand upon the small amount of leisure most of us enjoy these days.

Full support has been promised for the P.D.M., a preliminary announcement whereof appears in "Forthcoming Events."

Will any member who is prepared to give instruction to the A.T.C. (West Derby area) please contact Mr. Whitelaw (G4GH), 3 Daltry Close, Liverpool 12. Tel.: Stanley 1507?

The following attended the Liverpool meeting:—Messrs. Harper (4742), Sanderson (2AYK), Ashkan (G6TT), Mason (5335), Wright (5RY), Foster (7656), Lees (4891), Chroston (8QO), Kuhn, Mackenzie (3SX), Caunce (6KS), Cavill, Spears (8AZ), Dewhurst (7653), Curtis (5031), Palla (6DP), Jones (2JT), Slater (7072), Menzies (5MQ), Podolski (SP1RH), Whitelaw (G4GH), Nuttall (4BO), Pollard (5PO), and Stacey (6CX). G6CX.

DISTRICT 2 (North Eastern)

D.R.: C. A. Sharp (G6KU), 316 Poplar Grove, Gt. Horton, Bradford. Bfd. 10772. Scribe: H. Beadle (G8UO), 13 Chandos Street, Keighley.

The President (G6GR) and Secretary (G6CL) will attend the P.D.M. at the Hotel Metropole, Leeds, on May 14. Full details appear in the special announcement.

Bradford.—G6KU has recently completed a combined frequency meter-monitor and modulation indicator which he hopes to display at the P.D.M. 4CL was recently visited by Don Sutton. We extend our sympathy to 3KB on the death of his father. He is expected home from Egypt soon. News of Bradford members will be welcomed by 6KU.

Leeds.—Local members are asked to contact the T.R. (W. F. Wilson, 27 Grovehall Avenue, Beeston) or BRS6730 (F. Stork, 1 Brudenell View, Leeds, 6) who are making a joint effort to stir up interest in the town. We welcome new member BRS7567 who recently donated a parcel of gear to the A.T.C. News is wanted of Cpl. F. Knight, R.A.F., G4MC.

Huddersfield.—6340 has constructed a "Wireless World" moving coil pickup with excellent results. News of other local members will be welcome.

General.—6899 (R.C.S.) who is interested in 56 Mc/s. would like some advice on building a good receiver for this band. He was recently stationed with 8WP. 3HA has now rejoined his unit. 8RY and 3UP are still with him, the latter having recently returned from Italy. Sgt. West (Southampton) who is in the same unit has recently joined the Society. News is wanted from 2VO, 51V and 6ZN. Letters from T.R.'s should reach the scribe by the 23rd of the month. Congrats to Mr. and Mrs. Edgar Walker (G2LT) now the proud parents of a baby daughter.

G8UO.

DISTRICT 4 (East Midlands)

Deputy D.R.: Albert E. Clipstone (G8DZ), 14 Epperstone Road, West Bridgford, Notts.

Derby.—G5YY is welcomed back to membership. G2OU. **Leicester.**—At the March meeting 5605 demonstrated a valve tester, whilst 5529 brought along proof of his recording gear. A demonstration is to be arranged in the near future. A discussion followed on the subject of forming a local 56 Mc/s. network after the war. The majority were in favour of the idea.

G4BJ sends 73 from India. 2IX and 3BU request news of 5MY. BRS5605.

Mansfield and Sutton.—Arthur Goode, 2DTQ, who is welcomed back from the M.E., reports meeting G3XA while in Egypt. G8MR was last heard of in Italy. BRS7171.

Nottingham.—Thirty-three members attended the P.D.M. at Wigston and a good time was had by all. Our thanks are due to the T.R. (BRS5605) and G4FO for the work they put in to make the event so successful.

At the March meeting 2A00 demonstrated his oscilloscope. Many questions relating to the servicing of radio gear were asked and ably answered by technical members who were present.

The next meeting will take place on Sunday, April 16, at the Beeston Lads' Club, Station Road, Beeston, at 2.30 p.m., when Messrs. Taub and Norman will discuss Valve Voltmeters and Signal Generators respectively. Tea will be provided.

G4IY who has been abroad for about three years is welcomed home from the M.E. G8DZ.

NORTH EASTERN PROVINCIAL
DISTRICT MEETING

to be held on

SUNDAY, MAY 14th, 1944

at the

Hotel Metropole, Leeds

PROGRAMME

ASSEMBLE	2 p.m.
BUSINESS MEETING	3 p.m.
TEA AND BISCUITS	4.30 p.m.
OPEN DISCUSSION	5.30 p.m.

INCLUSIVE CHARGE 2/-

Reservations to Mr. C. A. SHARP (G6KU), 316 Poplar Grove, Gt. Horton, Bradford, not later than May 6th, 1944

ALL MEMBERS CORDIALLY INVITED TO ATTEND

DISTRICT 5 (Western)

D.R.: R. A. Bartlett (G6RB), 31 King's Drive, Bishopston, Bristol. Bristol 46960.

Bristol.—The March meeting was poorly attended, although we were pleased to welcome 2IK and 3RQ home on leave. 5KT is also on leave. 5WI reports fit but is unable to attend meetings.

Swindon.—3JO reports that 3HS is stationed near Maidenhead and 2CGN near Blechley. C. P. Eatwell (R.A.F.) has met several members at No. 2 R.S. G6RB.

DISTRICT 7 (Southern)

D.R.: W. E. Russell (G5WP), Milestones, Mayford, Woking, Surrey. Woking 1589.

Croydon.—BRS6064 has joined the R.A.F. (Good luck O.M. and don't forget to look us up when on leave.) 2RD and 4314 have been on leave. 4314 did some book-binding for 2DP which was greatly appreciated. We were pleased to read of the safe arrival in Egypt of Capt. Ellis, SU5KW. (Keep your eye open Ken for Capt. Herbert, G6RF.) (via G2DP.)

Reading.—There was a good attendance at the March meeting when Dr. Moss delivered a most interesting lecture. The slides, made by Mr. Moss, Ser., enabled even the beginners to grasp the working principles and construction of the Cathode Ray tube. Questions were ably handled by the lecturer to whom a hearty vote of thanks was accorded at the conclusion of the meeting. Among those present were G2YI, 6SY, 8KJ, 2BTV, 2DIO, 4030, 5225, 6957, 7578, 5530 and 4573.

The April meeting, details of which will be found under "Forthcoming Events," will be devoted to arranging a programme for the year and to electing a Committee.

(via BRS4573.)

Couldson.—G3IG has left this country for a warmer climate. No other news this month. (via 3003.)

Bournemouth.—G2NS has built a battery 1-V-1, 3BM is constructing new masts for post-war use, 4IJ was recently on leave. 2HNO, having taken his final examination, has returned to the town and resumes his duties as T.R.

(via G2NS and 2HNO.)

General.—6918 (R.A.F.) would be glad to hear from any member who has an H.M.V. "effects" record of wind and sea. It is required for an entertainment at his station (QRA from the D.R.). STJ (R.E.M.E.) is stationed in the District. Congrats to 6931, Thames Ditton, upon the safe arrival of a junior op 5YA arraigned before the magistrates to explain why his dog bit one of the P.M.G.'s employees was relieved of 10s.1

G5WP.

Forthcoming Events

- April 16 District 4 (Nottingham), 2.30 p.m. at Lads' Club, Station Road, Beeston. Lectures: "Valve Voltmeters" by D. M. Taub, and "Signal Generators" by E. H. Norman. (Tea provided.)
- " 23 District 1 (Ashton - under - Lyne, R.S.), 2.30 p.m. at 8 Hutton Avenue. (Bus to Stamford Park at 2.15 p.m.)
- " 23 District 5, 3 p.m. at 17 Colston Avenue, Centre, Bristol.
- " 23 District 12, 3 p.m. at BRS3386, 22 Church Hill, Winchmore Hill. (Bus 244 from Southgate Tube Station to Chase Side Tavern.)
- " 29 London Meeting, 2.30 p.m. at Institution of Electrical Engineers, Savoy Place, Victoria Embankment. Lecture: "Negative Feed-Back and its application to Transmitters and Receivers" by H. A. M. Clark, B.Sc., G6OT.
- " 29 District 7 (Reading), 6.30 p.m. at The Comrades' Club (1st floor), 42 Oxford Street.
- " 30 Scottish "A" District, 3 p.m. in Royal Technical College, George Street, Glasgow. (Enter by Montrose Street.)
- " 30 District 4 (Leicester), 2.30 p.m. at G6VD, 9 Cecilia Road. (Sale of surplus gear.)
- May 6 District 15, 3 p.m. at The Excelsior Hotel, 1 Ladbroke Gardens, Ladbroke Grove, Notting Hill, W.11.
- " 7 District 7 (Croydon) and District 13 (South Central and Eastern Areas), 3 p.m. at Croydon Y.M.C.A., North End, West Croydon.
- " 7 District 14, 3 p.m. at The Y.M.C.A., North Street, Romford.
- " 14 North-Eastern Provincial District Meeting, 2 p.m. at Hotel Metropole, Leeds. (See separate announcement.)
- " 14 District 15 (High Wycombe), 2.30 p.m. Details from Mr. Freer, 37 Melbourne Road, High Wycombe.
- " 20 District 13 p.m. at The Stork Hotel, Queens Square, Liverpool.
- " 21 District 4 (Mansfield), Meeting followed by tea. Ladies invited. Details from Mr. Davies, 18 Farndale Road, Sutton-in-Ashfield.
- June 24 District 15 Dinner and Dance, Park Royal Hotel. (Full details next month.)
- July 8 North-Western Provincial District Meeting in Liverpool. (Full details next month.)

DISTRICT 9 (East Anglia)

D.R. : H. W. Sadler (G2XS), The Warren Farm, South Wootton, King's Lynn, Norfolk. Castle Rising 233.

Mr. Houlit, 2FOH, reports having contacted W2BW and W2LXQ. 2FOH sends 73 to 2YL. We are glad to welcome Mr. T. Gates of Saxmundham as a new member, and were glad to see 4LM in King's Lynn during his recent leave. G2XS.

DISTRICT 10 (South Wales & Monmouthshire)

Deputy D.R. : H. H. Phillips (GW4KQ), 82 Cottrell Road, Roath Park, Cardiff. Cardiff 2697 during business hours.

Cardiff.—Amongst those present at the March meeting were GW2UH, 4KQ, 8UH and 2AGH. The next meeting will take place at the home of GWSUH, 29 Ladysmith Road, off Penylan Hill, Roath Park, at 2.30 p.m. on Sunday, April 30, 1944, and a cordial invitation is extended to all.

News from other parts of the District is scanty but the writer was pleased to hear from GW3CR, 2DBO and 6626, who are now on Active Service in the U.K., whilst welcome Airgraphs have arrived from 2DOS (M.E.F.) and 6898 (India).

GW4KQ.

DISTRICT 11 (North Wales)

Deputy D.R. : C. Spillane (BRS1060), "Woodside," Meliden Road, Prestatyn.

G2GZ, BRS1060, 2731, 4444, 7516, 7520 and 7529 met at the "Savoy Cafe," Prestatyn, on March 5, but owing to last-minute arrangements this meeting could not be advertised.

It is with deep regret we learn that one of our newest members Mr. C. D. G. Grant, BRS7516, whom we met at the above meeting for the first time, passed away on March 10 after a very short illness. To his family we extend our deepest sympathy in their tragic loss.

G2GZ has received letters from Cpl. White, 7228, R.A.F., and L.A.C. Hughes, 6921, R.A.F., at present stationed on the N.E. Coast and in Norfolk respectively. In an airgraph from Aden, L./Tel. R. Jones, GW3JJ, reports meeting amateurs from VK, ZC6, ZS, SU and W. He sends 73 to GW3KY, 3QN, 6AA, 60K and other old friends. F./Sgt. Dore, R.C.A.F., BERS520, now in Surrey, has just announced his engagement. (Congrats O.M.). 2DAH who recently transferred from C.M.P. to R.C.S. has contacted an old friend in BRS4214. They are on the same course somewhere in District 2.

GW4CK has met Sgt. Leigh, 2FCV at his station; he is anxious to hear from G8DQ (R. Sigs.), one-time visitor to District 11. He also seeks information on the radio control of model ships. 4762 (R.A.F.) is at an I.T.W. in Yorkshire awaiting aircrew course. 4761 is also understood to be awaiting a similar course. 2HIY, still in Hants, expects his W./Om.'s course posting to come through shortly.

GW4CK, 2GZ, 1060 and others have recently tried to contact BRS5660 who has opened a radio business in Prestatyn. As no success attended their efforts, the writer would like to hear from the member in question. BRS1060.

DISTRICT 12 (London North and Herts)

D.R. : S. Buckingham (G5QF), 41 Brunswick Park Road, New Southgate, N.11. Enterprise 3112.

North London.—The March meeting, held at the home of Mr. R. Reed, G2RX, was attended by G2DF, 5QF, 6OT, 2DHF, 2DWV, BRS3386, 4249, 4486, 4674, 4759 and 7793. A most enjoyable afternoon was spent and thanks are due to our host who also provided a welcome cup of tea. Congrats to Tel. F. Gregory on being awarded the B.E.M. The next meeting will be held at BRS3386 on April 23 (see Forthcoming Events).

The D.R. acknowledges with thanks the receipt of letters from BRS734, 6942, 7061, 7565, 7601 and 7793.

St. Albans.—2BVH, 2HAB, BRS4017, 4502, 7238, 7793 and 4709 (a welcome visitor from Lincolnshire) attended the February meeting at BRS3412. 7793's description of a visit to a U.S.A.A.F. Fortress aerodrome proved interesting and a wide range of radio topics were discussed. Thanks for tea are due to the parents of 3412 and his YL.

The T.R. has been pleased to receive visits from 2APS, BRS 4502, 4477 and 7238. G5QF.

DISTRICT 13 (London South)

A.R. (South Eastern and Central), S. E. Langley (G3ST), 62 Dumbarton Road, S.W.2.

The March meeting, held at the Y.M.C.A., Croydon, was supported by G2DP, 2JK, 3ST, 4NI, 5BT, 5JR, 2FWA, 2HHD, BRS1545, 3003, 4314, 4324, 4584, 4814, 5317, 5859 and 6064. During the afternoon Lt. Illott, R.E.M.E. (G2JK), gave a very interesting talk on the design of oscillator and P.A. circuits, including those for U.H.F. purposes.

A collection on behalf of the R.S.G.B. P.O.W. Fund realised £1 3s. 8d. thanks to special contributions from 2JK and 2FWA. The latter raffled some tickets for a B.B.C. show.

See "Forthcoming Events" for date of next meeting.

G3ST.

★ LONDON MEETING ★

Mr. H. A. M. CLARK, B.Sc. (G6OT)

WILL DELIVER A LECTURE ENTITLED

"Negative Feed-back and its application to Transmitters and Receivers"

at

A Meeting of the Society to be held at
The Institution of Electrical Engineers
Savoy Place, Victoria Embankment, W.C.2

On SATURDAY, APRIL 29th, 1944

The meeting will commence at 2.30 p.m.
followed by TEA at 4 p.m.

DISTRICT 14 (Eastern)

Scribe: L. J. Fuller (G6LB), 167 Galleywood Road, Chelmsford, Essex. Chelmsford 3929.

Chelmsford.—There was an excellent attendance at the March meeting held at G6LB, when the following full call-sign holders were present: G6AB, 6ZC, 2KH, 6LB, W5DJ, W4GHK and W2NYS. Five BRS members brought the number up to a round dozen. Interesting discussions took place between the English and American amateurs on the merits of their respective gear. Lt. Kerford Byrnes, G6AB, later related some amusing stories of life at sea, which gave us some idea of what we owe to the Silent Service.

Romford.—A meeting has been arranged for Sunday, May 7, at the Y.M.C.A., North Street, Romford, at 3 p.m. Roll up and make this function as big a success as the last. G6LB.

DISTRICT 15 (London West, Middlesex and Buckinghamshire)

D.R.: H. V. Wilkins (G6WN), 539 Oldfield Lane, Sudbury Hill, Greenford, Middlesex. Byron 3369.

Arrangements are being made to hold a Dinner and Dance at the Park Royal Hotel on June 24th. Full details will be published next month.

The D.R. and 2ADL were present at the recent meetings held in West London and High Wycombe. G5IJ, 5LN, 8KZ, Mr. Myles and Mr. Gardiner, Jr., attended the former, while 2RL, 6IF, 4781, 4782, 5666 and 7714 were at High Wycombe.

Although these meetings are seldom well supported they serve the very useful purpose of keeping keen members together. It is a pity that similar meetings cannot be held in places such as Hounslow, Staines and Twickenham, as they would help newer members to get to know something about our activities as a District. Are there any members who would organise local meetings in the areas mentioned?

As the High Wycombe stalwarts are trying to arrange a summer outdoor social, local members are asked to send their suggestions to the Acting T.R.

G3GY and 2BMY report fit and well by airgraphs. (3GY is now back in England.—Ed.). 7235 has visited the D.R. We learn with regret that 2ARR lost his home during a recent air raid.

G2VV is now located at The Hollies, 84 High Street, Hampton-on-Thames, Middlesex (Molesey 3580).

G8BW has left Aylesbury and is now located in West Drayton. Local members showed their appreciations for his past efforts by presenting him with a brief case. For this gift the recipient desires to express his warm thanks. Mr. C. R. Last, 6014, 91 Molefield Estate, King Edward Avenue, Aylesbury, having offered to act as T.R. it is hoped that all local members will give him the support necessary. The D.R. would like to thank Mr. Hamer for his past services and Mr. Last for agreeing to take over the duties of acting T.R. G6WN.

DISTRICT 16 (South Eastern)

Deputy D.R.: W. A. Scarr, M.A. (G2WS), 8 Beckenham Grove, Shortlands, Bromley, Kent. Beckenham 1131.

A letter from Cpl. Lane, G3GW, brings the news that he is in England again after a spell of duty in Ontario. While abroad he spent many happy hours with the VE 3's. He is hoping to settle in Canada after the war.

Eddy Trowell, 2HKU, reports from Sheerness that he has received visits from G3GW and 4721. He has heard that 2DHW is still fit and well and has also received letters from R. Geddes and Harry Nicholson who are still abroad.

The Acting D.R. would be glad to hear from other members who are still active, or have news of general interest to the District. G2WS.

DISTRICT 17 (Mid East)

D.R.: A. C. Simons (G5BD), Admiralty Road, Mablethorpe, Poole 69.

G6GH and 5LL are still the only overseas members to send a report. The former is hoping to attend the next Cairo meeting, while 5LL has little to say except that he is still in Sicily. 6270 writing from Staffa is anticipating what he will do with a full call! 80X is still snowed under with Service work and has not been able to arrange any meetings at No.1 RS recently. G5VS, who finds himself based in the district at the moment, has had personal contacts with G5LV, 5MT, 5GS and 5601. G5BD.

DISTRICT 18 (East Yorkshire)

District Scribe: S. Davidson (G6SO), 10 Sidney Street, Scarborough.

Scarborough.—G6CP (R.A.F.), after a spell of duty in Italy and elsewhere, is now in the South of England. 6943 (R. Tank Corps), a recent visitor to 6SO, was captured when Tobruk fell but escaped when his P.O.W. ship was sunk. He served with the 8th Army in Africa. 2FJM (R.N.), and 7235 (R. Sigs.), are now in the District. 3805 (R.A.F.), still stationed in the Chester area, has been on leave in Whitby recently.

Hull.—G3PL reports contacts with 4530, 4590 and 2FGQ. 2H4Z has met two Italian amateurs during his stay in that country, but his attempts to form a radio club have met with many difficulties. 2CGL, stationed in the Grimsby area, gets home fairly frequently. 7618 has returned to sea. 4209, writing

from Redditch, breaks a two years' silence. G3PL will be pleased to receive visitors at 79 Hayton Grove on Monday evenings after 7 p.m. G6SO.

DISTRICT 19 (Northern)

D.R.: R. J. Bradley (G2FO), 36 Raby Road, Stockton-on-Tees.

The only news to hand this month is from 2HMK of Darlington, who has just completed a new power pack and has spent some time "hotting up" his receiver. He now contemplates a new modulator using a 6C5 and 6L6. In spite of all this he found time to receive a visit from the stork which left behind a YL op. Hearty congrats, O.M.! G2FO.

Northern Ireland

D.R.: J. N. Smith (G15QX), 19 Hawthornden Drive, Belmont, Belfast. Telephone: Belfast 63323.

Belfast.—After a stay of three years G2FS is moving to another area. We are sorry to lose him but wish him the best of luck wherever he may settle. G3TR now back at his old QRA also has our good wishes.

Derry.—Congrats to VE5AJV on his recent marriage to Miss Joan McCallion (N.W.I.A.R.S.).

At a recent meeting of the local Society, the Chairman, G6QY, read an interesting and much appreciated paper on the subject of Interference Suppression.

The N.W.I.A.R.S. has decided to apply for affiliation to the R.S.G.B. 7131 has left us, while 7263 has reported his presence to the T.R. G15QX.

Scotland

Scottish Records Officer: J. Hunter (GM6ZV), 51 Camphill Avenue, Glasgow, S.1. Langside 237.

"A" District.—At the March meeting short talks were given by Messrs. R. S. Cameron, Ian B. Jamieson and David Macadie, GM6MD, on short-wave receivers, converters and pre-selectors. Each of the speakers illustrated his talk by specimens which aroused considerable interest. We were pleased to welcome G8SC and our old friend Sgt. Don Duthie, GM6IW (R.A.F.). It is hoped that the activities of the recently elected committee will result in an improvement in meetings. GM6ZV.

Swanage Soirée

Thanks to the initiative of F./Lt. Phil Thorogood, G4KD, a highly successful meeting was held at Strong's Cafe, 37 Station Road, Swanage, Dorset, during the evening of Thursday, March 23. Although only supported by a small number of Society members the attendance reached the satisfactory total of 25. Among those present were W2FLE, 2EMR, 90IY, 9UYL, VE4VO, G6VC, 2AOF, BR55746, 6082, 6997 and 6TG, who cycled 50 miles from Bournemouth to attend.

The disposal of obsolete W.D. and A.M. equipment, Service chevrons for ex-Civilian Wireless Reservists, and assistance to the A.T.C., were among a variety of subjects discussed. War experiences were related and photographs of pre-war amateur stations displayed.

It is planned to hold a further meeting at the same venue on Thursday, April 20, at 7.30 p.m. All enquiries should be addressed to F./Lt. Thorogood, at his home address, 35 Gibbs Green, Edgware, Middlesex.

Technical Contributions Wanted

The General Editor will be pleased to receive offers from members who are prepared to contribute articles on the following subjects:—

- (a) Impedance Matching (Aerials, Transformer and Valves). This article should be illustrated by analogies and written in a style suitable for the not-too-advanced reader.
- (b) The design, construction and erection of aerial masts for amateur stations. It is intended to publish a symposium describing various types of masts.
- (c) The propagation of radio signals with special reference to the most suitable frequencies, times of day, and times of year, for short and long distance communication.

In addition to the above, short constructional articles are required.

Members are requested to communicate their offers in writing prior to commencing the preparation of an article.

A.T.C. Instructor Wanted

F./O. R. F. R. Clark, G5PY, Officer Commanding 1588 Flight A.T.C. (L.C.C. School of Building, Clapham College, Nightingale Lane, London, S.W.4) would be glad to hear from any member who is willing to give Morse instruction on Monday, Wednesday or Friday evenings from 6 p.m. to 7 p.m. The Squadron Headquarters are within 50 yards of Clapham South station (Morden Line).

Publicity Leaflet

A revised leaflet outlining the aims and objects of the Society and privileges of membership is now available for the information of prospective members. An application form is also included. Copies are available on request to Headquarters.

KHAKI AND BLUE

● Further to the paragraph published in our February issue, Pte. Henderson, **BRS4504**, reports that the Meerut Radio Club has commenced its activities in good style. Alan S. Hobbs is the Secretary and D. M. Henderson, Chairman. The purpose of the Club is to foster the Spirit of Amateur Radio and to provide opportunities for members to discuss problems relating to Electronics and Radio Communication. The subject for discussion at the inaugural meeting, held on November 11, 1943, was "Radio for the Layman," but at subsequent meetings, alternating current theory and detector circuits were considered. Pte. Henderson can be located at the British Army Pay Office, Meerut, India Command.

● Lt./Cpl. E. J. Campling, **2BMY**, in an airgraph from India reports meeting **G5UC** (Lancaster) and a couple of W's. Apropos **G6RP**'s article on Post War Planning published in the December BULLETIN, he wisely points out that before structural alterations are made to property, the approval and consent of the local authority is necessary.

● Cfn. J. P. Evans, operator of **GW8WJ**, now in R.N.A., has met Rene Roujas, **FA3JY**, Ferdinand Laye, **FA8CC**, and Charles Roseau, **FA8HQ**, all of whom are in "Civvy Street." Laye is in Public Transport, Roujas has a radio business and Roseau is believed to be in the wine trade.

● Lt./Sgt. F. T. Smith, **G6FK**, now with the R.A.F. in the C.M. area, sends greetings to all old friends in Dudley, Stourbridge, Hinchley and Birmingham. His new home address is 25 Moor Street, South, Blackheath, Wolverhampton.

● Members stationed, or calling, at Gibraltar are invited to contact Sigm. J. Hartnell (R. Signals), **BRS7769**.

● Cpl. Cawkill, **BRS6657**, now at an R.A.F. W./T. Station, Telecoms. Centre, in the M.E. sends greetings to **BRS6582** and **6593**.

● After four years service afloat, Lt.-Com. Vernon Mellor, R.N.V.R., **G5MR**, is now back in England. Old friends can contact him via his home address, The Old Barn, Felpham, Bognor Regis, Sussex.

● Cpl. Arthur Newall, **G3QV**, an R.A.F. Wireless Mechanic who is with the C.M.F. wishes to be remembered to **G3AO**, **RY**, **SR**, **4LQ**, **6GX**, **NM**, **8HG**, **TH**, **SU1AX**, **1SG**, **ITM** and **W3DSY**.

● P.O. Tel. H. E. Corke, **BRS4474**, who has just returned from the U.S.S.R., reports meeting Martin Bourke, **2AOU**, and Bill Hamer, **G3WT**, in Moscow. The former celebrated his promotion

to C.S.M. during Christmas. The *Amateur Radio Handbook* is very popular among Russian amateurs, who have no equivalent publication.

More about the "Duration DX-ers"

W./C. John Hunter, **G2ZQ**, reports, by airgraph from H.Q. Air S.E. Asia Command, that the February meeting of the "Duration DXers" was supported by **XZ2EX**, **VU2AH**, **ZE1JM**, **G6GD**, **2ZQ**, **2FQR**, **VE3WN**, **W9RXR**, **W3ATY**, **KA1AN**, **WSWAK**, **W4GBN**, **W1XTY**, **Ft./Lt. Beckett** (one-time operator of **G8FC**) and other interested Service personnel. The Committee, which has been reconstituted to include one each U.S. and British officer and enlisted man, now comprises **G6GD**, **2FQR** (Great Britain), **W9RXR**, **WSWAK** (U.S.) in addition to the Club officers **W1XTY**, **W4GBN** and **G2ZQ**.

At the February meeting **F./O. Avery**, **XZ2EX**, gave a talk on his radio experiences during the Spanish and present wars.

G2ZQ anticipated that Cecil Goyder, ex-**G2SZ**, would be present at the March meeting.

Another Cairo Conventionette

Another United Nations Amateur Radio Conventionette will be held in Cairo on May 5. As usual the arrangements are in the capable hands of Mr. W. E. Marsh, **SU1WM**, 3 Rue Kattini, Tanta, Egypt. Home members are asked to pass on this information via Airgraph to their friends in the Middle East.

Congrats.

● To Telegraphist F. J. Gregory, R.N.V.R., **BRS3734**, who has been awarded the British Empire Medal (Military Division) for zeal and whole-hearted devotion to duty. His home is in Southgate, London, N.14.

● To Mr. A. C. Taylor, **G5CT**, and his wife, now proud parents of a son—John Bruce—born on March 4, 1944. After spending the first four years of the war in the R.A.F., Mr. Taylor is now Engineer-in-Charge of a R.N. W./T. station in the North of Scotland.

● To Ldg./Tel. E. J. Tubman, **BRS4546**, and his wife, on the safe arrival of a daughter—Sally Ann.

● To F./Sgt. R. Nicholas, **G8BJ**, Isle of Sheppey, who has been mentioned in despatches.

LEICESTER STAGES ITS FIRST P.D.M.

ON Sunday, March 12, 1944, the first P.D.M. ever to take place in the Leicester area was held in the comfort of the Wigston Magna Cinema, and the President, the Executive Vice-President and the General Secretary, who had travelled to Leicester for the occasion, had the novel experience of addressing the audience from the stage.

The Deputy D.R., Mr. Albert Clipstone (**G8DZ**), who convened the meeting, had brought with him a large contingent from Nottingham. Amongst the 50 odd present, BRS members were in the majority, a clear indication of the new and lively interest that exists in the East Midlands.

The President, Mr. E. L. Gardiner (**G6GR**), first addressed the meeting and outlined the plans which Council had in hand for the future. Next, for a solid hour, the Secretary, Mr. John Claricoats (**G6CL**), pumped facts and figures from his famous little black book into the ears of the audience in his comprehensive survey of the Society's affairs, in the course of which he made the announcement that the membership had reached the amazing total of 6700 and was still rising. The Vice-President, Mr. S. K. Lewer (**G6LI**), rounded off the business part of the meeting with

a review of the Society's policy regarding publications and THE BULLETIN in particular.

Two sound-films, kindly loaned by the Central Film Library, illustrating Service Radio applications and the Transatlantic Radio-telephone were then shown. Warm thanks are due to Mr. G. Cockcroft (**G4FO**) and his family for the comfortable facilities and the interesting entertainment provided for the meeting and for arranging a high-tea of most commendable quality. Thanks are also recorded to Sgt. Ken Chapman (**BRS 5605**), the Leicester T.R., for his excellent co-operation.

There is no doubt that the general interest and enthusiasm in the whole of the District have received a healthy impetus which should carry it through the coming season of invasions and suspended holidays to the time when we shall resume the pleasant contacts on the air and the exhilarating QSO contests—not forgetting the battle for the N.F.D. Trophy, which is still held by District 4.

During their stay, Headquarters representatives had an opportunity of visiting the Leicester College of Art and Technology, permission having kindly been given by the Principal, Mr. L. W. Kershaw, who also paid the Society a handsome compliment by attending the P.D.M.

"SPLODGE."



DISTRICT 4 P.D.M., MARCH 12, 1944.

Front Row: **G2IX**, **8CZ**, **2AOO**, **G4FO**, **8DZ**, **6CL**, **BRS6888**, **G6GR**, **6LJ**, Miss Coleman, Mr. L. W. Kershaw, **BRS5605**, **G6VD**, **3BU**.

Letters to the Editor

What is a Communication Receiver ?

DEAR SIR,—In his description of the features of the four-valve set in the January BULLETIN, Mr. Johnson, 2BJY, is, perhaps unconsciously, aware that it does not come within the accepted idea of a communication receiver, for he claims that it has a "communications" standard of reception, a rather superfluous claim for a communication receiver.

I imagine the term, as used by amateurs, originated in the U.S.A., and on page 482 of the 1938 A.R.R.L. Handbook, *Messrs. Hallicrafters* attempt to define it. They specify that such a set must be solidly constructed, electrically foolproof and suitable for prolonged operation in the tropics, at sea or in the Arctic, and specially designed for H.F. reception. There, unfortunately, they "fizzle out," but I think I can usefully supplement their description. I have searched both text and advertisements in the R.S.G.B. Handbook (2nd Edition), and the A.R.R.L. Handbooks for 1938 and 1943, but cannot find the term applied to anything simpler than a four-valve superhet with one I.F. stage, solidly built on an all-metal chassis, housed in an all-metal cabinet, possessing optional B.F.O. 'phones jack, send-receive switch and volume control.

What is lacking is a *minimum* standard of performance, and this is where our Society can perform a useful function, by officially sponsoring such a minimum specification. As a basis for discussion I suggest the set should have the mechanical qualities already mentioned plus the following radio standards:—All Amateur Bands between 1.7 Mc/s. and 30 Mc/s., selectivity 60 decibels down at 10 kc/s. off resonance; sensitivity of 5 microvolts input for an output of 5 milliwatts to the 'phones jack, noise equivalent not exceeding .5 microvolt, image ratio at least 50 at 14 Mc/s. and drift not exceeding 5 kc/s. at 14 Mc/s. in one hour, after "warming-up" for 10 minutes.

I know this eliminates some existing communication receivers of the very cheapest class but, like medals, a line must be drawn somewhere.

Yours faithfully,

A. STUART McNICOL (GM3UU).

Esperanto and Basic English

DEAR SIR,—Having spent more than half my life, including the major portion of this war, abroad, I feel qualified to criticise S.K.L.'s editorial on Amateur Radio and Basic English. I believe that 90 per cent. of the amateurs in the world are English-speaking, which is probably a sufficient majority to justify the use of proper English, but why inflict a new language on the whole lot? If it is desired to use an international language, it would be far better to use Esperanto, which has already been proved to be a thoroughly practical means of communication. Anyone who has travelled outside this country realises that the most important point about anything that is designed to be international is that it should not be national. Amateur Radio already possesses a fine vocabulary which, like the commercial English of the Oriental trader, is highly specialised, and quite picturesque; it would seem sheer folly to exchange it for such a crude and stilted mode of articulation.

Yours faithfully,

JOHN B. ROSCOE (2FJM).

Editor's Comment

Mr. S. K. Lewer did not suggest that Basic English should be "inflicted" on the radio amateurs of the world. He stated that if the recently introduced campaign to popularise Basic English succeeds in its purpose, it may open the way to vastly improved and more highly intelligent communication between amateurs of different mother tongues. He considered that it would be in the best interests of all radio amateurs to watch the growth of Basic English.

The Future of Basic English

DEAR SIR,—I would like to refer to the editorial in your February issue, for I think that radio amateurs have no need to watch Basic English, which will not make any material growth.

Language is a very strange thing; it is one of those things which springs from man's emotions and will be added to from time to time with neither rhyme nor reason. The only thing which saves language at all is its keystone—grammar. I think the amateur of to-morrow will do the same as he has done in the past, and that is, in a half-humorous fashion produce his own language—without grammar—and go no further. In the world at large, however, things should be different.

Basic English might be—although I rather doubt it—a good method of introducing English to foreigners; it will certainly be of no use or interest to Englishmen, and the fond hopes of many Anglophiles that English should be the one International language must also fall to the ground, mainly due to the fact that it is linked closely with Nationalistic ideas and is so inconsistent in structure. To produce an International language, all that is necessary is to simplify grammar (grammar is the stumbling block in all language learning) and then, for preference, select the commonest or most suitable roots already in use by the

polyglot peoples. At this stage phonetic spelling can be introduced. We shall then have something which has a fair chance of solving the problems; in fact, it is "going to the problem" in a scientific fashion, whereas the introduction of Basic English is only adding confusion to an already confused world.

Yours faithfully,

W. H. MATTHEWS (G2CD).

Valve Bases

DEAR SIR,—Quite a lot seems to have been said recently about co-operation between the manufacturer and the users of radio equipment. I should like to raise a point which is rather connected with this theme and which I do not remember seeing stressed before—that is the material used in the construction of valve bases. This is I believe in all normal receiving valves of the phenol resin type and has therefore rather poor electrical properties, at least on high frequencies.

No constructor of a receiver in say the 15 Mc/s. region would use anything but low-loss valve holders—usually of the ceramic type where steps are taken to reduce leakage to a minimum. Yet into this efficient valve holder is plugged a quite indifferent valve base. Surely, therefore, the use of ceramic valve holders is hardly justified by the losses in the valve base itself.

I suggest that a range of valves with ceramic bases might provide improved conditions on high frequencies. The increase in cost should be very small compared to the standard type and this the enthusiast would willingly pay to gain any improvement.

It can, of course, be said that footless and acorn valves are now finding their way on to the market, but they are as yet expensive, and have their limitations, while being not altogether necessary on frequencies as low as 15 Mc/s.

Yours sincerely,

T. FLAVEL, B.Sc.
(BRS3767.)

DEAR SIR,—With reference to the letter from Mr. Flavel I think that, as is all too common, the writer has missed the real reason for the use of ceramic materials as insulators. In general the only justification for the use of such materials is where extreme mechanical or electrical stability is required, or the voltage is sufficiently high to cause tracking on the surface of other materials. It must be realised that the power factor, or "Q," of a material is only of importance when related to the losses of the other parts of the circuit, and the effective "Q" of the whole is the determining factor.

Considering the above in relation to a valve as a component. All modern valves (i.e. made during the last 10 years) have the control-grid connected to the top cap, with the exception of "footless" valves and some transmitting types, hence the valve base and holder do not affect the grid circuits.

As "footless" valves have an "all-glass" seal and no base in the accepted sense, they do not come into the picture, but I would point out that these were available before the war and at prices equal to that of the normal UX or Octal range. Pre-war transmitting valves having a grid or anode connection in the base were almost invariably fitted with a ceramic base largely on account of the voltages employed.

We are therefore left with the anode circuit of normal based valves to consider. This circuit comprises as losses, the losses in (a) the coil and tuning condenser, (b) the valve holder, (c) the valve base, (d) the valve (cold) internal impedance including glass pinch and (e) the valve (hot) anode impedance, which is a parallel shunt across the circuit. Taking actual values of effective parallel resistance or dynamic resistance at 15 Mc/s. we get:—

Tuned circuit ($Q = 350$)	50,000 ohms.
Valve holder (Ceramic)	Loss negligible.
Valve base (Bakelite) (Octal pin 3 to pins 2 and 4)	1.5 megohms.
Valve cold (6K7g, 6K8g, 6J7g)	150,000 ohms.
Valve hot, anode impedance average	750,000 ohms.
Effective total, neglecting wiring losses and input load of succeeding stage	35,000 ohms.

It is evident from the above example that the entire removal of the valve base would reduce the loading across a circuit of 35,000 ohms by 1.5 megohms, which is negligible, it would in fact also reduce the distributed capacity by about 0.5 μf which would represent about 2 per cent. or less which is also negligible. There is none the less a justifiable reason for fitting ceramic bases to valves specially intended for use as oscillators whose extreme stability is required.

I would disagree with Mr. Flavel that no constructor would use other than low-loss valve holders at frequencies of the order of 15 Mc/s. as there are many examples of commercial equipment disproving this contention. The same state of affairs applies to switch wafers where the losses are higher but have been less publicised.

Yours faithfully,

D. N. CORFIELD (G5CD).

Can you help ?

F/Sgt. R. J. Gilbert, R.A.F., 2CQB is anxious to obtain a copy of the circuit diagram of the Hallicrafters SX17 receiver. His home address is, 35 Malvern Road, Leytonstone, London, E.11.

HEADQUARTERS CALLING

COUNCIL 1944

President:

ERNEST LETT GARDINER, B.Sc., G6GR.

Executive Vice-President: S. K. Lewer, B.Sc., G6LJ.

Honorary Secretary: H. A. M. Clark, B.Sc., G6OT.

Honorary Treasurer: A. J. H. Watson, A.S.A.A., G2YD.

Honorary Editor: Arthur O. Milne, G2MI.

Immediate Past President: A. D. Gay, G6NF.

* *

Members: F. Charman, G6CJ, D. N. Corfield, D.L.C.(Hons.), G5CD, Wing-Com. G. R. Scott Farnie, GW5FI, F. Hoare, G2DP, Wing-Com. J. Hunter, G2ZQ, W. E. Russell, G5WP, H. W. Stacey, G6CX.

General Secretary: John Clarricoats, G6CL.

February Council Meeting

Resume of the Minutes of a Council Meeting held at New Ruskin House, on Monday, February 21, 1944, at 6 p.m.

Present.—Messrs. E. L. Gardiner (President), S. K. Lewer, A. D. Gay, A. E. Watts, H. A. M. Clark, A. J. H. Watson, A. O. Milne, D. N. Corfield, F. G. Hoare, W. E. Russell, H. W. Stacey and J. Clarricoats (General Secretary).

Apologies were received from Messrs. Charman and Farnie.

1. It was unanimously resolved to elect 216 Corporate Members (170 sponsored by Corporate Members, 46 supported by References) and 11 Associates. An application from Mr. Claydon, 83 Shorton Valley Road, Paignton, for Life Membership was approved.

2. The Cambridge University Wireless Society and the Long Row Old Boys' Radio and Television Society were granted affiliation.

3. It was agreed to authorise an expenditure of £25 for the purpose of overhauling and enlarging the Society's collection of historical lantern slides.

4. Messrs. Lewer and Simmonds were appointed to serve, with the Editors, on a reconstituted Editorial Committee.

5. The following were appointed to serve on the Publications Technical Advisory Panel:—E. L. Gardiner, B.Sc. (G6GR), S. K. Lewer, B.Sc. (G6LJ), H. A. M. Clark, B.Sc. (G6OT), D. N. Corfield, D.L.C. (Hons.) (G5CD), F. Charman (G6CJ), and E. H. Simmonds (G8QH). The duties of the panel will be to advise the Editors on BULLETIN technical matters, to make recommendations to Council for BULLETIN honoraria, and to co-operate with the General Editor in the preparation of Society technical Handbooks and publications.

6. It was announced that a P.D.M. had been arranged to take place in Leeds on May 14.

7. It was agreed to record that any member who proposes to incur a minor expense on behalf of the Society, in connection with the organisation of a local meeting, must first obtain the approval of his D.R.

8. It was reported that an informal meeting had taken place between a representative of the Society, and officials of the W.T. Board. A further meeting with the G.P.O. was being arranged to discuss post-war licensing matters.

9. In connection with an announcement made by the British Institution of Radio Engineers, regarding their proposal to form a British Radio Research Institute, it was agreed to study future developments, and to keep in mind the possibility that the Society be represented, if the proposal is adopted.

The meeting closed at 8.20 p.m.

Honorary Member

The Council has been pleased to elect Mr. Alfred Duncan Gay, G6NF, an Honorary Member in appreciation of his past services to the Society and in recognition of his work as President during the years 1941-1943.

Mr. Gay is the fourth Past President to be so honoured.

London Meetings

Mr. H. A. M. Clark, B.Sc. (G6OT), will deliver a lecture entitled "Negative Feedback and its application to Transmitters and Receivers" at a meeting of the Society to be held on Saturday, April 29, 1944, at the Institution of Electrical Engineers, Savoy Place, London, S.W.1. The lecture will commence at 2.30 p.m. and tea will be served at 4 p.m.

Service and Provincial members are cordially invited to support this lecture which will be followed by a demonstration of the principles outlined.

The attendance at the meeting held on March 25 at the I.E.E. was smaller than usual, but those present listened with great interest to Mr. Laister's discourse on the application of some less-common metals to radio purposes. It is hoped to publish a synopsis of the lecture in an early issue of this Journal. At the conclusion of the meeting Mr. E. L. Gardiner, G6GR (President), announced that Mr. A. D. Gay, G6NF (Past President), had been elected an Honorary Member of the Society.

R.S.G.B. Prisoners of War Fund

DONATIONS.—The General Secretary acknowledges with thanks, on behalf of Council, receipt of donations from:—Anon, 11s. 8d.; District 5 (Bristol) per G6RB, £1 10s.; District 14, per G6LB, £1 5s.; District 4, per G8DZ, 10s.; BR5212, 10s.; J. D. Kingston, G3VK, 6s.; R. Tucker, G5LU, 5s.; W. J. Thompson, G2MR, £1 2s. 6d.; P. C. Mortimore, G8KI, 10s.; Mrs. Targett, G6PG, 5s.; E. W. J. Theobalds, 2DW1, 5s.; H. Morris, 4480, 5s.; Anon, 3s. 10d.; Mrs. Quartermaine, £2; W. D. Ingle, G2BD, 5s.; R. Robbins, G4CY, £1; E. F. Prior, G3SH, 10s.; R. C. White, 6116, 10s. 6d.; F. E. Wenger, G2VG, £100; A. A. Goldie, BERS182, 7s. 6d.; District 13, per G3ST, £1 3s. 8d.; District 1 (Liverpool), per G6CX, 12s. 6d.; R. J. Dearson, 7479, 3s. **Total receipts to date, £1194 2s. 11d. Total Expenditure to date, £577 6s. 7d. Balance in hand at 31st March, 1944, £616 16s. 4d.**

Changes of Address

Members who change their permanent address are asked to note that at least one month must elapse before the change can become effective for BULLETIN despatch purposes.

The Society cannot, under existing conditions, send the BULLETIN direct to a Service address. Members on Active Service should arrange for re-direction from their home address. Provided re-direction is effected promptly, no additional postage is required.

Technical Publications

The attention of members is directed to the fact that no facilities exist at Headquarters for obtaining technical publications other than the A.R.R.L. and Radio Handbooks listed below. Considerable inconvenience is caused by members who send cheques and postal orders for other publishers' books when forwarding either their subscription or an order for American handbooks.

American Publications

The Society is in a position to accept orders for the following publications which are ordered individually from America:

"QST" (Official monthly publication of The American Radio Relay League). By subscription, per annum	17s. 6d.
"The Radio Amateur's Handbook" (A.R.R.L.)	10s. 6d.
"The Radio Amateur's Handbook"—Special Defence Edition (A.R.R.L.)	8s. 6d.
"The Antenna Handbook" (A.R.R.L.)	4s. 0d.
"A Course in Radio Fundamentals" (A.R.R.L.)	3s. 6d.
"The Radio Handbook" (Editors and Engineers Los Angeles)	12s. 0d.

Orders must be accompanied by a remittance made payable to the Society and rates and prices are subject to alteration without previous notice. Delivery can be expected in about 12 weeks from date of order. Service Addresses must not be used. Single copies of text books only may be ordered.

The Amateur Radio Handbook

The tenth printing (22,500 copies) of the Society's Handbook is now on sale price 4s. post free. Cloth bound copies are also available, price 6s. 6d. Headquarters will be pleased to allow trade terms on orders for 12 or more copies.

Cash Sales Department

The following items are now in stock at Headquarters:—
 Members' Note paper (new style), 100 sheets .. 3s. 6d.
 Car Plaque of Emblem .. 3s. 6d.
 Rubber Stamp of Emblem .. 3s. 0d.
 All the above items will be sent post free to any address in Great Britain on receipt of remittance. Orders for Eire are despatched via the Censorship authorities.

Headquarters Address

Last month more than 500 letters, dealing with Society business, were delivered to the General Secretary's private address. This, in spite of frequent requests for all official R.S.G.B. correspondence to be sent to New Ruskin House, 28/30 Little Russell Street, London, W.C.1.

Those who act as sponsors to applicants for membership are kindly requested to record the above address on the application form, if the latter bears the temporary war-time address of the Society, viz. 16 Ashridge Gardens, Palmers Green, London, N.13.

When communicating with Headquarters the Society's name must *always* preface the address. Embarrassment and delays are often caused because letters intended for the Society are opened by one of the other firms operating from New Ruskin House.

EDITORIAL—(continued from page 145)

for the Signals trades. Alternatively the erection of a hut in the garden of a local member or the hiring of a suitable room above a garage would solve the problem.

Fortunately many Districts are still functioning satisfactorily and regular meetings continue to be held in most of the large towns. May we suggest that during the coming summer those responsible for arranging meetings make a point of bringing to the notice of members the ideas now put forward? An interesting discussion should result, and in some cases it may be found possible to form a small local working committee to explore the possibilities of the scheme.

One thing is certain—if groups of members are in a position to set up Experimental Workshop Centres, they will earn the gratitude of all those young enthusiasts who are looking forward with such eagerness to the time when they will return home to take an active part in the "great game of Amateur Radio".

The views outlined here, which incidentally are personal to the writer and the Honorary Editor, are put forward to evoke discussion. Some readers may discover serious "snags" but if a seed has been sown, some good may ultimately accrue both to the Society, and to the Amateur movement in general. J.C.

EXCHANGE & MART-ADVERTISEMENT RATES

MEMBERS' private advertisements 2d. per word, minimum 3s. TRADE advertisements 4d. per word, minimum 6s. Box Numbers: 6 words, plus 1s. TERMS: Cash with order. All copy and payments to be sent direct to Advertisement Managers, PARRS Advertising Ltd., 121 Kingsway, London, W.C.2, by the 30th of the month for following month's issue.

Advertisers and buyers are reminded that under Defence Regulations 1939, Statutory Rules and Orders 1940, Number 1689, a permit (T 99 G) must be obtained before sale or purchase of certain electrical and wireless apparatus, particularly such valves and apparatus as are applicable to wireless transmission.

ALL KINDS OF PRINT.—Send your enquiries to G6MN, Castlemount, Workop.

BR33171 (now overseas) wants copy of *Principles of Radio Engineering* by R. S. Glasgow.—Price to C. A. BAIGENT, Higham-on-the-Hill, Nuneaton, Wares.

EXCHANGE.—Garrard automatic record changer, complete with pick-up in radiogram cabinet. Wanted: Avometer 46 or Taylormeter.—WEBB, 48 Grosvenor Avenue, Barnet, Herts.

FOUR 4211E, three 242A valves, all O.K. Offers please. Can anyone supply "Simplot" of Acetate recording blanks?—COOPER, Darwin House, Darwin Street, Mountfields, Shrewsbury.

HAM SPRING CLEANS.—New valves: Y64, VP2, FC2A, two 6C6, all 6s. each. Used valves, AC/ME, 121/DD, VP210, TP22, S4VB, K77A, 77, QP22B, K23B, 30, 6A7, U5U, U12, MKT4, L86A, AC/P, all 2s. 6d. each. 210HL, 2s. 431U, 3s. Two U8's, 7s. 6d. each. Two PX4's, 7s. 6d. each. D025, 12s. 6d., also many more. State wants. Condensers: Type M, -002, -0003, etc.; 100 assorted, 4d. each. Non-electrolytic block type, "Hydra," 4mfd 2000v, 15s. Two 2mfd 2000v, 10s. each. Four 2mfd 1000v, 7s. 6d. each. Transformers: Ferranti, two AF5's 12s. 6d. each. AF6, 12s. 6d. AF8, 10s. Varley 200-250v primary, 2v-0-2v at 5 amps., 20s. Output for PX4's in p/p. 100mas, 12s. 6d. Pentode mains, 40mas screened, 10s. Mains, 200v-250v, secondaries 400-0-400 at 300 mills, 180-0-180 at 100 mills, 3-75v-0-3-75v at 6 amps, 3v-0-3v at 4 amps, 2-0-2 at 5 amps, by Rich & Bundy, £5. No. 73 unused. Chokes by Rich & Bundy; two E116's twin 300mas at 300v, 35s. each. Two E154's 100mas at 300v, 25s. each unused. Ekco Vibrapak 2v in, 130 at 15mas out, requires wiring, with circuit, £2. 200 Wireless World's or exchange for Q.S.T.'s Radio News, etc. 6v Amplifier with Vibrapak and L/S, 6Q7, 6V6, 6X5, £5. Powerpack, 200-250v in, 350-0-350 at 120 mills, with Philco X-former, 80 Rect., 8x8 and Choke, on chassis £5. National NC81X, 10-valve communication R.X., 5 wave-bands, B.F.O., A.V.C., crystal filter, etc., best offer over £35. Hundreds of resistors, chokes, condensers, coils, transformers, knobs, etc. State your wants. I want H.R.O. L/S, "Mac" Bug Key, Browns "A" phones, Hamurand "Super-Pro," Thorlerson audio transformers and outputs for "A.R.R.L." 40 watt amplifier. Can we make a "swap"? S.A.E.'s please.—Box 327, PARRS, 121 Kingsway, London, W.C.2.

HOWARD 438 eight-valve communication receiver, 7 to 5.5 metres, bandspread with crystal filter, BFO, 6 in. speaker also separate Howard valve "R" meter to match, for sale.—Offers to G6AS, 23 Hawthorn Croft, Quinton, Birmingham.

H77 Frequency Standard, £12. Communications receiver and many interesting items for sale. S.A.E. list. Wanted: "Bug" key, photo-electric cell, battery portable, fishing rod.—Box 326, PARRS, 121 Kingsway, London, W.C.2.

MONOMARK service.—Permanent London address. Letters redirected. Confidential. 5s. p.a. Royal patronage. Key tag 9d.—Write BM/MONO7A, W.C.1.

SALE.—Astaire T.3 Crystal microphone with table stand and screened Yaxley jack and lead. £6 10s. New.—MCNEILL, 3 Kittock Street, East Kilbride, Glasgow.

SALE.—CR tube 12 in. diameter blue 6000v trans mu chassis etc. £15.—G6LU, 20 Cody Road, Farnborough, Hants.

SALE.—Hallcrafters Sky Champion, fitted Goodmans speaker externally, with components, cabinet and circuit for high gain preselector, and new Brown's "A" phones, £25 complete, or near offer. Mallory vibratorpack VP 554, £3 5s. Rothermel brush de-luxe xtal microphone on table stand, £3 10s. New valves; one of each, 1852, 1853, £1; RK25, RK39, 22s. 6d.; 6A6G, 15s. 6JYGT, 10s. 6d. New mains transformer 350v, 120ma, 5v and 6-3v heaters, cost 37s. 6d., 22s. 6d. 80 ft. used heavy concentric cable, 17s. 6d. Bakers Solhurst 12 in. triple cone P.M. speaker, £3. Good battery T.R.F. S/W receiver considered in part exchange for above, also quality audio equipment.—Box 332, PARRS, Kingsway, London, W.C.2.

SALE.—Hamrad, 140 communications rx late 1939 model. 13 tubes, R meter, xtal filter. Best offer or would consider exchange with radiogram with cash adjustment.—2DVA, Hope Farm, Halegate Road, Halebank, Widnes, Lancs.

SALE.—12 in. magnetic tube with coils, mounting frame and line transformers. 5,000 volt transformer, rectifier and condensers. Chassis with time bases, vision and sound receiver, with 13 valves. Lot £18. Also, VP210, 210SPT, D210SW, P2, 220HPT, 240B, 6s. 6d. each.—Box 331, PARRS, 121 Kingsway, London, W.C.2.

SKY BUDDY or Sky Champion required. State condition and price.—WILLY (BR34254), "Ashbourne," Orchard Avenue, Thames Ditton, Surrey.

SUB-FREQUENCY Standard and Oscillator, valves, 100 kc/s. oscillator, two H63's multivibrators giving 10 kc/s. output. Buffer 6J7, variable frequency section, two H63's. Franklin oscillator 6J7 Buffer, U50 rectifier, large scale and cursor; housed fine metal cabinet, really fine instrument. Offers.—Box 336, PARRS, 121 Kingsway, London, W.C.2.

UNIVERSAL Avometer as new, also acorn triode for disposal. Best offers accepted.—KAY (BR33789), 24A Watcombe Road, Bournemouth.

WANTED.—Amateur Call Book, any year from 1937 onwards. State price to PEARCE, 102 Kinghill Road, Swindon, Wiltshire.

WANTED.—Baek numbers T. & S. W. World. Electronic Engineering, July, September, November, 1940, January to November, 1941. J. Brit. IRE Vol 2, Nos. 1, 3, 4. T. & R. BULL. July-October, 1940.—HART, Sandwycke, Sandpit Lane, St. Albans.

WANTED.—Car radio in good condition.—2DRT, "Allendene," Spalding Road, Binchbeck, near Spalding, Lincs.

WANTED.—Half gallon grey cellulose, thinners, pair TZ40's and 800v transformer for CRT.—G6CU, 5 St. Luke's Road, Maidenhead, Berks.

WANTED.—Multi-range meter, Avo, Taylor or similar. Maximum £6. Also Avominor.—LEWIS, 108 Hill View, Henkeaze, Bristol.

WANTED.—National H.R.O. with matched speaker, in good condition. State price.—Box 333, PARRS, 121 Kingsway, London, W.C.2.

WANTED.—Transformer, 230 volt 50 cycle primary; secondary stepped volts 4 to 12, handle 100 to 250 watts continuous load. No junk!—JAMES, "Lynwood," Cefn Road, Blackwood, Mon.

WANTED.—Universal Avo Minor in good condition.—Write giving price etc., to Box 328, PARRS, 121 Kingsway, London, W.C.2.

WANTED.—230v A.C. Gram motor. Good condition.—GREEN, c/o Longmire, West Street, Somerset, Somerset.

WELL-KNOWN amateur has for disposal large number receiving and transmitting components, materials etc. Finest makes. Much unused. No cheap junk. State specific wants. S.A.E.—BM/GAA, London, W.C.1.

5s. each for back copies of THE BULL. Wanted: Nos. 1 to 6 of Vol. 1, No. 1 of Vol. 4, and Nos. 1, 5 and 8 of Vol. 10.—Write Box 321, PARRS, 121 Kingsway, London, W.C.2.

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KING'S Patent Agency Ltd. (B.T. King, G5TA, Mem. R.S.G.B., Reg. Pat. Agent), 146a Queen Victoria Street, London, E.C.4. Handbook and Advice on Patents and Trade Marks free. Phone: City 6161. 50 years' refs.

Congrats

● To Mr. and Mrs. Reg Radford, G2IM, of 1 Gibbs Green, Edgware, Middlesex, on the birth of a son and heir—Roger—on March 17, 1944.

● To Mr. D. Macadie, GM6MD, (Scottish "A" District Officer), whose wife presented him with a junior op.—Gordon Lindsay Ross—on February 13 last.

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