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BULLETIN

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

- POST-WAR LICENCE POLICY
- THE PROPAGATION OF RADIO WAVES
- AUDIO AMPLIFIER

R.S.G.B. BULLETIN

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POST WAR LICENCE POLICY

A Statement issued by the Council of the Incorporated Radio Society of Great Britain.

SINCE the early days of the war, the Council has studied closely the many problems involved in the restoration of amateur transmitting facilities. Conversations have taken place on several occasions with the General Post Office and other Government Departments. Although it has not been considered expedient, until the present time, to publish a statement of post-war licence policy, members who have read the Resumés of recent Council Minutes will not have failed to appreciate that a great amount of work has been taking place behind the scenes.

Military Considerations

The chief difficulty encountered so far has been that of resolving certain features of the problem which are affected by military considerations. The far-sighted member does not need reminding that this aspect must loom large in every discussion. No one, not even the highest Service authority, can state what is likely to happen in Germany after all organised resistance has ended. Possibly the military situation may be such as to remove many of the dangers which have been visualised; on the other hand guerrilla warfare may continue for many months, bringing with it grave risks to security if a large number of amateur stations were permitted to resume transmissions on frequencies capable of reception in Europe.

Service Demands

A further difficulty arises when considering post-war licence plans, namely that of assessing the demands which are likely to be made by the military and other Services for the use of frequencies in that part of the spectrum normally used by amateurs.

The Society's Policy

It is of importance to record that in June 1939, the Council then in office put forward to the G.P.O. certain proposals designed to improve the conditions under which amateur licences were then being issued. Unfortunately, before these proposed changes could be brought into effect the war intervened.

The task confronting the Council during war-time has been further complicated by the knowledge that radio technique has improved in many directions. Consequently additional amendments to the licence conditions have become necessary.

After the most careful consideration of all aspects of the problem, it was decided some months ago to submit to the G.P.O. an agenda containing the Policy which had been formulated by the Society as a basis for discussion. In the meantime it was decided to solicit the views of members with the idea of discovering whether there was a measure of support or opposition to the policy laid down by the Council. The response to the invitation published in the September and October 1944 issues of THE BULLETIN, was gratifying, because the views expressed coincided very closely with the policy of the Council. It had been anticipated, however, that a few proposals new to Council would come to light, but these did not mature although in fairness to the members concerned, it must be admitted that many useful suggestions were put forward which may prove of practical value once licences are restored. Among the latter can be mentioned the reiteration of the pre-war suggestion to allot special bands for telephony experiments.

The Society speaks for British amateurs

In drawing up the Society's policy, the Council recognised that they were acting as spokesman for the very large majority of British Isles amateurs—a fact which is fully recognised by the G.P.O. and other Government Departments. The knowledge that the Society continues to be accepted by the Government as the organisation responsible for safeguarding the interests of all British Isles radio amateurs should be a matter of satisfaction to the membership as a whole.

The Restoration of Licence Facilities

It is the intention of the G.P.O. to restore facilities to all pre-war fully licenced amateurs who may make formal application. An official statement will be published later indicating the date from which applications will be considered. Pre-war call signs will be reallotted unless a different call sign is specially requested.

Artificial Aerial Licences not to be reissued

It is understood that for some time prior to the war the G.P.O. had held the view that the issue of artificial aerial licences should be discontinued. The Society in its proposals of June 1939 asked for this to be done partly on the ground that an artificial aerial licence provides incentives for illicit transmissions. It was also appreciated that Great Britain was the only country issuing this type of licence.

War-time Councils have endorsed the policy of the 1939 Council and it is now understood that the G.P.O. is likely to agree—subject to certain provisos—that the A.A. licence shall be discontinued.

In this event pre-war holders of artificial aerial licences would upon application, be issued with full licences, subject to the applicant producing evidence of Morse proficiency.

Full Licences to be issued to applicants who have served in a Service Radio Trade

The G.P.O. has agreed to the proposal put forward by the Society after being suggested in THE BULLETIN dated July 1941, and referred to again in the March 1943 issue, that applicants who have served in a radio trade in the Navy, Army or Air Force recognised by the G.P.O. and can produce satisfactory proof of proficiency, may cite this as technical and/or Morse qualification for the granting of a licence. Those who qualify for Morse only will be required to pass a simple technical examination, whilst those who only qualify technically, will be required to pass a 12 words per minute Morse test. Those who have qualified by Service in certain radio trades (*e.g.* R.A.F. Wireless-Operator-Mechanic) will be exempted from both the Morse and technical tests.

New Licences

Those not covered in any of the foregoing paragraphs will be required to pass a Morse test and simple technical examination unless they can produce evidence of proficiency in either or both subjects.

New Call Signs

It is anticipated that all new licencees will receive a call sign comprising the International prefix (G, GI, etc.), a figure and three letters, *e.g.* G7ABC.

Classes of Licence

The Society has proposed and it is anticipated that in future all new licences will fall into one of the following three Classes :—

Class A. 25 watts (telegraphy only except by special application) to all new applicants.

Class B. 150 watts (telegraphy and telephony) after twelve months, upon application to the G.P.O.

Class C. High Power.

Applications for Class C licences will not be made through the Society as in the past, but direct to the G.P.O. and granted only to qualified applicants who can show the necessity of the facility to pursue a course of experimental work of scientific value. Such facilities will be for a restricted period.

The Society has asked for the lowest possible fees to be charged for all classes of licence.

"Guard Bands" to be Abolished

Prior to the war, small tolerances or "guard bands" were specified to prevent radiation occurring outside the limits of the bands allotted to amateurs. As the state of the art progressed, the Society asked for and obtained the reduction of the width of these "guard bands," which we now fully anticipate will be dispensed with. This will increase still further the responsibility of amateurs to ensure that no radiation occurs outside the allocated band of frequencies in use.

Permission sought to use all amateur frequencies

The Society has asked for all amateur frequencies allotted in accordance with International Conventions to be, in general, available to all British amateurs, and it is anticipated that this proposal will be adopted.

1.7 Mc/s Operation

It is expected that in general, as suggested by the Society, permission will be granted for British amateurs to use an input of 25 watts on 1·7 Mc/s. The pre-war figure was 10 watts except in special cases.

No restrictions on sending times

The Society has asked for the pre-war restriction on the number of hours that an amateur station could be operated during any one day to be abolished and it is anticipated that this will be agreed.

Aerial Systems

Subject to agreement being reached with the G.P.O. and other Government Departments regarding stations located near to aerodromes and Government stations, it is hoped to announce later that no restrictions will be placed on the length and type of aerial system used by amateurs, but there may have to be some restriction as to height.

Permission to operate at another station

Permission is likely to be granted for the holder of any licenced British amateur station to operate any other licenced British amateur station for the purposes of experiment and with the prior knowledge and consent of the owner. In such cases the onus will be on the owner of the station, who will be required to see that a full record of the transmissions is entered into the station log and signed by the second operator.

Portable Stations

It is anticipated that no difficulties will be encountered by those who wish to apply for permission to operate a portable station within a radius of 10 miles of their address.

Frequencies

The Society has requested the G.P.O. to make available the following bands of frequency to amateurs :—

1,715—2,000 kc/s	14,000—14,400 kc/s
3,500—4,000 kc/s	28,000—30,000 kc/s
7,000—7,300 kc/s	56,000—60,000 kc/s

The G.P.O. has also been asked to support the Society's request for permission to use the band of frequencies from 21,000 to 22,000 kc/s and to agree to allocate sample bands of frequency in the V.H.F. region. If it is not possible to continue the harmonic sequence beyond 56—60 Mc/s, the Society has suggested that a new datum point be assigned say 130 Mc/s, doubling to 260 Mc/s, 520 Mc/s, etc. The importance of amateurs being allotted sample bands throughout the spectrum up to the highest frequencies, is recognised by the G.P.O.

Whilst it is not yet possible to state whether the six short wave bands referred to above will be issued *in toto* to British amateurs, the Society intends to press for the most liberal treatment, bearing in mind

(*a*) the very valuable service which British amateurs have rendered during the war,

(*b*) the substantial increase in the number of licencees which is certain to occur within a few years of facilities being restored,

(*c*) the educational and scientific value of amateur radio.

Service Reserves

No details are yet available concerning the Government's plans for the re-establishment of Service Reserves.

(*Continued on page* 144.)

THE PROPAGATION OF RADIO WAVES

By B. H. Briggs (2FJD)*

PART III

Velocity of Radio Waves. Dielectric Constant of Ionized Gas. Attenuation of Waves. Conditions for Reflection. Effect of the Earth's Magnetic Field. Measurement of Critical Frequency and Virtual Height. Wave and Group Velocity.

IN this part it is proposed to consider how the ionized layers in the atmosphere are able to bend radio waves and return them to Earth.

The Velocity of Radio Waves

All electromagnetic waves travel with the same velocity, *viz.* 3×10^{10} cm./sec., in empty space. When the waves pass through a material medium, however, the speed alters in relation to the particular medium. Theory and experiment show that the velocity is inversely proportional to the square root of the dielectric constant of the medium.

Thus :—

$$v = \frac{c}{\sqrt{k}} \quad .. \quad .. \quad .. \quad .. \quad .. \quad (1)$$

Where v = velocity of wave in medium
c = velocity of wave in empty space
k = dielectric constant of medium.

As explained already for the case of sound waves, it is this change of velocity which causes a tilt of the wave front when the wave crosses the boundary of the medium. In the case of light waves entering, for example, a block of glass, the boundary between glass and air is very sharp, so that the light travels in straight lines in the glass and in the air, but there is a sudden change of direction at the surface (Fig. 10). The bending is governed by Snell's Law for refraction, which states that :—

$$\frac{\sin i}{\sin r} = \text{constant} = \mu = \frac{\text{velocity of wave in air}}{\text{velocity of wave in medium}} = \frac{c}{v}$$

Where i = angle of incidence (see Fig. 10)
r = angle of refraction (see Fig. 10)
μ = refractive index of material.

Combining this with (1) we see that

$$\mu = \frac{c}{v} = \sqrt{k} \quad .. \quad .. \quad .. \quad .. \quad (2)$$

Thus the refractive index of any medium is equal to the square root of its dielectric constant.

In the case of radio waves entering an ionized layer, there is no longer a sharp boundary, for the ionization increases gradually, as we go upwards. There is no sudden change of direction of the wave, but rather a gradual bending. The idea of refractive index is still useful, however, for if we know the refractive index at each point, we can map out the path of the wave in the layer, and find the conditions under which the bending will be sufficient to return the wave to Earth. Our first task will be to investigate the dielectric constant of an ionized gas. We shall then be able to deduce the refractive index from formula (2). Of course, it does not follow that the gas will behave as a perfect dielectric, and we shall find, in fact, that it is always a more or less " leaky " dielectric, and in some circumstances it behaves more like a metallic conductor.

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The Dielectric Constant of an Ionized Gas

The dielectric constant of a substance is the ratio by which the capacity of an air condenser is increased when the space between its plates is filled with the material. To find the dielectric constant of our ionized gas, we therefore imagine it to be placed between the plates of a hypothetical condenser. It is important to note here that dielectric constants are never constant, but depend on frequency. If we are interested in the effect on a radio wave of frequency f, we must therefore apply across the condenser plates an alternating voltage of this frequency. To find the change in capacity we must investigate the extra alternating current which flows between the plates because of the presence of the ionized gas.

The alternating voltage produces between the condenser plates an alternating electric field, which acts upon the electrons in the ionized gas and sets them into a vibration of the same frequency as the field. It now becomes important to consider the collision frequency of the electrons in relation to the frequency of the applied field. To obtain a picture of the situation, first imagine the electrons moving about in random zig-zag paths, colliding with neutral gas molecules, and making a definite number of collisions per second. Now imagine that superimposed upon this motion there is a steady oscillation of frequency f in a direction at right angles to the condenser plates, the amplitude of which is small compared to the distance between the molecules. Clearly, we can study two limiting cases, according as the collision frequency is much less than, or much greater than, the frequency f.

(*a*) Collision frequency much less than *f*

In this case the electron is able to complete many cycles of the oscillation before making a collision. To

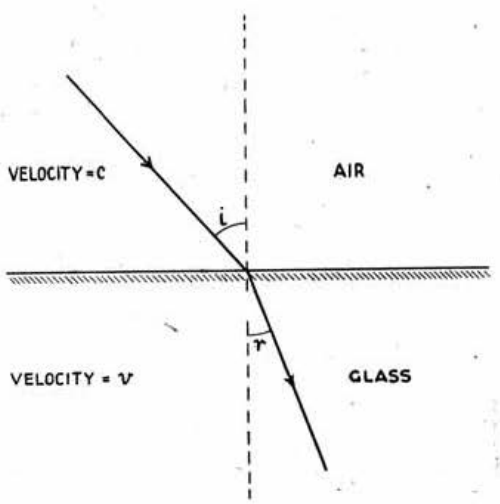

Fig. 10.
Refraction of a light ray at the surface between air and glass.

a first approximation, therefore, we may neglect the effect of collisions, and since the random motions contribute no nett current, we can simply regard the electrons as vibrating with frequency f about fixed positions. Now a moving electric charge constitutes an electric current, and the oscillation of the electrons about their mean positions means that an effective alternating current is flowing between the condenser plates. Now the current due to a moving charge is a maximum when the velocity is a maximum. In the case of the electrons, this occurs when they are passing through their mean positions. At the extreme position of the vibration the velocity is zero, and so the current is zero. In other words, the current flowing is 90° out of phase with the voltage between the plates. This behaviour is typical of a condenser, so that the gas is behaving like a pure dielectric.

The calculation of the current for this case can be carried out fairly simply, and it shows that the effective dielectric constant of the gas is given by the formula :—

$$k = 1 - 81\frac{N}{f^2} \quad .. \quad .. \quad (3)$$

Where f is in kc /s., and N is the number of electrons per c.c.

An important fact which emerges from the calculation is that the amplitude of the electron oscillations is larger the lower the frequency, and so the average velocity acquired by the electrons, due to the action of the field, is highest for low frequencies.

(*b*) Collision frequency much larger than *f*

In this case we cannot neglect the effect of collisions. The electron no sooner begins to move under the action of the field than it collides with a molecule, and the velocity it gained from the field is lost. The average velocity over each short time between collisions will be proportional to the field acting at that particular time. Thus when the field is at its maximum value, so will be the velocity. In other words, the effect of the collisions is to force the velocity to be *in phase* with the field. The current between the condenser plates is therefore *in phase* with the voltage, and the gas is behaving like a conductor of electricity.

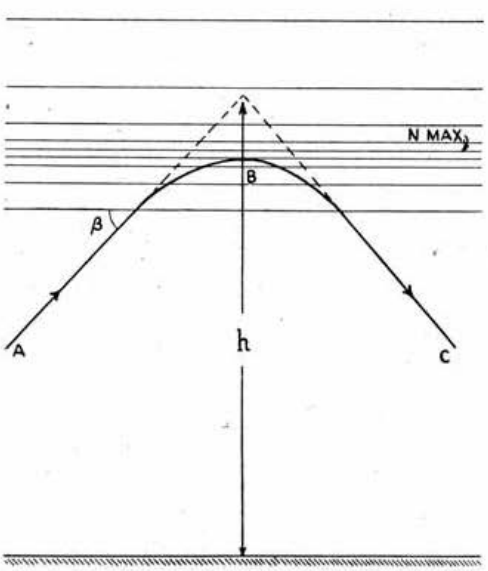

Fig. 11.
Reflection of a radio wave from an Ionized layer. The height marked *h* is the *virtual height* of the layer.

In between these two limiting cases, the gas behaves in a manner intermediate between a conductor and a dielectric. The dividing line comes roughly where the collision frequency is equal to the frequency of the applied electric field. Now a glance at Table I of Part I shows that for the E layer, the collision frequency is about 500 kc /s. Thus the E layer behaves like a conductor for frequencies considerably lower than 500 kc /s. (*i.e.* on the long wave band) and like a dielectric for frequencies higher than 500 kc /s. (*i.e.* for short waves). In the case of the F_1 and F_2 layers, the collision frequency is so low that they behave like a dielectric for all radio frequencies. The practical consequences of these results will be considered in the next article.

We may note that the electric field of an electromagnetic wave is identical with that existing between the plates of our hypothetical condenser with an A.C. voltage applied. The actual motions of the electrons when a radio wave enters an ionized layer will, therefore, be the same as those which we have been considering.

Attenuation

The electrons acquire a velocity from the field, which is lost when they make a collision. Due to the effect of collisions, energy is continually being abstracted from the wave and turned into heat, so that a wave becomes weaker as it progresses through an ionized region. The energy removed from the wave is proportional to the number of collisions per second, and to the average energy lost per collision. Now it was mentioned above that the velocity acquired by the electrons is larger the lower the frequency. Consequently, more energy is lost per collision on low frequencies than on high, and the attenuation is heavier. For this reason, it is a good general rule always to use as high a frequency as other conditions will allow. It is clear that the attenuation will be heaviest in the case of a low layer where the collision frequency is high. Thus, it is much heavier in the case of the E layer than the F layer.

Conditions for Reflection

Fig. 11 shows a ray impinging on an ionized layer. If the bending produced by the layer is sufficient to turn the ray completely round and return it to Earth, as shown in the figure, we shall say, for simplicity, that the wave is *reflected* by the layer. We now investigate the conditions which determine whether reflection is possible or not, taking the case of short waves, for which formula (3) for the dielectric constant holds.

The refractive index at any point of the layer is :—

$$\mu = \sqrt{1 - 81\frac{N}{f^2}} \quad .. \quad .. \quad .. \quad (4)$$

(Note that all normal substances have dielectric constant and refractive index *greater* than unity, so that the velocity of the wave is *less* than in empty space. In the ionosphere the reverse is the case. The direction of bending is, therefore, opposite to that occurring for light entering a normal substance.)

As the wave travels up into the layer, N increases, and so the bending increases. Eventually, if N reaches a large enough value, the direction of the wave becomes horizontal, as at B in Fig. 11, and it is then bent down again and returned to the ground. If, however, N never becomes large enough, the wave penetrates the layer and is lost. Thus, it is the largest value of N in the layer, or N_{max}, which determines its reflecting power.

The formula also shows that the higher the frequency of the wave, the nearer the refractive index approaches unity, so that conditions for reflection become less favourable. Thus, as the frequency is increased, there comes a time when reflection is no longer possible, and the wave penetrates the layer. The last factor influencing the reflection conditions is the angle of incidence on the layer. By *angle of incidence* in this case will be meant the angle which the ray makes with the layer itself, not with the perpendicular to the layer (the latter is the usual convention in light, *cf* Fig. 10). If the wave strikes the layer at a small angle, it will have to be turned through only a small angle for reflection to take place. Thus, reflection is more likely, the smaller the angle of incidence. In other words, higher frequencies will be reflected at small angles than at large angles, and for smaller values of N_{max}. It is for this reason that a very low angle of radiation is usually sought for in aerial design, for long distance transmission. However, even waves which leave the Earth's surface tangentially will strike the layers at a definite angle, and this is the smallest possible angle of incidence. For the E layer the smallest angle of incidence is about 10°, and for the F layer, it is 15°.

Mathematically it can be shown that the ionization density N required for reflection, is related to the angle of incidence, β, and the frequency, by the equation

$$\cos\beta = \sqrt{1 - 81\frac{N}{f^2}} \quad .. \quad .. \quad .. \quad (5)$$

Conditions are the worst possible for reflection when the wave is sent vertically upwards. The highest frequency which is reflected under these conditions is called the *critical frequency* of the layer. The meaning of the term *virtual height* of the layer is shown in Fig. 11.

We have seen in Part II how the value of N_{max} varies with time of day, with the seasons, and with the sunspot cycle. The reader should, therefore, have already obtained a general picture of how the reflection properties of the ionized layers will correspondingly vary. For transmission over a given route, it will be necessary to use lower frequencies during the night than during the day, lower frequencies in winter than in summer, and lower frequencies at sunspot minimum than at sunspot maximum. As already mentioned, it is always desirable to use the highest frequency which the reflection conditions will allow, for attenuation is then a minimum.

Effect of the Earth's Magnetic Field

The Earth's magnetic field has a small disturbing effect on the motion of the electrons in the layer and makes our equations not quite accurate. As we have seen, the vibrating electrons are equivalent to an electric current, and a current experiences a force in a magnetic field. The electron vibrations become ellipses instead of linear oscillations. The effect of this is that the wave emerging from the layer is split into two circularly polarised components called the *ordinary* and *extraordinary* rays. The two components have different critical frequencies, and different attenuations. The effect is important in interpreting the ionosphere records obtained by radio methods, which we are about to discuss, and it also causes certain fading effects.

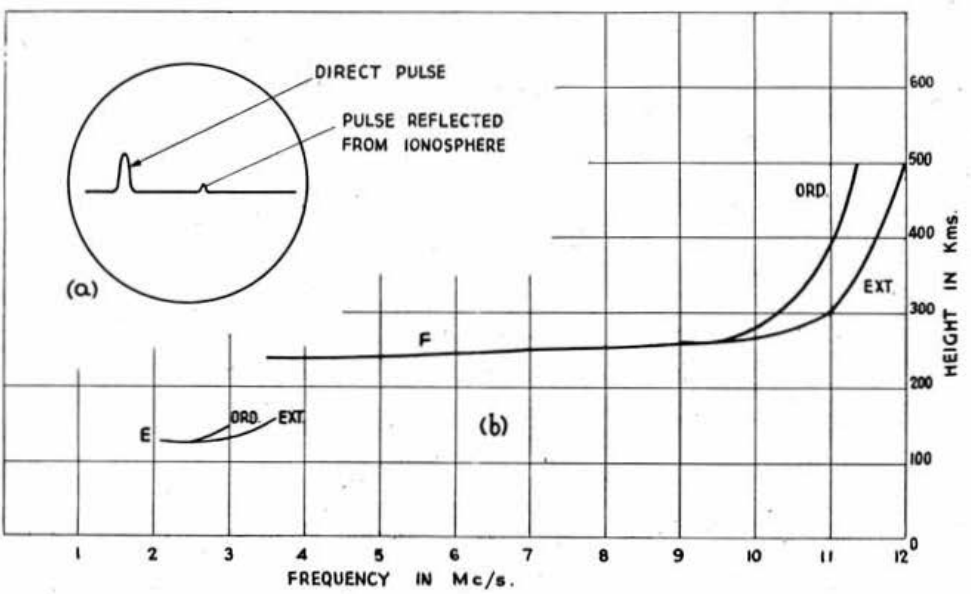

Fig. 12.

(*a*) Appearance of echo from the ionosphere on the screen of a C.R.T. in the pulse method.
(*b*) Variation of virtual height with transmitter frequency.

The Earth's field also causes a resonance effect at a certain frequency, in which the electrons execute large oscillations around the lines of force of the field. The frequency at which this occurs, depends on the value of the field at the place concerned, but it is normally about 200 metres. The effect causes a heavy absorption around this wavelength.

For very oblique incidence, such as is the case for long distance transmission on short waves, the Earth's field has little effect.

Measurement of Critical Frequency and Virtual Height

For convenience, the subject has been presented, so far, in a way which may suggest that the conditions in the ionosphere are known independently, and that

the effects on radio waves are deduced from them. Actually, our knowledge of the ionosphere is obtained almost entirely by radio methods of investigation, which we shall now consider.

The method normally used for obtaining data about the ionosphere is the *pulse method*. A transmitter sends out very short pulses, which are received at a receiving station a short distance away, and applied to the Y plates of a cathode ray oscillograph. Also received by the receiving station is the pulse reflected from the ionosphere, which arrives after a short time delay. Thus, the appearance on the screen of the cathode ray tube is as shown in Fig. 12 (*a*). The time taken by the pulse to travel up to the layer and back again can thus be determined if the time base speed is known, and so the height of the layer can be found from the known velocity of radio waves. It can be shown that due to the different velocity of the waves in the layer, the height obtained by this method is actually the virtual height shown in Fig. 11.

Fig 12 (*b*) shows a typical record of how the virtual height measured by this method varies as the transmitter frequency is altered. Starting at a low frequency of 2 Mc/s., reflections are obtained from the E layer at a height of 120 Kms. The height increases slightly as the frequency is raised, due to the deeper penetration into the layer before reflection takes place. When a frequency of about 3·5 Mc/s. is reached, the virtual height suddenly jumps to a higher value of 240 Km. The E layer has been penetrated, and reflection is now taking place from the F layer. The effect may be repeated if the F layer is split into two parts F_1 and F_2, but at the time this particular record was taken, this was not the case. Since the transmitter and receiver are quite close together, the reflections are taking place for waves travelling vertically upwards, and so the penetration frequencies measured by this method are the critical frequencies of the layers.

The two echoes received from the layers, due to the ordinary and extraordinary rays, can be seen on the curves, and the different critical frequencies of the two are clearly shown.

By measuring the critical frequency of a layer, we can find the maximum ionization density in it. At the critical frequency, f_c, the wave will penetrate up to the level of maximum ionization, and at the highest point μ must be zero; hence from formula (4)

$$N_{max} = \frac{f_c^2}{81} \quad .. \quad .. \quad .. \quad (6)$$

where f_c is the critical frequency of the layer in kc/s. This is the way the values of N_{max} given in Part II were obtained. The curves could equally well have been plotted to show critical frequency instead of N_{max}, the two being related by the simple formula (6).

Wave Velocity and Group Velocity

It will be noticed in Fig. 12 that the apparent heights of the layers increase very rapidly as the critical frequencies are approached. We should expect *some* increase in height, owing to the progressively deeper penetration of the signal into the layer, but the increase is much too large to be due to this alone. It is caused by the fact that a pulse travels more slowly in the layer than in empty space, so that the time-delay of the echo received back is increased, and our estimate of the height is too large. Near the critical frequency the velocity in the layer becomes very small, so that the layer appears to be much above its true height.

As has already been seen, the *wave velocity* in the layer is higher than in empty space, so that it is at first sight very surprising that a pulse signal, which is merely a short batch of waves, should travel more slowly. Fig 13 (*a*) represents the group of high frequency oscillations constituting the pulse, and the whole must be imagined to be travelling forwards to the right. If we concentrate attention on one particular wave crest, such as the one marked x, it will be found that this moves forward with the wave velocity. If, however, the whole group is watched, it will be found to be moving more slowly, and its velocity is called the *group velocity*. It follows that the individual waves are constantly overtaking the group, new ones are being generated at the end A and others are disappearing at B. The effect can easily be observed with waves on the surface of water, by throwing a stone into a still pond, so as to cause a batch of circular ripples to spread outwards. If our attention is fixed on one particular wave near the inside of the circle and we follow it as the whole group moves outwards, it will be seen to travel right through the group and finally disappear on the outside. This proves that the wave velocity is higher than the group velocity for waves on the surface of water. For any kind of waves the group velocity differs from the wave velocity in a medium in which the velocity depends upon the wavelength. (Equation (3) shows that this is the case for radio waves in the ionosphere.) If the wave velocity is the same for all wavelengths (as for radio waves in empty space) the group velocity is the same as the wave velocity.

The effect can be explained as follows. Any pulse or modulated wave can be expressed as the sum of a number of sine waves (the Fourier components). To take the simplest case, consider a beating wave produced by adding together just two sine waves of equal amplitude, but slightly differing frequencies (Fig. 13 (*b*)). If the sine waves are of frequencies f_1

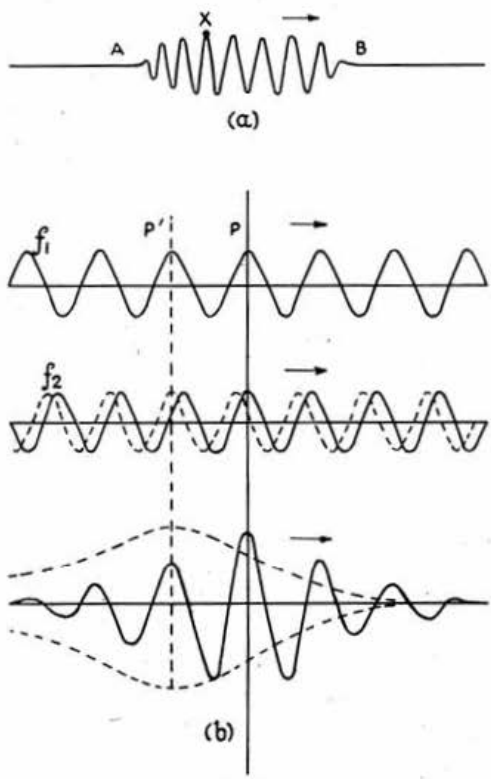

Fig. 13.
Wave velocity and group velocity.

and f_2 a beat of frequency $f_2 - f_1$ is obtained, which is due to the fact that the waves come in and out of phase at different points, so that the resulting amplitude varies from twice the amplitude of either down to zero. Fig. 13 (*b*) shows one cycle of the beat frequency, the waves being in phase at the centre P, and out of phase at each end. Now imagine that the whole picture is moving to the right, but that the sine wave of higher frequency f_2 travels more slowly than the wave of frequency f_1. At some later time, the relative position of f_2 will be as shown by the dotted sine wave, for it will have fallen back relative to f_1. The point at which the waves are in phase has also fallen back from P to P^1, so that the batch of waves produced by the beating of the two sine waves will be as shown by the dotted envelope. It follows that the batch of waves travels more slowly than either of the individual sine waves composing it, *i.e.* the group velocity is lower than the wave velocity. The same can be proved for a group of waves of any shape. In fact, for any type of modulated wave, the modulation travels with the group velocity. The group velocity is lowest when the wave velocity changes very rapidly with frequency, as is the case in the ionosphere, when near the critical frequency. The effect is very important in interpreting observations of the ionosphere.

The next article will be devoted to practical problems of radio transmission.

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(*To be continued.*)

Mr. LESLIE McMICHAEL ELECTED AN HONORARY MEMBER

IT is with great pleasure that we announce the election of the co-founder of the Society, Mr. Leslie McMichael, G2FG, to Honorary Membership.

Mr. McMichael is rightly regarded as the "Father" of the Society and holds a position of respect and affection in this country comparable with that of the late Mr. Hiram Percy Maxim in the United States.

Born in 1884, he was educated at Ackworth School and made his first experiments with a 10-in. spark coil and coherer in 1903, later holding the call-sign MXA.

In 1913, together with Mr. R. H. Klein and Mr. L. F. Fogarty, he founded the London Wireless Club which, later the same year, became the Wireless Society of London.

Mr. Leslie McMichael, Co-Founder of the Society, Honorary Member and Vice-President.

After serving in the R.F.C. during World War I he resumed his activities in 1919 and became Hon. Secretary of the Society, doing much of the work which culminated in the re-issue of licences.

In 1921 he presented the historic petition to the P.M.G. which began the weekly telephony transmissions from 2MT at Writtle and which laid the foundation stone of British broadcasting. In succeeding years he was closely associated with the Transatlantic tests and the early radio transmissions from a moving train.

In 1921 he founded the famous radio firm which bears his name and of which he is still chairman and joint managing director.

Mr. McMichael's influence has been widespread in the world of radio. He is a Member of the Institution of Electrical Engineers and President of Brit. I.R.E., Fellow of the Television Society and of the American I.R.E. as well as a Vice-President of R.S.G.B. He was Chairman of R.M.A. Council in 1932 and is Treasurer of the British Radio Equipment Manufacturers Association.

We offer him our sincere congratulations upon receiving this signal honour which has been awarded only seven times previously in the Society's history.

A. O. M.

OUR FRONT COVER

THE MULLARD ALL-GLASS TECHNIQUE

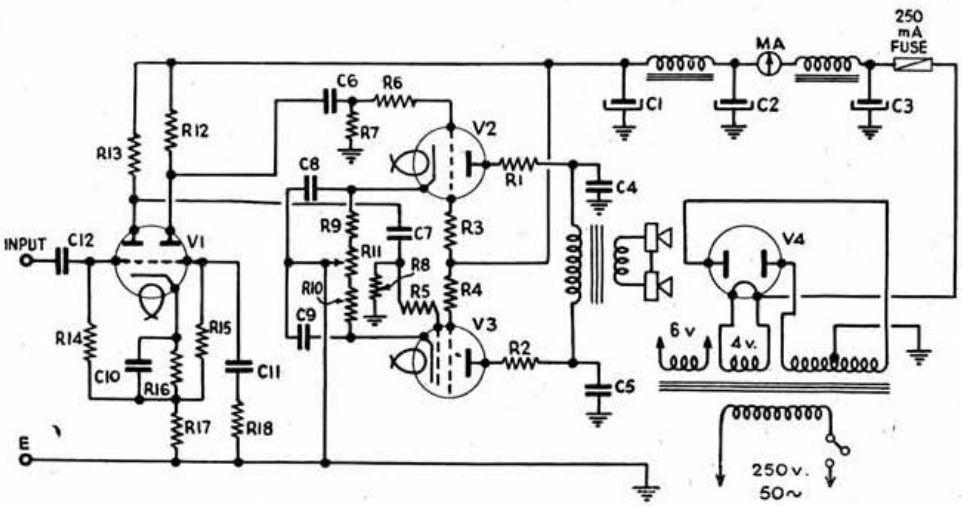
BY a complete departure from the conventional form of valve construction, Mullard have effectively reduced the losses due to H.F. resistance, inductance and capacity effects within the valve itself and in the leads coming from the electrodes. The all-glass technique makes use of an almost flat circular glass pressing for the base of the valve, into which short pins are sealed, the electrodes being welded directly to the pins By thus reducing the length of the lead-out connections, considerably improved efficiency at the higher radio frequencies has been achieved.

A SIMPLE AND FLEXIBLE AUDIO AMPLIFIER

In the April, 1943, issue of THE BULLETIN, *Colin Coates, G5CS, described an amplifier using an unusual arrangement of valves in a differential phase invertor. The author is indebted to him, and to Emrys Williams, Ph.D., author of "The Cathode-Coupled Double Triode Stage," published in the May, 1944, issue of* ELECTRONIC ENGINEERING, *for providing some of the ideas upon which the design of this amplifier is based.*

By L. A. SAUNDERS (BRS5917).*

THE unit was constructed from components on hand with the object in view of providing a good quality audio amplifier suitable for a variety of purposes. The amplification obtained is not particularly high, two stages only being used. For use with a crystal microphone, or with other small outputs a further stage could easily be incorporated.



CIRCUIT OF CATHODE INVERTOR AUDIO AMPLIFIER.

C.1, 2, 3	16 μF.	R.1, 2, 3, 4	25 ohms.	R.16	1,000 ohms.
C.4, 5	.001 μF.	R.5, 6	25,000 ohms.	R.17	30,000 ohms.
C.6, 7	.1 μF.	R.7, 8, 12, 13	100,000 ohms.	V.1	6N7G.
C.8, 9, 10	25 μF.	R.9, 10	250 ohms.	V.2 & 3	6V6G.
C.11, 12	.02 μF.	R.11	300 ohms (with slider).	V4	DW 4/500.
		R.14, 15	1 megohm.		

Circuit Details

The valves employed are a 6N7G, followed by two 6V6G's, with a DW 4/500 rectifier. The input circuit to the 6N7G, shown in the diagram, is for an audio source with one side earthed. Since, in this arrangement either grid of the double triode can be used as the input grid, two inputs with earthed limbs can be connected to the grids, and the amplifier circuit used to compare the two, since only the differences between the two inputs will be amplified. The grid not in use must be provided with an A.C. path to chassis, in this instance through a ·02 μF condenser and a 10,000 ohms resistor. The value to be used in this position does not seem to be critical so long as it is comparable with the estimated load on the other grid. The cathode coupling resistor is considerably larger than that specified for use with pentodes in the amplifier described by Mr. Coates. The value of this resistor is, however, quite critical and depends upon the mutual conductance of the valve and upon the total cathode current. Where no output meter is available, a simple method of ascertaining the best value, when using two single triodes or other alternatives to 6N7G, is to try various resistors and note the bass response, which falls rapidly with bad matching. In any case it is advisable to measure the outputs from the anodes of the double-triode at various input levels before finally completing construction, as the two triodes, although in the same envelope, may differ slightly.

This circuit requires neither decoupling, nor special smoothing, but as the grid and cathode circuits are very sensitive to induced hum from mains and heater wiring, it is necessary to use screened heater wiring for this stage. The valve should be kept well clear of the mains transformer. Unfortunately, as the 6N7G has a diameter of 1 13/16ths inch it is too wide for the standard valve cans, otherwise it would be as well to fit one.

The anodes of the double-triode are resistance capacity coupled to the grids of the 6V6G's. The component values chosen were found to give good overall response, and the rising frequency characteristics of the beam-tetrodes was used to make up for losses in circuits prior to the amplifier. It is, of course, an easy matter to cut "top," by increasing the value of the condensers between the tetrode anodes and chassis. Bass can be improved if desired by increasing the size of the coupling condensers to ·25 μF.

It was found that whilst grid, screen and anode stoppers were desirable in the output stage, the double-triode shows no sign of generating parasitics, neither is it in the least unstable.

Operation

The output of this amplifier was fed into two energised speakers mounted in a fair-sized box baffle. The difference in bass response, due to accurate

* 64 Cat Hill, Barnet, Herts.

matching of the anode current of the output valves by means of the potentiometer provided in the cathode circuit, was very noticeable. This can possibly be accounted for by the fact that a commercial output transformer was used, with less iron than that employed by G5CS. As a consequence it is more prone to swamping by unbalanced D.C.

The cathode-coupled invertor was found to give equal amplification to the " kangaroo " circuit (with an additional triode stage). It also produced much better matching, right up to the overload point of the output tetrodes. The two 6V6G's behave very well, giving a rated output under these voltage conditions, of 12 watts. With an additional 6N7G used as two triodes in push-pull following the invertor stage, and feeding into two 6L6G's a larger output could be obtained—about 18 watts.

Power Supply

The H.T. is well smoothed so that it can be used to provide a good supply for a pre-amplifier, or radio circuit. The use of two chokes of low D.C. resistance is preferable to employing the field coils of speakers which give poor regulation, and since the valves are operating under Class AB1 conditions they will give rise to voltage variations under load. Incidentally, when a directly heated rectifier is used, it is advisable to employ an aqueous condenser as the first condenser in the circuit, since peaks of about 500 volts have been measured at this point. Most " dry " condensers seem to object to such loads after a few weeks' work !

As variations of the input circuit will probably suggest themselves to intended users of this type of amplifier, the writer will be interested to hear what novel uses can be found for it.

INEXPENSIVE HOME-MADE RESISTANCES

By L. E. Tagliaferro,* BRS8033

THE purpose of this short article is to assist members who find it difficult at the present time to obtain commercial resistances.

Construction

Resistances of any value can be constructed by the use of " Graphite Card " (known as " Mastite "), normally employed by engineers for water-system joint gaskets. The " Graphite Card " is first cut into small oblong segments, measuring about 1in. wide by ¼in. wide. When tested with a " Megger " or Wheatstone Bridge, for conductivity, the segments will be found to register zero resistance. The next process is to make several light incisions across the two faces of the material with a safety razor blade. When tested a second time, an ohmic value will be obtained. The procedure is repeated until the required value is reached.

The segment of " Graphite Card " is then bound at its extreme ends with a few turns of single-strand bare copper 7/22 s.w.g. aerial wire, making sure that the bindings of wire are in good electrical contact with the two flat surfaces. The bindings become terminals for connecting the resistance to any required position in a circuit.

Sealing and Testing

From an old or unserviceable H.T. battery, extract a quantity of pitch and heat to a liquid state, using a flat tin lid for the purpose. The assembled resistance is completely immersed in the melted pitch, until thoroughly coated, and then withdrawn, allowing the residue to drain off. It is then hung up by its wire ends to cool.

After testing each resistance, and ascertaining its value, the latter can be " colour-coded " with coloured sealing wax. It is unwise however to colour the body of the component with present-day paint, owing to its metallic ingredients, as this may upset its value.

Once the resistances have been sealed, they will prove to be very robust and perfectly accurate.

* 21 Village Way, Pinner, Middlesex.

IMITATION CRACKLE FINISH

By A. J. Ward (G3WD)

DURING a rebuilding scheme which covered all equipment (excepting the transmitter) at his station, the writer was forced to find some means of obtaining a durable substitute for crackle finish. Some considerable amount of time was spent in experimenting with various paints and processes, and eventually the method to be described was found very satisfactory.

It should be mentioned, however, that the paint can " make " the job and that the type chosen should be that known as " hard gloss." The harder the paint dries the more durable the finished article.

First thoroughly clean the work from all traces of grease. A rub-down with a rag soaked in lighter fuel can be used effectively. Then apply a coat of hard gloss paint—put it on fairly thick and even, but there is no need to brush it smooth—just let it settle and spread naturally.

Next spread evenly over the freshly painted surface a layer of *fine* silver sand—it is important to put on as much sand as the paint will allow—the surplus can be tipped off and used again as it will not be spoilt in any way. Leave this to stand until the paint and sand are quite dry, then brush lightly with a soft brush to remove loose particles of sand.

Finally dab on a good coat of hard gloss paint—do not attempt to brush it on in the usual way—and leave to dry. If the finish obtained lacks depth, dab on another coat after the first is dry.

This finish can also be applied to wooden articles, although two coats of paint should then be applied before sanding.

As in all operations concerning the finishing of cabinets, *etc.* great care should be taken with the job. In this case make sure that the sanded paint is quite dry before attempting to brush off the loose particles of sand. Failure to do this will result in a very patchy look on the finished surface.

There is no reason why one of the synthetic enamels now appearing again on the market should not prove as satisfactory as hard gloss paint, provided it is not too quick drying.

NINE POINTS

H. V. Wilkins, G6WN (Representative for District 15), unfolds a Nine Point post-war plan first suggested by K. Freeman, 2ADL, and later approved at a District 15 Meeting.*

DO you remember that informal discussion held in May, 1943, at the Institution of Electrical Engineers, when Mr. P. W. Winsford, G4DC, and others outlined their views on the post-war planning of the amateur station ? If you do, you will also remember that the suggestions were, in general, personal to the individual.

Some time after the meeting referred to above, Mr. Freeman conceived the idea that it might be possible to evolve a post-war plan which would provide facilities for members in a collective, rather than an individual, sense. The broad principles of the plan were first considered at a District meeting held last October, and in view of the interest it evoked, further meetings were arranged to hammer-out what has now been styled the "District 15 Post-War Plan."

It was realised from the inception that such a plan, however far-reaching, should in no way interfere with the aspirations of individual members many of whom are known to have commenced the planning of their post-war station. It was also recognised that if the plan was to succeed it would have to be of such interest and value as to make members anxious to participate in its operation.

In presenting the plan to the membership the writer and his colleagues wish to emphasise that their primary purpose at the moment is to stimulate discussion. No doubt many improvements will be suggested and adopted before it is finally launched.

The plan is as follows :

Point 1

A census will be taken of all pre-war fully licenced members resident in the District, who are prepared to support the plan. Each such member will be requested to indicate the type of experimental work he proposes to specialise in as soon as licences are restored.

The following four headings have been suggested :—

(*a*) Telegraphy and/or Telephony.
(*b*) Long distance and/or local communications.
(*c*) Short wave and/or Micro-wave technique.
(*d*) Specialised interests.

The census will be checked periodically and brought up-to-date by including the names of newly licenced members and newcomers to the District. A record will also be kept of those returning to civilian life from the Services or industry.

When the census is complete, arrangements will be made for all members interested in the specific groups to meet and discuss their problems. These group meetings will also enable the participants to consider how best their activities can be made to fit into the District Plan as a whole.

Point 2

It is planned to provide facilities for non-transmitting members in the District to be "adopted" by fully licenced members. This will ensure that the former receive proper instruction in station operating and procedure.

Point 3

It is planned to set up, throughout the District, a group of qualified receiving stations capable of operating on all amateur bands. These stations will be manned by qualified BRS members whose duty it will be to listen for unsuccessful DX calls and report upon them to the transmitting station concerned. These stations will, of necessity, have to be equipped with accurate frequency measuring apparatus to enable them to pass an exact frequency by land-line to the transmitting amateur concerned.

A central receiving station will monitor all bands at regular times of the day. A rota of members on individual watches will be maintained at this central station.

Point 4

It is planned to establish a Frequency Measuring Station within the District. The operator of this station will provide checks as requested on transmissions from any District Station. (This proposal was, to some extent, covered in pre-war days by Mr. J. Paine, G6PR, of Slough, a member of the R.S.G.B. Band Monitoring Section).

Point 5

It is planned to select suitable permanent or semi-permanent sites in the District, from which members will be permitted to operate V.H.F. equipment. This proposal will enable members to have access to sites in general superior to that of their home station.

Point 6

Subject to permission being granted, it is planned to broadcast at stated times, from a Central station in the District, notices of general interest to members. Such transmissions will be carried out on the V.H.F's. by telephony and would probably also be relayed to ensure good coverage of the District.

Point 7

It is planned to form a special group of qualified members to assist with the design and erection of aerial systems. To this group probably others will be added to assist or advise members in specific problems.

Point 8

It is planned to revive the District 15 Magazine (which was ably edited by G5JL for some years and was taken over by G2UV just prior to the outbreak of war), and to take steps to ensure that press publicity is obtained for all District activities. The co-operation of the local press will be sought and invitations extended to the press to attend all social functions.

Point 9

It is planned to set up a fully representative District Social Committee with power to organise :—

(*a*) Dinners and Dances.
(*b*) Visits to amateur and commercial stations.
(*c*) Field Days.
(*d*) Week-end visits to Continental amateurs.

The writer appreciates that before such an ambitious plan can take shape, it will be necessary to receive the full support of many members, and in particular the Town Representatives in his own District. As many of the pre-war District 15 T.Rs. are now on active service, he particularly appeals to them for their views. He would also like to hear from other D.Rs. and T.Rs. interested in the plan.

* 539 Oldfields Lane, Sudbury Hill, Greenford, Middlesex.

Liberated Amateurs

News has been received by Ft./Lt. Wilberforce, **G2IY**, from Monsieur R. Desgrouas, F8OC, Vice-President of the R.E.F., now of La Croix Breffaut, Vendome (Loir-et-Cher). He and his family are well and have escaped personal injury during the German occupation, though his former house in Calvados was smashed in the battle of Normandy. M. Desgrouas mentions that his gear is safe and that he was able to keep his transmitter hidden throughout the occupation. Another Vire amateur, André Leroy, F8MW, was deported to forced labour in Germany before the Liberation.

We learn from Douglas Lamb, **GM2UU**, that ON4VU, Charleroi, is fit and well and is still at his pre-war address.

BRITISH ISLES NOTES AND NEWS

CLOSING DATE FOR APRIL ISSUE IS MARCH 31st. REPORTS SHOULD BE POSTED TO REACH D.R.'s AND SCRIBES BY MARCH 26th.

DISTRICT 1 (North Western)

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

THE D.R. has not so far received any response to his inquiry about the proposed P.D.M., except from the Ashton Radio Society, who again suggest that the venue should be Manchester. This is a convenient centre for most parts of the District, and if no stronger claims for another venue are made and substantiated it is felt that Manchester would be as good a place as any, provided somebody on the spot can assist the D.R. by making the necessary hotel arrangements. Time is, however, too short to permit of the P.D.M. being arranged and adequately advertised for the date originally and provisionally suggested. The next available date which will fit in with H.Q. is Saturday, September 8, or Sunday, September 9, and the D.R. has asked H.Q. to book the P.D.M. for one of those dates, the venue to be settled later. The day of the meeting is also yet to be settled and the views of T.R.'s are invited.

Ashton-under-Lyne.—At the General Meeting of the Ashton-under-Lyne Radio Society held on Sunday, February 4, officials were elected for the year 1945. Later there was a demonstration of measuring instruments built by individual members. A cathode-ray oscillograph created interest with its versatile possibilities for amateur radio after the war. The meeting was well supported. G5PX.

Bolton.—Our one and only "Early Bird," Cpl. Harold Willets (2FPI) has come home to roost after four years in the Middle East. One evening recently 2BTO (also on leave) accompanied by 2ABF and 2DVQ, spent a few hours discussing old times with him. Thanks are due to Mrs. Willett for providing the refreshments. One result of the discussion was a decision to try to revive the Bolton Radio Society. The T.R. would appreciate it if any local member interested in this project would send him a postcard at 32 Bromwich Street, Bolton. Subject to an adequate response he will endeavour to announce the date of the preliminary meeting in the April issue.

3594, writing from Italy, reports a leave spent in Rome, whilst 5542, after a spell afloat with the Polish Navy, is once more a dry-land sailor somewhere in the M.E. 2DVQ.

Liverpool.—Only one offer of assistance in connection with the local meetings has been so far received. The D.R. is very grateful for this and hopes that it will be possible to hold a meeting in April next.

Oldham.—The meeting held at G2MQ in February was attended by five members and three visitors. The H.Q. list of components, etc., needed in the post-war amateur world was discussed and a report on the discussion sent to H.Q. A Morse practice session followed and another is planned for the next meeting at G3PD, 26 Bargap Road, Oldham, at 6.30 p.m. on March 25.

G2MQ.

The D.R. would like to remind scribes and T.R.'s that he cannot at present undertake to arrange for the publication of notes not in his hands by the 25th of the month and hopes that all concerned will do their best to oblige him in this respect.

G6CX.

DISTRICT 2 (North Eastern)

D.R.: C. A. Sharp (G6KU), 56 Moore Avenue, Wibsey, Bradford. Bfd. 10772. Scribe: H. Beadle (G8UO), 13 Chandos Street, Keighley.

Bradford.—G3KF (R.A.F.), who has been having a hectic time in "doodle bug" alley, receives the BULL regularly and reads these notes with interest. SP1RH is at his station. 4CL suggests that G. Haylock contacts Cpl. Underhill, 3 Coy. 3rd TTB. CL has been having trouble with his 1,000/100/10 kc/s. oscillator. 3HA (R.A.F., C.M.F.) reports fit and well and would like news of 4GJ 4JB, 6BX, 6PL, and 2DM.

Leeds.—G4MC, this time writing from Kenya, where he is experiencing great heat, says that he is shooting "crocs" in his spare time. The few radio sets that he has seen have been American and 10 to 20 years old. He sends 73 to 3HA. From 2DRO we learn that 6QA and 8WS are in the Services, 3VU is in India. 2XY and 8OG are looking forward to post-war operation. 2DRO is having difficulty in learning the code and suggests that the proposed H.Q. station puts out code practice. 4349 (R.A.F.) is now in Trinidad with 6FJ. He was married shortly before going overseas (congrats. O.M.). Whilst in VE he met 2LP and 3975.

Barnsley.—G5IV has been home on embarkation leave. He has been in Oxfordshire for 12 months and conveys thanks to the Reading Radio Club for the welcome he received. He recently met 2BXS and sends 73 to the "gang."

Sheffield.—The report of our February meeting will appear in the next issue. The next meeting is on March 28. There are still a few members we have not seen at these meetings and we extend to them a special welcome.

General.—2AGP, after four years overseas, is now back on an R.A.F. station in Yorks. 3RY is still with the B.L.A. and hopes for leave shortly. The July and November Letter Budgets recently reached 6KU in one envelope, they had only covered half the rota. News would be welcomed from 5CX, 2AGH, 2BOJ, 4005, 4819 and 5603.

G8UO.

DISTRICT 3 (West Midlands)

D.R.: V. M. Desmond (G5VM), "The Chestnuts," Hanley Castle, Worcester. Scribe: E. J. Wilson (2FDR), 48 Westbourne Road, Olton, Birmingham.

Birmingham.—A meeting of M.A.R.S. was held on February 20, when Mr. B. K. George gave a very interesting lecture on "Transformer Design." Twenty-six members and visitors were present. 2FDR.

Coventry.—Twenty members and visitors (including PA0EO) were present at a meeting held on January 29. It was decided to hold monthly meetings, probably at the old C.A.R.S. headquarters, G5GR.

Rugby.—Eleven members attended the February meeting, when Mr. L. W. James gave an interesting lecture on "Valve Characteristics."

Congratulations to Mr. L. Woodhams, G8RL, on receiving the B.E.M. G8FM.

NORTH EASTERN PROVINCIAL DISTRICT MEETING

to be held on

SUNDAY, APRIL 22nd, 1945

at the

HOTEL METROPOLE, LEEDS.

PROGRAMME

ASSEMBLE	2 p.m.
BUSINESS MEETING	2.45 p.m.
TEA and BISCUITS	4.30 p.m.
OPEN DISCUSSION	5.30 p.m.

INCLUSIVE CHARGE 2/6

Reservations to Mr. C. A. SHARP (G6KU), 56 Moore Avenue, Wibsey, Bradford, not later than April 17th, 1945

ALL MEMBERS CORDIALLY INVITED TO ATTEND

DISTRICT 4 (East Midlands)

Deputy D.R.: A. E. Clipstone (G8DZ), 32 Tettenbury Road, Perry Road, Basford, Nottingham.

Derby.—At the February meeting G6XM described and demonstrated his 22-valve superhet which he has recently completed. Members were very much impressed with the constructional work and design which includes a double crystal filter noise silencer and push-pull output. Those who have heard this receiver can testify to its excellent performance.

9114 has been at RMS2 for three and a half years. 9020, who has wide U.H.F. experience, has promised to give a talk on same at a future meeting. G2OU reports that his resistance bridge is nearing completion and that his transformer has been returned for his oscilloscope which will be next on the programme although he expects to be held up by QRM from a YL junior op. who has just arrived. (Congrats.)

For details of next meeting on March 25, which is to a place of interest, see "Forthcoming Events." G2OU.

Leicester.—A lively discussion on topics ranging from power wiring to mast erection was enjoyed by those members who attended at G2IX last month. A warm welcome was extended to 2FNW, who made a round trip of 30 miles by cycle to attend. His example should be an inspiration to those members who live much nearer, but who do not attend meetings.

Next meeting, March 18, at BRS5329, 52 Regent Road, Leicester, at 2.30 p.m., when our host will give a demonstration of C.R.O's. BRS5605.

Nottingham.—The first meeting held at the D.D.R.'s new home proved a great success, there being 19 members present including Mr. W. Schulte, of Buffalo, an operator of W8QBU, who journeyed from London to attend. The main topics were the component list compiled and submitted by H.Q. and post-war transmitting licences. Of those who were present at least 12 intend to apply for

a licence and to assist them, it was arranged that the D.D.R. should give Morse lessons at his QRA every Tuesday at 7.30 p.m.

5546 has been busy on beam aerials of the Hertz type and a radio analyser, a description of which he has promised to submit for publication.

The next meeting is to be held in conjunction with Derby on March 25. (See "Forthcoming Events.")

A collection for the P.O.W. Fund realised 22s. G8DZ.

DISTRICT 5 (Western)

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

Bristol.—Attendance at the January meeting was the largest for some time, 18 members being present. G2IK (R.A.F.) put in an appearance, as well as a number of others who have not been seen recently. 2BYU was presented with the G5FS Memorial Cup for the grand work he has been doing for the Bristol section. Mr. B. C. Tunstall, a welcome visitor, gave an interesting demonstration of the uses of the cathode ray tube. His own model was used and many detailed graphs and sine waves were shown and explained.

Forthcoming Events

Mar. 18	District 3 (Rugby), 3 p.m. at the Percival Guildhouse. Talk by G8VN on "The Development of Radio."
,, 18	District 4 (Leicester), 2.30 p.m. at BRS5329, 52 Regent Road. Demonstration of C.R.O's.
,, 24	District 15, 3 p.m. at The Excelsior Hotel, 1 Ladbroke Gardens, Ladbroke Grove, Notting Hill, W.11. Discussion on Frequency Measuring Apparatus.
,, 25	District 4 (Derby and Nottingham), 3 p.m. prompt. Meet at the corner of Becketwell Lane and Victoria Street, Derby, for a visit to a place of interest arranged by G5YY.
,, 25	District 5, 3 p.m. at 17 Colston Avenue, Centre, Bristol.
,, 25	District 10, 2.30 p.m. at GW8UH, 29 Ladysmith Road (off Penylan Hill), Cardiff.
,, 25	District 17, 2.30 p.m. at the Gainsborough Cine Club, Neptune Inn Bridge.
,, 25	Scotland "A" District, 3 p.m. in Royal Technical College, George Street, Glasgow. Enter by Montrose Street.
,, 28	District 15 (Hayes), 7 p.m. at The Hambro Arms, Dawley Road, Hayes (G.W.R. or buses 55, 90, 98, 120, 140).
,, 31	District 7 (Reading), 6.30 p.m., at Palmer Hall, West Street.
April 1	District 15 (West London), 5.30 p.m. at BRS6275, 51 Rusthall Avenue, Bedford Park, Chiswick (District or Piccadilly to Chiswick Park, or buses 27, 55, 88).
,, 8	Districts 7 and 13. Combined Meeting, 3 p.m. at the Y.W.C.A., North End, West Croydon.
,, 14	District 7 (Reading), Morse instruction, 7 p.m., Palmer Hall, West Street.
,, 17	Midland Amateur Radio Society, 6.30 p.m. at the Chamber of Commerce, New Street, Birmingham. Demonstration of High Fidelity Reproduction.
,, 22	Provincial District Meeting, Hotel Metropole Leeds.
May 26	Provincial District Meeting, Imperial Hotel, Birmingham.

At the February meeting which showed a decrease on the splendid attendance of the previous month, we were pleased to see G5KT, who is now back in "civvy street." A most interesting talk was given by Mr. Dinham on the application of Time Bases to amateur radio. A discussion took place on the list of equipment drawn up by Council for submission to the radio industry. 6267 with the B.L.A. writes to introduce himself to the members of the District.

Bath.—G2IW recently had a visit from 8DX when he was on leave. 6JQ is now up North. G6RB.

DISTRICT 6 (South-Western)

D.R.: W. B. Sydenham, B.Sc. (G5SY), Sherrington, Cleveland Road, Torquay. Torquay 2097.

Reports are scarce this month, but the whole District, and particularly N. Devon, would we are sure, like to congratulate W./C. Forsyth, G6FO, on the honour of being "Mentioned in Despatches." G6FO was for some considerable time T.R. of N. Devon, and did good work in the U.H.F. field.

Taunton.—Local members met at the Y.M.C.A. on February 8 when there was an interesting discussion on pick ups. It was decided that the next meeting should be on March 18 to enable the T.R. to be present. G3SB, 5AK, 5LM, 6LY and 2DRW were present. G5SY.

DISTRICT 7 (Southern)

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

Bournemouth.—2FWA (Croydon) was here recently. 2ADX (Dorchester) and 2HCD (Blandford) have introduced themselves and we look forward to their attendance at our meetings. Bad weather affected the attendance at the January meeting. On February 24 Mr. Coxall, BRS8827, gave the first of his talks on U.H.F. technique. He will continue the series at the next meeting at 45 Parkwood Road, at 3 p.m. on March 31. Local members are strongly recommended to attend. 2HNO.

Coulsdon.—The T.R. wishes to thank 9013, 9302 and FRS105 for their letters. 9013 is serving with R. Signals in the Home Counties. 9302 recently finished the construction of an amplifier. FRS105, who has been in this country since 1942, is a Wireless Mech. in the R.A.F. BRS3003.

Croydon.—The February meeting at Croydon was attended by 2DP, 2HP, 2UA, 3ST, 4NI, 5BT, 2CVA, 2FTX, 1545, 3003, 4324, 4814, 4903, 6487, 6894, 7834, 8130, 8417, 8740, 4996, 9004, 9110, VK3EJ, VK3KV, two associate members, and a visitor. The lecture by Dr. V. A. Sheridan, F.P.S., A.M.I.E.E., of British Physical Laboratories on "Measuring Instruments" was one of the most interesting that we have had for a long time. A discussion followed and numerous questions were answered by the lecturer. A report of the meeting appeared in "The Croydon Times." Several members came from Aldershot, Basingstoke, and other "remote" areas—we hope that they enjoyed themselves. Dr. Sheridan has promised a lecture on an inductance meter at a later date. 2CVA would like some contacts in the area during his spare time. 2FWA sent some tickets for the P.O.W. Fund. A collection was also taken and the sum of £1 16s. 6d. raised. VK3EJ and VK3KV are coming to future meetings whenever possible.

G5BT will give a talk on Oscilloscopes at the April meeting, details of which will be found under "Forthcoming Events." G2DP.

Reading.—G2YI, 2BHS, 2BTY, 2BYZ, 2DIO, 6GT, 8KJ, 4030, 4573, 7578 and VS7RP were among those present at the February meeting when a most instructive demonstration of an Oscilloscope was given by 2DIO. It was pleasing to see one of the "old brigade" turn up for the first time in the person of G6GT; he was made very welcome. This was the last meeting of the year's run and it is gratifying to the organisers to see so many of the local members according their continued support.

The Morse class was held as usual on February 13 followed by a rag-chew.

The next meeting will be held at the Palmer Hall, West Street, Reading, on March 31, at 6.30 p.m. BRS4573.

Weybridge.—Mr. R. J. Denny, G6NK, has kindly offered to investigate the possibility of organising local meetings if there is the promise of support. Please write him at 32 Waverley Road, Weybridge.

Guildford.—Another highly successful meeting took place on February 25, when there was an attendance of 34. The lecture by Mr. E. A. Dedman, G2NH, on "Crystal Filters in Communication Receivers" was right up to the high standard we had anticipated from Ernie expounding on his pet subject. The receiver on view fairly bristled with crystal filters, but on the whole we were convinced that in spite of all the "gates" to be surmounted the wanted signal would probably emerge at the right place!

Again our grateful thanks to organisers Rawlings and Salmon. It was quite like old times to see Bill Gilhespy, G6GS, looking as fit as a fiddle after his sojourn in the Near East. G5WP.

DISTRICT 9 (East Anglia)

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

Norwich.—G2MN reports a recent visit to BRS Dodds, of Thorpe, whom he found to be very interested in a "358." Mr. Dodds had recently heard from 4809, who is in Italy. 2MN has heard from 7423 who has been doing a Continental tour. 2CWO, of Lowestoft is hoping to get back to amateur radio in the near future.

King's Lynn.—G2XS bids welcome to two new members, W. M. Barnes, 8721, now serving in India, and P. F. Wheeler, 9139, of whom he would welcome news. G2XS.

DISTRICT 11 (North Wales)

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

During February a few members were able to get together on two occasions. Those present included: G2GZ, GW4CK, 1060, 8152, 8265 and 9307. Discussion centres round V.H.F. receivers, which many are at present constructing, post-war possibilities, and valve developments. G2GZ, 8152, 8265 and 9307 are hoping to arrange regular informal meetings in Rhyl and would like to hear from others who will support them. Dates will be announced when possible. The writer will put any interested member in touch with G2GZ.

GW2PH reports fit and well from Italy. G6KP has recently arrived in Cairo. 4444 has been ill and could not attend our meetings. He is working on a new frequency meter and hopes soon to be active again. Ft./Sgt. Thomas, 9017, one of our new members, is stationed in the District, and two of his associates are

G4OY and an ex-Polish amateur. His present activities include a new superhet, and a midget receiver for use on a cycle. He asks for news of activity in the Caernarvon area.

7529 (Caernarvon) who writes from Malmesbury, where he is working, reports being billeted with 7520, 7525 and 7953. 8761 runs the radio shop where he used to work. His present activities include constructing an oscilloscope. 8828 (Penrhyndeudraeth) is building a power supply (engine-driven, dynamotor vibrator effort) to run his present receiver.

4761 (Rhyl) training with R.A.F. in Transvaal, is now flying solo, and hopes to gain his wings during March. The recent death at the age of 48, of "Ced" Elliott, BRS1450, will come as a shock to many of the Prestatyn members, and others who knew him. To his widow and family we offer our sincere sympathy.

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 February meeting held at BRS3386, was attended by G5CD, 5QF, 6CL, 6OT, 2DHF, 2DWV, BRS3386, 4249 and 8075. After discussing a suggestion that a standard method be adopted for measuring field strength when giving signal reports, arrangements for the P.D.M. were considered and a draft plan prepared.

After tea the meeting was rounded off by our host exhibiting the casket containing photographs of Stalingrad presented to him by the citizens of that city for his services in connection with the construction of the famous Stalingrad Sword. (A full account of the presentation and details of the casket were published in a recent issue of the "Palmers Green and Southgate Gazette."—Ed.)

Members living in the Tottenham – Edmonton area are invited to get in touch with Mr. W. Larbey, 2DWV, 21 The Hale, London, N.17, with a view to arranging local meetings.

Those living in or near to Barnet, Finsbury Park, Finchley and Watford, and who are willing to organise local meetings in their area are asked to communicate with the D.R.

2DWV and 4249 recently visited BRS6518, who is in hospital. We are glad to learn he is making a rapid recovery.

Due to the difficulty of finding suitable accommodation there will be no N. London meeting during March, instead several members plan to stage a surprise visit to one of the other London Districts.

Members associated with local government work will be interested to learn that the General Secretary (G6CL) has been elected to serve on the Southgate Borough Council.

St. Albans.—The members present at the meeting held at BRS3412 were honoured by a visit from Mr. E. H. Laister, 3386, our new member of Council. G4GT, 5NU, 5QF, 2DHF, 2HAB, 7238 and 9135 also attended when a lively discussion ensued on the District 12 P.D.M. to be held at Barnet on Saturday, June 30. Views were also put forward in connection with the list of items to be submitted by Council to the British Radio industry. 5NU, who is now stationed at Watford, would like to get in touch with local members. So far three members have expressed a wish to attend code classes. Congrats. and best wishes are extended to 2BVH on his recent marriage. We understand that three other members are waiting for the warmer weather before taking the plunge; we hope this will not mean four less to attend future meetings!

G5QF.

DISTRICT 13 (London South)

Acting D.R.: S. E. Langley (G3ST), 19 Elm Gardens, Mitcham, Surrey.

There was a record attendance at the Y.M.C.A., Croydon, for our February meeting, when Dr. Sheridan, to whom we are very grateful, gave a most complete and detailed talk on meters. Types of particular interest to Radio Amateurs, received special attention (see District 7 notes for further details of this meeting).

G3ST thanks District 13 and 7 members and others for their support in his recent election to Council, and assures them that he will attend to their interests, to the best of his ability.

All members, especially the "old timers," are asked to make every effort to attend the Croydon meetings, as we want to get our affairs in order, ready for the take off, for one fine day soon we shall surely become airborne again!

In order to keep up the good work in aid of the P.O.W. Fund, 3ST will be pleased to receive contributions for this fund, from those members who are unable to attend at Croydon.

G3ST.

DISTRICT 15 (London West, Middlesex and Buckinghamshire)

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

For some months past very little has been written in these notes of happenings at meetings held within the district. Nevertheless, plenty *has* been talked about and it is now possible to present to the membership a scheme which has been evolved and which is known as the District 15 Post-war Plan. The plan is published elsewhere in this issue. We should like every District member to read it carefully.

At the February meeting we had the company of Mr. S. K. Lewer, G6LJ (Executive Vice-President), whom we hope to see again on many occasions. Others present included G2TJ, 3HT (home on leave from R.A.F.), 3SU, 3UQ, 5LN, 6WN, 8KZ, 2ADL, 2FUX (also on leave from R.A.F.), 4871, 5056, 5246, 5301 and 9448 (both on leave from R.E.M.E.), 6275 and 9448. At this meeting Mr. Newham (3SU) ably opened a discussion on post-war receivers. For dates and details of future meetings (including those starting in Hayes) see "Forthcoming Events."

The following members have agreed to take over as Acting Town Representatives and we thank them cordially: Mr. L. G. King (3QK), 36 Lyndhurst Gardens, Pinner Hill (Pinner, Ruislip Eastcote, Northwood, Hatch End and North Harrow), Mr. G. A. Ferns (5056), 9 St. Hilda's Avenue, Ashford (Staines, Ashford, Wraysbury, Bedford, Sunbury and Feltham), Mr. J. A. V. Clarke (9094), 124 Springfield Road, Heston (Hounslow, Heston, Osterley, Whitton and Isleworth, together with Colnbrook, Cranford, etc., on the Bath Road). They hope to get meetings under way soon so please give them your support.

Reports have been received from the following:

West London.—2FCJ (R.A.F., Suffolk) sends regards to all his friends, particularly 6XP. 7250 is with the B.L.A. 9087 is serving with R.E.M.E. in India.

Hayes.—G5JL in Italy has exchanged the busted ribs for a chunk out of his shin—you guessed right—he has again been playing football! 9422 lives in a brewery so should have no difficulty with bottles.

Edgware.—4487, who last reported from the Orkneys, is now with the R.A.F., in India.

Perivale.—8054, who has just returned from the Middle East, is also with the R.A.F. He sends greetings to 8053, 8057 and 8087.

Pinner.—3QK is pleased to hear about 8MA.

Aylesbury.—2CGN is Flight Sergeant to 9355, a Flight Lieutenant stationed near Bletchley. They would welcome some meetings in that area. What about it Mr. Last?

High Wycombe.—4781 reports that the following are still busy with various amateur interests: 2RL, 6IF, 6JK, 6RP, 5666 and 8572. BRS7191 (R.A.C., in Scotland) recently met 2FV, a past member of this section, at a GM meeting.

G6WN.

DISTRICT 16 (South Eastern)

D.D.R.: W. A. Scarr, M.A. (G2WS), 8 Beckenham Grove, Shortlands, Bromley, Kent. Scribe: E. H. Trowell (2HKU), 27 Unity Street, Sheerness, Isle of Sheppey, Kent.

Cpl. Ward (R. Signals), BRS3188, now with the B.L.A., is building V.H.F. gear and has a portable receiver with him. He met a W2 on the ship going "over there" and has visions of post-war QRM for he lives near G2MI and right opposite 6VX! L.A.C. Nicol (R.A.F., B.L.A.), 7740, would like to hear from members near Orpington as he expects to be on leave during March. L.R.M. Chandler (R.N.), 7538, has built a nine-valve communications superhet and is experimenting with a cine film sound projector. He would like to hear from 5CI and 4BY and he sends 73 to 3GW. F./O. Clarke (R.A.F.), 2AAN, has built a 15 watt modulator, two stage pre-amplifier, and a 3 in. oscilloscope and plans to build a modulation indicator, C.W. monitor and power packs. He would like to hear from 5CI, 3BD and 2BIB. He also asks for information on P.A. circuits of the Taylor T20. L.A.C. Nicholson (R.A.F.), 2DOH, has met two members at his station in Huntingdonshire and also 2AFT and 2FYD whilst on leave. B. D. Cooper (R.A.F.), 7272, has built an all-wave superhet and is interested in quality receivers. He would like to contact members in the Petts Wood area. L.A.C. Jobson (R.A.F.), 9195, welcomed as a new member, is building a large superhet whilst studying for the City and Guilds Exams. He is serving in District 6 and hopes to make contacts there. Cadet Morrison, 8429, reports having met only one member in a year and hopes to make some contacts near his OCTU in Kent. G2VA has heard from 5FN and also had a personal contact with 6QC (Chatham) who is building test gear. 2HKU has had visits from 3GW (who is very interested in oscilloscopes), A. Crickmere (R.E.M.E.), 7188 and Ldg. Tel. Whiting (R.N.), 7928, who has just returned from another brief visit to Russia.

Sussex.—C. F. Barnard (R.A.F.), G8AC, 90 Coombe Road, Brighton, has just returned from Malta and has offered to assist local members to organise some activity. 6GS recently contacted him at his unit following a request in "Khaki and Blue." E. G. Cocks (R.N.), 7412, 3 Hyde Road, Eastbourne, hopes to hear from nearby members and mentions that his wife is very interested in radio, too. L.A.C. Nugent (R.A.F.), asks for news of 3CX and 2HGL. He expects to go overseas shortly.

Please keep sending those letters and remember that the smallest amount of news is appreciated by other members. It is regretted that some of the above notes were unavoidably delayed due to the D.D.R. being away from home.

2HKU.

DISTRICT 17 (Mid East)

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

Last month's note of inquiry has located PA0EO, who is in Warwickshire and his QRA has been sent on to PA0AD *via* 2AUR with B.L.A. G3OS reports that a local meeting was attended by G3WB, 4NU, 8BA, 4315 and 3376. G3VP has been posted to District 4. 2AJV is at Cranwell and would like some contacts. 8034 is now on his way home from India. 8613, a Naval telegraphist stationed in the District is finding trouble with his midget receiver. See "Forthcoming Events" for Gainsborough meeting. Please advise G3OS for catering arrangements.

G5BD.

DISTRICT 19 (North-Eastern)

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

Newcastle.—G3UB reports that while reading the BULL during a train journey recently he was contacted by a G4 and found that, unknown to each other, they had been working in the same building for the past four and a half years! He also reports building the "Fox Hole Receiver" and it works! 3UB, who sends 73 to all District 19 members, would like to hear from 5QY

Darlington.—BRS6943 has completed a new 0–v–1 receiver. but is not satisfied with its performance. 2HMK's Morse is now improving rapidly and the mains hum in his audio amplifier has been eliminated.

Middlesbrough.—BRS8919 of Guildford, sends news that 7413 of Middlesbrough has been giving him Morse practice and is building the 3PL Midget. 5XT lost the felt from the roof of his shack during the recent bad weather and is now busy drying out his gear. G2FO.

Scotland

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

"*A*" *District.*—At the February meeting happy memories were brought back to many of the members present when some of the R.S.G.B. films were displayed. Thanks are due to Mr. Janes, BRS4684, who arranged for Mr. Robertson to bring along a projector and operate it. Ft./Lt. Ian McDermid has been home on leave.

"*B*" *District.*—Due to the fact that BRS5857 has been swotting for his B.Sc. finals he has been unable to hold a meeting for some time.

"*C*" *District.*—The speaker at the February meeting was Mr. R. P. Conway, who chose for his subject "History of the Superhet." Many interesting and obscure facts were brought to light.

"*D*" *District.*—A welcome letter has been received from Sigmn. A. G. Brown, BRS8631, who writes from Greece. GM6ZV.

Northern Ireland

D.R.: J. N. Smith (GI5QX), 19 Hawthornden Drive, Belmont, Belfast, N.1. Phone 63323.

Belfast.—GI5HU, who records another visit from W8VVH, has also met G4RX who was in Belfast for a few days. The usual Wednesday night sessions at GI6YM continue to be well attended; EI9F was a recent visitor. At the last general meeting of the R.S.N.I. GI6TK gave an interesting talk about the QSL system, and how it functioned before the war.

Correction to last month's notes: Read GI3ZX instead of GI5ZX. GI5HU.

General.—A welcome is extended to BRS8870, who is stationed in N.I. and working alongside GI5TK. W2IOP writes to say he does not expect to get back to N.I. He sends 73 to all old friends. GI5QX.

The G5FS Memorial Cup

In the days before the war, the G5FS Memorial Cup (donated to perpetuate the memory of the late Mr. W. H. Andrews, G5FS), was awarded annually to the member resident in the Bristol area who, in the opinion of the adjudicators, had performed the most meritorious transmitting work during the year. Although transmitting work is still suspended, the Committee has decided to revive the award for the current year.

The new holder is Mr. G. E. Hellen, 2BYU, whose tireless efforts on behalf of the Bristol membership have contributed largely to the progress made in that town since the war began. Without his help in arranging for members to meet at his premises the section would have found it very difficult to carry on.

No less than 18 members—the largest gathering in Bristol for many years—attended the January meeting, to pay tribute to the new holder of the Cup.

Congrats

● To Sgt. C. T. Fairchild, **G3YY**, of Brighton, who was married on February 10 to Miss Hilda Smith. The wedding took place in Manchester.

● To Mr. and Mrs. W. T. Pickard, **G8KP**, of Wakefield, on the birth of a daughter—Sandra—on February 13, 1945.

● To Mr. and Mrs. H. Beaumont, **G5YV**, on the birth of a daughter—Patricia—on February 6, 1945.

● To Bdr. C. J. Spencer, **BRS7634**, of Barnet, whose wife presented him with a second son on January 13, 1945.

● To F./O. Douglas Lamb, **GM2UU**, of Stranraer, who was married recently to Section Officer Marjorie Spence, W.A.A.F. No doubt Rowley Scott Farnie, GW5FI, "Bill" Pope, G3HT and Ken Jowers, G5ZJ, will be specially interested in this news as all three have been the bride's C.O. at some time or other during the war years.

● To Wing Commander W. N. Craig, **GM6JJ**, who married Section Officer Dorothy Robson, W.A.A.F., on March 2.

KHAKI and BLUE

● W./O. Arthur Leonard, **G5KV**, writing from 164 Signals Wing, R.A.F., India, sends news of Ken Jowers, G5ZJ, Reg. Farr, G8IG and R. Nicholass, G8BJ, all of whom are fit and well. Arthur hopes to arrange a meeting soon with F./O. L. King, G4IB, who is also in India.

● From Italy comes news of Ft./Lt. C. S. (Pim) Bradley, **G5BS**, who mentions that W./O. Lavery, G5UV is with him. G5BS sends greetings to all old friends and looks forward to meeting some of them whilst abroad.

● L.A.C. N. D. Glass, **2FFM**, reports that as the result of co-operation between the Army Educational Authorities and Mr. Frank Pettitt, SU1SG, a radio club has been formed in Alexandria and meetings held in the Catholic Soldiers Club. Among those who attended the first meeting were SU1AX, 1RD, 1SG, G5UI, 2DOS and three BRS. The club is intended to provide facilities for instruction in Morse and radio theory. It is also hoped to arrange demonstrations of test equipment and to encourage constructional work. L.A.C. Glass expects to return to England at an early date.

● Sgt. W. O. Sturmey, **G8KL**, writes from Italy to say that he has spent several weeks in the "Eternal City," Naples and Bari. The only lasting impression he has of the "Jewel of the Adriatic" is of thousands of fountain pens on sale by itinerant street salesmen. Prices were quite modest—a 2s. 6d. pen being offered for 800 Lira (about £2)! Sgt. Sturmey would like to see someone prepare a list of "ham" terms in French, German, Italian, Spanish and Russian. Would any member like to try his hand? This task was commenced by the late Mr. E. H. Paulton, G4IT, but the response to his invitation for co-operation was poor.

● L.A.C. E. W. Bonson, **BRS4702**, who is now at 567 A.M.E.S. India, after a spell of duty in Ceylon, laments the absence of amateurs in his part of the world, although he met G2PN just before leaving VS7. He wishes to be remembered to all old friends especially those in District 14.

● Cpl. D. T. Boffin, R.A.F., **G3HS**, looks forward to meeting 2FWX and many old friends at the Cafe de Horlage, Porte de Namur, Brussels, on Thursday evenings at 8 p.m. He is anxious to arrange an Anglo-Belgian meeting at an early date.

● Sgt. D. Alimundo, **G4HK**, writes from India to report a meeting with G5KB. He also mentions that Ft./Sgt. Cretney, 2BKO, is now in Ceylon. 4HK wishes to be remembered to G3HZ, MR, 6KS, LN, SO, 8HG and 2DRR.

● From W./C. Ken Jowers, **G5ZJ**, R.A.F. (India), we learn that ham meetings are now taking place on his station. Among those giving their support are: Ft./Lt. Hardy, G4GB, Sgt. Farr, G8IJ, F./O. Spearing, G3JG, Ft./Lt. Evans, G8BJ, W./O. Leonard, G5KV and Ft./Lt. Simmons, G3AD.

● We learn from G3WW that Pat Crisp, **G6DX** (ex-VU2AB) recently returned home from Palestine. He has been abroad since 1939 and is now living at Ouse Bank, St. Ives, Hunts.

● From India comes news of Ft./Lt. Ian Clark, **2BIB**, who reports meeting a relative of Lt.-Col. F. J. Mustill. Col. Mustill operated from Maymyo (XZ2DY), before the war, but his present address is not known. Can any member oblige 2BIB with the information?

OLD TIMERS.

Topical interest is added to this photograph by the announcement made on another page that Mr. Leslie McMichael has been elected an Honorary Member of the Society. Featured in the photograph are:

Front Row.—Miss May Gadsden (Assistant Secretary), Mr. E. L. Gardiner, G6GR (President), Mr. Leslie McMichael, G2FG, Mr. Gerald Marcuse, G2NM (Past President).

Back Row.—Mr. A. D. Gay, G6NF (Immediate Past President), Mr. C. G. Allen, G8IG, Ft./Lt. John Clarricoats, G6CL (General Secretary), Mr. Arthur Milne, G2MI (Hon. Editor), and Mr. S. K. Lewer, G6LJ (Executive Vice-President).

January Council Meeting

Resume of the Minutes of a Meeting of the Council of the Inc. Radio Society of Great Britain, held at 6 p.m. on Monday, January 15, 1945, at New Ruskin House, Little Russell Street, London, W.C.1.

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

1. It was unanimously resolved to elect 153 Corporate Members (109 proposed by Corporate Members, 44 supported by references), 15 Associates and 8 Junior Associates. Applications for Life Membership from Messrs. Hughes, G4CG and Roberts, BRS9189, were approved as were two applications from Junior Associates for transfer to Corporate Membership.

2. Monthly Balance Sheets and Statements of Account covering the months of November and December, 1944, were presented by the Hon. Treasurer and approved.

3. It was agreed to purchase tax reserve certificates to a value of £500.

4. It was reported that to date orders had been received for 11,351 Handbooks (11th printing) and 6,337 Supplements (4th printing).

5. It was reported that two junior clerks had been engaged.

6. It was announced that a new membership record card had been introduced by Headquarters as from January 1st, 1945.

7. It was reported that a further meeting had taken place between representatives of the Society, and the Wireless Telegraphy Board.

8. It was agreed to publish in the March BULLETIN a statement outlining Council's post-war licence policy.

9. A general discussion took place on matters regarding licence policy not covered by an Agenda which had already been submitted to the G.P.O. Matters discussed included (*a*) third-party message handling and (*b*) the division of certain amateur bands into telegraphy and telephony channels. The opinion was expressed that little evidence had yet been forthcoming to show that the membership in general was interested in message handling. The view was also expressed that it would be unreasonable to restrict British Isles amateurs to telegraphy and telephony channels unless European or International agreement could be reached.

10. Copies of the testimony submitted by the A.R.R.L. to the F.C.C. were handed to members of Council.

11. It was reported that Mr. Corfield had prepared for the guidance of the G.P.O. Liaison Committee, a memo dealing with Radio Heating, with special reference to possible interference with amateur communication.

12. It was agreed to write again to the M.A.P. (Contracts Branch) asking for further information regarding the plans which have been made to dispose of surplus Government radio equipment.

13. A copy of a report prepared by the Institution of Electrical Engineers, dealing with suggestions for the part-time education and training of electrical engineers, including courses for those returning from the Forces, was tabled.

14. It was reported that the I.E.E. had, at the request of the Postmaster-General, set up a new Committee to consider matters relating to electrical interference with broadcasting. The Society had been represented on the original Committee which published its findings in 1936. The I.E.E. now invited the Society to submit comments based on the application of the recommendations of the original report. After due consideration Council agreed to take no further action at present in view of the fact that as amateur transmissions have been suspended since 1939, no up-to-date information is available on matters relating to interference with short-wave broadcast reception.

15. It was reported that 380 members holding full calls, 167 with A.A. calls, 816 B.R.S. members and 5 foreign members voted at the recent Council elections. The total of 1,368 compared with 1,541 last year.

16. An application from the Association of B.B.C. Engineers for permission to reproduce in its Proceedings, certain technical articles published in the Society's Journal, was approved, subject to the Association obtaining permission from the authors concerned.

17. It was reported that arrangements had been made by the Radio Technical Planning Board (a U.S. organisation concerned with post-war planning) to send copies of relevant papers and documents to the Society.

18. A "Charter of Radio" prepared by the Cambridge University Wireless Society, and adopted by that Society on November 15, 1944, was discussed. The President agreed to write to the Secretary thanking him for sending a copy to the Society.

19. Letters were read from Mr. R. C. Jennison, 2AJV (dealing with grades of membership), Mr. E. R. Westlake, G6KR (dealing with Council elections and the Headquarters station project), and Mr. P. Bradley, G8KZ (dealing with Post-war licence policy, the Headquarters station project, and venues for Council meetings). Replies sent from Headquarters were approved.

20. It was reported that a recent technical inquiry to Headquarters had caused embarrassment on account of its professional aspect. The policy of the Society in restricting technical assistance to such inquiries as may be regarded as purely amateur, was confirmed.

21. It was agreed to hold P.D.M.'s in Birmingham (May 26/27) and in Nottingham (June 23/24). The following weekends were also reserved for P.D.M.'s—April 21/22 and July 21/22.

22. All serving District Representatives (including Acting and Deputy Representatives) were re-appointed for the year 1945.

23. Mr. S. E. Langley, G3ST (Representative for the South London Central Area) was appointed Acting D.R. for District 13 (London South).

24. The following members were appointed to serve on Committees of the Council:—

Editorial: Messrs Milne and Lewer.
Technical Publications Advisory: Messrs. Gardiner, Clark, Charman, Corfield and Lewer.
G.P.O. Liaison: Messrs. Watts (Liaison Officer), Gardiner, Gay and Lewer.
The General Secretary will continue to act as Secretary to all Committees of the Council.

25. The Secretary suggested that the Council should confer Honorary Membership upon Mr. Leslie McMichael (Founder Member). The suggestion having met with unanimous approval, the President formally moved in accordance with Article 11 that

"Honorary Membership be conferred upon Mr. Leslie McMichael, a Founder Member of the Society, in recognition of his past services to the Society, and as a mark of the esteem in which he is held by the Council."

Note:—(Article 11 states

"Honorary Members shall be proposed at one Meeting and elected by ballot at a subsequent Meeting of the Council, every such election shall be announced at the next Meeting of the Society. Not more than one Honorary Member shall be elected in any one year.")

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

DONATIONS.—The General Secretary acknowledges with thanks, on behalf of Council, receipt of donations from: District 4, per G8DZ, £1 5s.; Mrs. K. Ellis, for G5KW, £1; P. C. W. Green, 3753, 10s.; Coventry Amateur Radio Society, per G2ZT, £2; J. Higham, 3172, 5s.; T. L. Ring, 10s.; H. W. Fisher, 2CKP, 5s.; F. O. Catling, 4823, 5s.; R. C. Clemo, 9403, 2s.; C. R. Chick, G3JF, 5s.; J. Rose, 5164, 5s.; G. Smith, 7314, 5s.; J. Garner, 2BGG, 5s.; P. D. Williams, 6053, 5s.; J. R. Muddell, 2AOY, 1s.; E. J. Buick, G3XJ, 5s.; W. A. Clark, G5FY, 5s.; F. Barnard, G4FB, 5s.; R. H. Drew, G3MD, 5s.; District 7, £1 16s. 6d.; Lt.-Col. K. Morton Evans, GW5KJ, £5; L. F. Allen, 7825, 1s. 6d.; A. D. Peskett, £1 11s.; Anon, 7s. 6d.; J. S. Mark, GM3DD, £2; A. G. Davies, G2PC, 5s.; E. J. Tucker, GI5DX, 10s.; N. Routledge, £1 1s.; R. A. Walker, 1s.; S. Ince, G6LG, 5s.; E. F. Prior, G3SH, 5s.

Total receipts to date £1,491 17s. 2d. Total expenditure to date £895 17s. 1d.; Balance in hand as at 28th February, 1945: European fund £226 0s. 1d. Far East fund £370.

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.
"Radio" (Monthly publication of Radio Ltd.) per annum	21s. 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.

Members who change their address during the currency of a subscription to *QST* or *Radio* should advise the publishers *direct*.

POST-WAR LICENCE POLICY—(*contd. from page* 129).

Impounded Apparatus

It is the intention of the G.P.O. to return all impounded apparatus as soon as possible after the cessation of hostilities.

Examinations

The Council hopes to publish a full statement shortly in regard to the technical examination referred to above. It is anticipated that the examination will be based on selected chapters from *The Amateur Radio Handbook* and similar text books, and that the examining body will be the City and Guilds of London Institute. Examinations will take place at local centres every six months. It is expected that the examination fee will be approximately 10s.

Final Decisions

In outlining its policy, the Council wishes to emphasise that final decisions cannot be expected until hostilities cease. Whether or not certain facilities can be restored at the conclusion of the war in Europe, will depend upon many circumstances. It is, however, the intention of the Council to urge the Government to restore facilities as soon as the military situation permits.

News from the Kreigies

● Extract from a postcard dated October 11, 1944, received from Lt. Gordon Blair: "I have just received from your P.O.W. Fund, a parcel of 1,000 cigarettes. This astoundingly generous gift has come at a time when cigarettes are very short, and you will, I am sure, be glad to know that not only I myself am very grateful to the Society, but so also are my friends with whom I am sharing my good fortune. A parcel of 1,000 cigarettes is "no mean parcel" when chaps are practically down to saving up cigarette butts! So thank you very much indeed for this and many other parcels of cigarettes and books received in the past both in Italy and Germany."

P.O.W. Camps

Censorship authorities have requested the Society to refrain from sending parcels to members who were located in P.O.W. camps now over-run by the Russians. Next-of-kin of the 15 members concerned are requested to advise Mr. C. H. L. Edwards, G8TL (Speedways, St. Bartholomews Lane, Sudbury, Suffolk), immediately they receive a new address.

The following are affected by the "stop" order:

Luft III.—Campbell, Wilkes, Newson, Richardson, Kennaby, Barry, Cunningham and Babcock.
Stalag VIIB.—Carr and Garrett.
Stalag XXB.—Marshall.
Stalag IIID.—Smith.
Stalag IIIA.—Caughey.
B.A.B. 20.—Briscombe.
Camp 344.—McArthur.

The Ramp Persists

Mr. T. Yates, of Fleetwood, answered an advertisement in a local paper. The following reply was received: "Re my RME.70 and DB 20 Pre-Selector, the price I am asking is 100 guineas (£105). I am not quite sure what year's model it is, but the RME.69 was a 1938–39 model and this is even later, so I think I shall be right in saying it is either a 1939 or 1940. Sorry I cannot be more concise (*sic*!). I have an instruction book with the set."

We estimate the instruction book to be worth about £50!

EXCHANGE & MART - ADVERTISEMENT RATES

ALL KINDS OF PRINT, especially QSL Cards.—Send your inquiries to G6MN, Castlemount, Worksop.

BRAND New components only, at list prices, for discriminating amateurs and professional constructors. SUPPLIERS to British and Allied Services and Government Departments. Cathode Ray Tubes, G.E.C., 1½ in., £2 15s. Cossor 23D, 2¾ in., £3 6s. Cossor 26D, 4½ in., £6 10s. Cossor GDT4B gas filled triode, 24s. 4d. High voltage rectifiers and condensers. Weston 0–1mA, £2 10s. One mA instrument rectifier, 12s. 6d. Single contact 12 position switch, 3s. 6d. Wire-wound Precision Resistors plus or minus 1 per cent., 4s. 6d. each; plus or minus ·05 per cent., 5s. 6d. up to 50K. Carbon pots, 4s. 6d.; with switch, 6s. 6d. Wire-wound pots 6s. 6d. each. Crystals 100 Kc., 45s. 450/470 Kc. resonator crystals, single, £1 15s. Band-pass, £2 10s. (P.O. Permit). Rothermel pick-ups, £3 13s. 6d. and £3 18s. 9d. Wide range of British and American valves. Vitavox, Celestion and Goodman Speakers. I.F. Transformers, Steel Cabinets and Chassis, any specification, callers only. Unlimited resources for technical information to callers. Post and packing extra on all goods. Inquiries invited. Write Dept. "R." Business hours 9 to 5·30 Mon. to Sat. inc., except Thursday 9 to 1.—TELE-RADIO (1943) LTD., 177A Edgware Road, London, W.2. (Corner of Edgware Road and Marylebone Road.) 'Phone: Pad. 6116.

BULLETINS. Vol. 5, nos. 9, 10, 11, 12, Vols. 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18 complete. Vols. 12, 13, one number missing from each. Good clean condition. Offers.—G2OK, 6 Gatcombe Road, Tufnell Park, London, N.19.

COULPHONE Radio.—Prompt service. New goods only. Over 2,000 valves in stock. Send S.A.E. for comprehensive list of service goods.—BRS6858, New Longton, Nr. Preston.

EDDYSTONE 358X complete with all coils and power pack. Guaranteed perfect as new. Offers.—Box 544, PARRS, 121 Kingsway, London, W.C.2.

E.D.C. Convertor, 24v. D.C. in 220 A.C. out 90 watts. Two T.C.C. anti-interference units. Cash or exchange.—LYALL, Ewart, Wooler, Northumberland.

EX-TRADER disposes stock. British rectifiers equivalent Marconi U12, 9s. each or 3 for 26s. Mains transformers, 500–0–500 volt 200 mills, with 5 volt and three 6·3 volt windings, 55s. All above brand new. Philco Signal Generator less batteries. Offers.—Box 535, PARRS, 121 Kingsway, London, W.C.2.

FOR SALE.—*QST* and *Radio*, 1934–1942. Some bound. *Wireless World*, *Electronic Engineering*, BULLETIN, 1942 to date. S.A.E. inquiries.—BM/JEHU, London, W.1.

FOR SALE.—Collaro double-spring gramo-motor, 12 in. turntable with speed control complete. B.T.H. pick-up, both in A.1 condition.—Offers to BRS4615, "Ambleside," Carberry Road, Leven, Fife.

HALLICRAFTER Sky Champion for sale. Excellent condition, recently overhauled and calibrated, £20.—Box 541, PARRS, 121 Kingsway, London, W.C.2.

METERS for sale.—First class and new condition. Two 0–1 amp thermo-couple type. Two 0–50 micro-amp. One 0–2·5 amp thermo-couple type. Three 0–500 micro-amp, £2 15s. each. Brand new 3½ in. 0–200 micro-amp, £4 10s.—1 Squirrel Lane, Booker, High Wycombe, Bucks.

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

NEW Mullard Red-E valves for disposal. One each ECH3, EB4, EBC3, EF6, EF8, EF9, EL3. List price, holder free. 12SA7, 12s. 6d.—Box 542, PARRS, 121 Kingsway, London, W.C.2.

RADIO.—Fully experienced technical salesman wanted. Permanency.—Full particulars, salary required, etc., to BERRY'S (Short Wave) Ltd., 25, High Holborn, London, W.C.1.

SALE.—*QST* October 1927 to June 1942, May, June, July 1938 in duplicate, one or two copies missing, total 175 copies. *Radio*, May 1936 to February 1942, 62 copies. R.S.G.B. BULLETIN, February 1928 to present issue, one or two missing, total 190 copies. Best offer 10 days after publication secures. What offers for all, or any set? No inquiries for single copies please.—Write JARDINE, 73 Ardleigh Green Road, Hornchurch, Essex.

SALE.—Table Superhet, 200–230 A.C., 7 valves, 5 bands. Continuous L.W. to 23 Mcs. Hand calibrated in kcs., energised speaker, £13. Battery chargers. 230 A.C., 6v., 1·2A and 120v., ·12A. Filament transformer. 230 A.C. H.V. insulation for rectifier. 4v., 6A. Suitable GU5O. Wanted, filament transformers. 230 A.C. outputs, 6·3v., 7.5v., 10v., 12·6v.—SHARP, 56 Moore Avenue, Wibsey, Bradford.

SALE.—Marconi electric gramo-motor (requires two 0·7 μf condensers), 25s. Set Wearite band pass coils, less switch-bar, types BP1, BP2, TG. Good condition, 20s. the set. Few odd 4 and 6 volt valves. Wanted urgently, VR150 valve; Simpson turntable.—Box 546, PARRS, 121 Kingsway, London, W.C.2.

SALE.—6H6, 6J5, 6C5, 7s. 6K7, 6J7, 6K8, 6F6, 6N7, 6SK7, 6SJ7, 12SK7, 12SJ7, 1852, 5Z4, 6F8, etc., 8s. 6d. 6L6, 6V6, 5449, 10s. 6d. Acorns, 30s.—JOHNSON, 37 Bulk Road, Lancaster.

SALE.—Bullet type crystal mike, unused, 42s. Modified McElroy straight morse key, 8s. Moving iron 0–30mA, flush mounting, 8s.—F./O. CLARKE, Clarendon Hotel, Harrogate, Yorks.

SALE.—National NC8IX communication receiver, 9 tubes, vari-selectivity crystal gate, Ham band spread, etc. New 39, little used, owner in R.A.F. Offers.—Box 549, PARRS, 121 Kingsway, London, W.C.2.

SALE.—BULLETINS, April 1928–December 1936. *QST*, October 1927–December 1932. *Electronic Engineering*, June–December 1943. Wanted, combination plane.—Offer to 6 Pine Grove, Prestwich, Manchester.

SKY Buddy (needs attention) for sale. Offers. Wanted, one Eddystone 40$\mu\mu$f tuning condenser.—LARK, 11 Winnipeg Road, Lowestoft.

VALVES.—2v., 4s. each. 12A7, 6V6, 6J7, 6K7, 5s. 6d. each. Wanted, all-wave superhet tuning unit.—F./O. MARRIS, R.A.F., c/o 28 Archibald Road, Exeter.

WANTED.—Ostar-Ganz valves. For Sale.—A few American and British valves, transformers, chokes, condensers.—G2YZ, 32 Onslow Drive, Sidcup, Kent.

WANTED.—Text books, literature or any technical information on the manufacture of gramophone records; also offers of recording apparatus.—H. LAYTON, 3 Emscote Road, Stoke, Coventry.

WANTED by Serviceman, S.E.A.C., 6v Mallory Vibropack delivering 250 volts or more at 80 mills. Must be a bargain.—BRS6347, GOULD, 77 Lancaster Road, London, W.11.

£10—ACORN "1 to 10" super-regen, Eddystone (956–955–6C5–6F6), only requires 180 and 6·3 volts.—G2NS, 26 Southlea Avenue, Southbourne, Bournemouth.

PATENTS AND TRADE MARKS

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.

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