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BULLETIN

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

- AMATEUR RADIO AND BASIC ENGLISH
- RADIO AND ITS RELATIONSHIP TO KINDRED SCIENCES
- THE SYNTHESCOPE

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AMATEUR RADIO AND BASIC ENGLISH

MOST pre-war readers who were active on the high-frequency bands will remember explaining to their interested friends how it was that they were able to converse with fellow-amateurs in foreign countries in spite of the obviously severe language difficulties. To the uninitiated, it seemed incomprehensible that an Englishman could " talk " to someone in, say, Chile, and another in Greece, Latvia or Indo-China without himself being an expert linguist.

The study of foreign languages has, perhaps regrettably, not been one of the common activities of British radio amateurs, but nevertheless we were experts in the special international language which had evolved in the development of world-wide amateur communication since its inception twenty years ago. This language, which has been described as a mere jargon and as " radiese," had its origins in the international codes such as the Q-code and the old line-telegraph codes. In a very short space of time, world-wide amateur practice had produced an international vocabulary in which various letter-groups adopted from these codes constituted the nouns and verbs pertinent to the amateur's art, which were immediately recognisable by an amateur of any nationality whatsoever.

One typical example may be recalled to illustrate the nature of this development. According to the official handbooks, the code group '*QRM*' signifies '*I am being interfered with.*' In amateur practice, '*QRM*' is not used with this complete meaning but is paradoxically restricted to the single word '*interference.*' The context is usually implied, or padded with a few stock phrases, but the complete statement of meaning, which had earlier been agreed by International Convention is intended to facilitate official communication between operators not versed in any common language (and, of course, to eliminate irregularities due to individual personalities).

An amateur in Czechoslovakia in contact with an amateur in Iceland might perhaps refer to '*vy QRM*' or '*slite QRM*' and he would be readily understood. '*Vy*' being an abbreviation of '*very,*' signifying '*much*' or '*heavy,*' and '*QRM*' meaning '*interference,*' there could be no doubt as to the intended meaning. Similarly, '*slite*' is shorter and easier to send in Morse than in the orthographically correct form '*slight.*' From the early telegraph codes, we amateurs extracted (and sometimes modified to suit our convenience) many useful letter and figure groups, such as '*DX*' to signify '*long-distance*' and '*73*' to convey '*kind regards.*' Amateur communication in pre-war days depended very large upon phrases based on such conventionalisms. Even between operators of the same nation, speaking the same mother tongue, this internationally understood language was predominant.

We are indebted to the amateurs of the U.S.A. for the lead they gave, in the early days before international DX began, by popularising useful abbreviations. Two examples have already been mentioned: '*vy*' for '*very,*' and '*slite*' for '*slight.*' We might add '*tmw*' for '*tomorrow,*' '*thru*' for '*through,*' '*tnx*' or '*tks*' for '*thanks,*' and so on. These modified forms are designed to ease the burden of manipulating a Morse key and to reduce the time occupied in transmitting the text of the message. The non-English-speaking countries have always found some difficulty in recognising these abbreviations and altered spellings, in the same way that an Englishman, even though he be fluent in French, might not readily perceive that '*mci bcp*' is an abbreviation for '*merci beaucoup.*'

The use of these shorter forms to facilitate transmission in Morse between amateurs is fully justifiable. It is a much more controversial question whether there is any justification for using the same modified forms when writing straightforward script entirely apart from any telegraphic communication. But that is a matter of personal taste and idiosyncrasy.

The hiatus in the development of amateur radio due to the war may bring about a radical change in these old-established practices. As time goes on, official codes become obsolete, new codes are formulated, and the universal clarity of meaning that once existed in the pre-war amateur language may become lost in a confusion of new terms and new jargon originating perhaps in Service training or other war-time experiences.

The old international amateur language, whether it be praised or deplored, was admittedly extremely limited, and the restriction undoubtedly reflected unfavourably on the degree of satisfaction derived from foreign contacts. As a post-war requirement, the need for an improved language system for international amateur communication must be recognised.

The recently introduced campaign to popularise Basic English, if it succeeds in its purpose, may open the way to vastly improved, more highly intelligent, communication between amateurs of different mother tongues. As participants in international communication, we must not fail to keep abreast of the times and take advantage of whatever developments may occur, and it would be in the best interests of all radio amateurs to watch the growth of Basic English.

S. K. L.

RADIO AND ITS RELATIONSHIP TO KINDRED SCIENCES *

By W. A. Scarr, M.A. (G2WS)

Introduction

ALTHOUGH I have chosen for my subject to-day what appears to be a highly scientific topic, it is not my intention to deal with it in an exact scientific manner and my remarks will, to some extent, embrace speculation, imagination and philosophy as well as scientific calculation and deduction.

Amateur workers in the sphere of radio perhaps spend too little time in contemplation of the subject and too much time in playing with its tiny mechanisms. Certainly he whose chief aim is to cover the walls of his room with evidence of the success with which he has disturbed the receiving apparatus of his most distant colleagues has failed to realise in any way the vastness of his subject or the scope of his researches.

Let me explain in the first place the object of my talk. It is to link the study of wireless with the latest discoveries in those sciences with which radio is naturally akin—electricity, heat, magnetism, light and sound, and to discuss some of the underlying principles which are common to all these branches of science. We may also consider radio-activity and in fact all those phenomena which are generally regarded as having their basis in wave-motion.

I would like at the outset to crave the indulgence of those who are well-versed in the general principles of the sciences in order to make clear by simple illustrations the more complex phenomena to which I shall refer later.

Sound

As my first illustration I will take a familiar type of frequency generator consisting of parallel wires of varying length stretched over a frame and provided with hammers whereby the wires may be struck either in turn or simultaneously. In the former case the performance is often termed "five finger exercises," or "hammering out the tune." We sometimes refer to this machine as a piano, though if situated in a neighbouring house, more picturesque terminology is often employed.

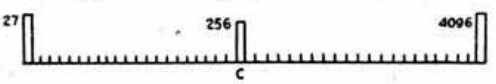

Fig. 1.

The diagram (Fig. 1) shows parts of this instrument and the figures denote the number of vibrations the strings make during each second after they have been struck. You probably all know that sound travels in air approximately 1,100 feet in a second. We have only to divide the numbers in the diagram into 1,100 to see that the sound-waves produced at the top of the piano are about 3 in. long whilst the lowest notes are made by waves 40ft. long. Simple experiments show that these waves are merely air disturbances—alternating ripples in the atmosphere of pressure and rarefaction caused by the pushing of the air at regular intervals by the to and fro movements of the piano strings. They are like the puffs of smoke emitted by the funnel of a locomotive and we call them longitudinal waves as each particle of air is pushed forward and then springs back during the passage of the wave. Thus we have a simple form of wave-motion and before leaving it to consider other forms it will be convenient to note one or two of the characteristics of the sound-wave in air. Place a pianola in a sealed room and then gradually extract the air—the sound dies away steadily as the medium (air) in which the sound travels is removed.

A locomotive passes through a station and an observer finds that the sound of its shrill whistle is partially cut off as the engine passes behind a board or building. The roar and rattle of the engine continues unchanged, however. In other words the screen produces a sound-shadow of the whistle, but not of the lower tones. Short waves bend slightly while long waves bend right round objects. A wireless loud-speaker is most effective if built into a large board. Without this board the long waves of the low notes being emitted on both sides of the speaker, flow round its sides and cancel each other out—thus reducing the bass response and giving a shrill reproduction. Let us note one other effect—called the Doppler effect.

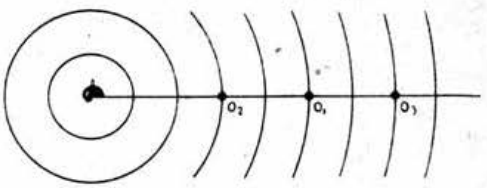

Fig. 2.

Imagine a source of sound emitting waves regularly at a frequency of 500 per second. A stationary observer at 0_1 (Fig. 2) will hear a steady note of this frequency. Next, suppose that during the second the observer has moved to 0_2, two wave-lengths nearer to the source. It is at once obvious that he will have received 502 waves during the second—but this frequency represents a higher pitch and he will hear a note slightly higher than that actually emitted by the source. If he had gone the other way, only 498 waves would have entered his ear in the second and he would have heard a lower note. This is the Doppler effect and we may observe it in the street or on the train any day we wish.

To take a very common example—an electric bell is ringing continuously in a signal box as our train dashes by (Fig. 3). Approaching the source we hear a note higher than the bell is actually emitting. The moment we shoot past the bell the effect changes and from now on we receive too few waves per second and hear a note lower than that of the bell. If the train passed close to the bell the drop in pitch would be very sudden and quite unmistakable—especially if the train were moving very fast.

In passing we may note that the speed of the train could easily be calculated if the exact pitches of the

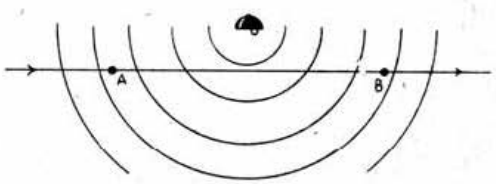

Fig. 3.

* A paper read to the Society on October 30th, 1943, at the Institution of Electrical Engineers, London.

two tones received were determined. We shall see later how useful the Doppler effect is in another connection.

The " High Frequency " Spectrum

The wavelengths of visible light-rays are roughly between 4 and 8 ten-thousandths of a centimetre. Violet to ultra-violet waves represent wavelengths of .00004 to .0000004 cm. The X-ray spectrum begins roughly where the ultra-violet ends. Extreme red light rays are .00008 cm. long. From here, heat rays extend to waves as short as .03 cm.—that is to say, heat detecting instruments can detect waves found by measurement to have such a length.

We now approach U.H.F. radio waves in length—the shortest of which are measured in centimetres. The longest radio waves, of course, are kilometres long.

This high frequency spectrum only indicates the wavelengths or frequencies of certain vibrations—nothing must as yet be assumed as to the nature of these waves or vibrations.

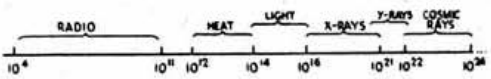

Fig. 4.

Electro-magnetic Waves

Before proceeding to consider the relationship of wireless waves to those of light, X-rays, etc., let us for a moment refresh our minds on the generally accepted characteristics of wireless or electro-magnetic waves.

We know that wireless waves travel with a speed of approximately 186,000 miles per second. Many of us have heard direct signals and those which have travelled apparently round the world mixing themselves in our receivers—the " round-the-world " signals arriving about one-seventh second after the direct signal from the nearby transmitter. The time interval will, of course, be less if the station is further away and the difference of the two paths from the receiver becomes less.

We know that radio waves can be reflected and refracted. The round-the-world signal is proof of refraction and it appears that the signals penetrating layers in the upper atmosphere where considerable concentrations of free ions are found, are bent by a series of refractions until they return to the earth's surface at a distant point. The round-the-world signal must also experience reflections from the surface of the earth and sea and this reflection from solids is easily demonstrated in the reflection of short-wave signals from large objects such as ships and aircraft.

Whilst on this subject I should like to suggest an experiment which has been in my mind for some time and which might in the light of recent discoveries provide a useful field of research after the war. I refer to the possibility of sending signals to celestial bodies, not I fear with much hope of establishing two-way communication, but with, I submit, a very fair chance of receiving our own reflected signals back again. Our easier target would undoubtedly be the moon, only some 250,000 miles away. I should like to be associated with an attempt to shoot signals to the moon and receive them back and as I have already said there seems a very good chance of success providing that care is taken in the choice and design of the apparatus, the time and the frequencies used. We shall have to take into account the likely attenuation due to the various ionised layers of our atmosphere and it might be that unsuspected barriers of this nature would appear elsewhere in space. We could however, easily select times when the known layers are least dense and use the frequencies which pass most easily through these regions. A highly directive aerial system would be required and this suggests the use of ultra-high-frequencies. Receiver as well as transmitter would be focussed on the moon and this could easily be done by mounting an ordinary telescope on the array and having the whole apparatus properly mounted so that it could be rotated at will.

The time which would elapse between the transmission and the reception of the reflected signal can be calculated in a few moments and is, of course, in the region of two and a half seconds for the moon—a very convenient interval and long enough for the experimenter to be quite sure that his signal had really done the journey. Whatever the result, I am certain that much valuable information would be obtained from such an experiment.

If successful, we should at once be tempted to launch out on more ambitious attempts. The sun and planets would attract us as possible targets. I cannot think that the sun would be a good reflector for various reasons. Its great heat and absence of flat surface, together with the variety of intense radiations proceeding from it suggest that our signals would stand a poor chance of avoiding dispersion and annihilation. The nearer planets might yield results, but beyond that the experiments would become tedious—for example it would take six and a half years for a reflected radio signal to return from the nearest star, even if it survived the journey !

In going for these more distant targets we should have to calculate not merely the time-lapse, but also the possibility of a change in frequency due to the recession or approach of the celestial body. To understand this, we return to the Doppler effect. This effect is already made great use of in astronomy and is as applicable to light waves as to sound waves. It would undoubtedly apply equally well in the case of electro-magnetic waves reflected from a fast-moving target.

Waves of light or radio are transmitted through space at 186,000 miles per second and we will imagine that they are reflected from a body moving away from the source at 100 miles per second. Without going into figures, it is clear that the number of waves reaching the reflecting surface in a second will be slightly less than if that surface were stationary. But the number of waves striking the surface in a second is the number reflected in that second and the reflected waves will therefore have a slightly lower frequency than the incident waves. In addition the reflection surface is moving away from the earth whilst emitting the reflected waves, and a further stretching out of the waves will occur thus doubling the effect.

In Astronomy this principle is made use of in determining the speeds at which stars are approaching or receding from the earth. By analysing the light from a star, we find lines in the spectrum corresponding to light rays emitted by the common elements. For example, the light emitted by an incandescent element always has the same wavelength and produces one or more bright lines in the spectrum, the exact position of these lines being determined by the wavelength. Here you will see an exact analogy to the tuning dial of a radio receiver. Observations reveal slight changes in the positions of these lines when light from the distant celestial bodies is split up. This is due to the rapid recession or approach of the star which is giving out the light and simple calculations on the observed changes in frequency reveal the speed at which the star is moving relative to the earth. Reflected wireless waves would undoubtedly show similar changes in frequency which could be calculated if the speed and direction of movement of the celestial body were already known.

Nature of Radio Waves

I am now going to ask you to consider carefully a familiar statement. It is this: "Radio transmissions consist of transverse waves in the ether moving with the speed of light."

How many of you reading this statement in a book on wireless would hesitate to accept it? We have become so used to accepting the fundamental concepts of our science that we never question them.

What are transverse waves and what is the ether? You may say, nobody knows so why should I worry? But this is hardly the attitude for a serious experimenter and certainly not for a scientist.

Consider first the word "ether." Pick up an old physics book and you will learn that ether is that mysterious, invisible and weightless substance that permeates all space and matter and fills the spaces between the molecules. The book will probably tell you that we know of the existence of the ether from the fact that it carries ether-waves of various types—light, wireless, etc. These waves, the book says, are vibrations in the ether. In our schooldays we probably accepted this story without question.

Since then, however, grave doubts have risen about the mysterious substance. No new facts have come to light. The ether does not help us to understand the universe in any way. We have failed to detect its presence.

We know that solid substances and, in fact, all forms of matter influence the passage of light and radio waves. Yet these waves are (we read) in the ether and not carried by matter. No experiment which has ever been performed has, however, ever shown that matter is influenced by the ether. Celestial bodies are not in any way retarded by it. How then, the modern scientist says, can waves in the ether be influenced by matter? Looking through the evidence we realise that the whole concept of ether was merely a device for explaining how electro-magnetic waves travel. We are clearly on the wrong track—ether has no existence. It became, as Einstein says, the "enfant terrible" of the physical substances soon after its birth. The idea of an ether filling all space must be abandoned. Space becomes space again and our earth is surrounded by "nothingness," apart from the celestial bodies which are discovered at remote intervals.

But we are left with our problem. How do wireless waves travel? How does light reach the earth from the sun? At this stage I must ask you to assume that both light and radio have electro-magnetic properties. For it is light, and not the newer science of radio, that has been used as the basis of experiments in radiation.

The Nature of Light

It is worth while for a moment recalling the first serious attempts which were made to understand the nature of light. The first theory, and one which then fitted the known facts very well, was the corpuscular theory and this was generally accepted until about the year 1800. Light consisted of minute particles shot in streams at high velocity by all luminous bodies. The motion of light in straight lines, reflection and refraction could all be very well understood on this hypothesis.

The wave theory which followed only held its own with difficulty at first. It was necessary to invent the ether to explain its method of propagation and another difficulty had to be overcome—why, if light was waves, did it travel in straight lines and not bend round objects like sound or ripples on water? Satisfactory explanations were given later to these difficulties and in addition other properties of light were discovered which seemed to point conclusively to a perfect explanation on the lines of wave motion. The production of interference rings, when monochromatic light was passed through a tiny hole, gave striking support to the wave theory.

The colours seen in a thin film of oil on water or between two sheets of glass pressed closely together were perfectly explained by the wave-theory. When the minute distance between the two surfaces was an exact multiple of the wavelength of red light—red was seen. For other colours, the ray reflected from the second surface interfered with the direct ray and the two produced a part or complete cancellation of the light. This type of interference is the same as that obtained when direct and reflected radio-waves cancel each other out and reinforce each other alternately. The usual conditions here are that the frequency (corresponding to the colour) is fixed, but the relative distances vary, as for example when a direct ray between a transmitter and nearby receiver is interfered with by a ray from an aircraft from the same transmitter. It would be interesting to perform a similar experiment by fixing the reflecting surface and moving the receiver from place to place. In this way we should be able to stake out the stationary waves on the ground.

The polarisation of light when passed through tourmaline crystals showed that the waves were transverse. A light wave was regarded as a quivering effect produced in a jelly-like ether by the rapid to and fro vibration of solid particles or some other effect.

With the discovery of Hertzian waves, the first forms of wireless emanations, it became at once apparent that these had many properties in common with light, especially when due allowance was made for their longer wavelengths—a considerable allowance when we remember that the wavelength of yellow light is only about .00006 centimetre.

It was only with the discovery of the electron about 50 years ago that the wave theory was once more called into question. Up to that time, light had been considered in bulk, but now it was possible to consider light, as it were, microscopically. Ether had, of course, been accepted to help explain the wave theory.

Experiments with electrons were in full swing by the end of the last century and some very surprising things were discovered. Most important was perhaps the photo-electric effect. When ultra-violet rays are projected on to a metal plate, electrons are found to be shot off the metal. It was assumed that the more intense the ultra-violet light used, the greater would be the energy imparted to the electrons shot from the plate. It was possible to study these electrons experimentally and to the astonishment of the experimenters it was found that whatever the intensity of the light, the energy exhibited by individual electrons remained unchanged. All that did change was the number of electrons knocked off the plate.

This and other experiments changed the whole of light theory. Light was acting more like streams of machine-gun bullets—"light-darts" as they were first called—each having the same energy and, therefore, the same power of knocking electrons out of metals.

Obviously the next step was to change the colour of the incident light—that is to say the frequency. The experiments showed at once that the energy of the light-darts was directly proportional to their frequencies. Ultra-violet was powerful, infra-red weak.

Here I think we see a direct parallel in the field of radio. During the last 20 years we have produced shorter and shorter waves and as we have steadily increased the frequencies used we have discovered a corresponding increase in the energy of the transmissions. The short range of long waves in spite of the use of tremendous power is proof of this.

Returning to the story of light we can find simple proof of the energy principle in photo-chemical effects. Rays of sunlight have the power of knocking electrons into such confusion in certain compounds that chemical changes are produced proportionate to the amount of light falling on a chemical substance spread on plate or film. This is the basis of photography. We take the exposed plate into a dark room but can still use a red light because the long waves of red light have not sufficient power to produce changes in the chemical substance of the film. We take photographs in the morning rather than the afternoon because the sunlight is then richer in violet rays. Photographs taken on a sunny evening are often disappointing—red rays then predominate.

Quantum Theory

The single light-darts are to-day known as photons. No smaller quantity of light than a photon can be imagined and as light thus travels in small parcels or fixed quantities, the theory has become known as the "quantum theory." It would thus seem that we are back again at the corpuscular theory, but in a modified form. Nevertheless, the wave-theory fits some of the evidence as well as the quantum theory and the latest researches tend to show that the two theories are not really alternatives, but two ways of looking at the same phenomena. In minute quantities light behaves as predicted by the quantum theory, but surveyed in bulk, these quanta obey the rules formulated by our wave-theory.

Neither theory shows us the real truth. We cannot see the electron—we can only say that light behaves as corpuscles would behave and also as waves would behave. It all depends on the way the evidence is obtained. Direct observation or a really true picture is quite impossible. We have ideas about light waves and we relate them to known effects. But of the ultimate reality we know little.

An experiment performed by Professor G. P. Thompson gives striking proof of the way in which the phenomena of quantum and wave theories can be observed in high frequency transmissions. You will probably be familiar with diffraction gratings as used in light experiments. Lines are ruled on a metal plate spaced about 1/30,000 in. apart. This is the wave-length of red light. Reflected light from such a surface is split up as when passed through a prism. It was later found that crystalline metal could be used in place of the lined metal, the crystal giving the same effect as a plate, with, however, millions of lines to the inch instead of a few thousand. Professor Thompson used a metal plate only about 100 molecules thick and shot streams of electrons (not light waves) through this metal film at a speed of 50,000 miles a second. The electrons were made to impinge on a photographic plate, and when this plate was developed, it was found to bear alternate light and dark rings just as would have been found if, instead of electrons, light waves, or at any rate X-rays, had been used.

We are led to ask, does light consist of streams of electrons moving at tremendous speed? Is the difference between electric current, light and radio just a matter of speed and energy? We can apparently measure the wavelength of a shower of electrons! At this point we are almost up-to-date with the latest theories and investigations and must leave the subject to turn to other things. But next time we press the key attached to a ten kilowatt transmitter perhaps we shall ponder a little on what kind of bird-seed our winged messenger is really carrying in its beak.

X-Rays

Passing along the frequency spectrum from radio to light and then to ultra-violet light, we gradually enter the range of frequencies which contain X-rays. We have seen that the shortest visible light rays are about 1/80,000 in. in length. X-rays from an ordinary X-ray tube average about 1/250,000,000 in. in length. Between the two is the vast range of ultra-violet rays of varying intensity. There is no marked separation between X-rays and ultra-violet rays—one gradually merges into the other.

Streams of negative electrons which are drawn off the negative electrode of an arc in an exhausted tube are called cathode rays as we all know and when these are made to impinge at high speeds on to a sheet of metal or other target, the type of radiation called X-rays is produced. These rays bear little resemblance to the streams of electrons which, as it were, knocked them out of the target. They are not influenced by a magnetic field, they pass readily through the glass and as is well known, they penetrate the less dense solids. I will not weary you with a detailed account of X-rays —the subject is fully covered in the textbooks.

But now the pace quickens again as we probe further into the high-frequency spectrum. The figures of frequencies become almost incomprehensible, but are nevertheless interesting. For X-rays we had a frequency of some 3,000,000,000,000,000,000 per second—but we have by no means reached the limit of the waves whose frequencies have been detected and measured.

Radio Activity

The discovery by the Curies of the radio-active properties of radium and several similar elements is one of the most romantic stories of science. The elements having the highest atomic weights are, it seems, rather like top-heavy houses which are unstable and (as it were) fling bricks off their structures at a great speed in order to maintain their stability, but every time a brick goes, the shape of the building is naturally slightly altered and we actually find one element changing to another. The dream of the alchemists really true after all!

If we examine this brick throwing process in detail, we find that the whole procedure is well-ordered and surprisingly accurate. Let us watch a minute quantity of radium at work. First of all there are heavy bricks being lobbed off quite spontaneously at a rate of about 20,000 miles per second—they are called α-rays. Experiments have shown that the rays behave as streams of positively charged particles—they can be deflected by a magnet and have now been actually collected in sufficient quantity for their identification as positively charged helium atoms.

The second type of throw-off from the speck of radium, called the β ray, moves much faster and is also deflected by a magnet, but in the opposite direction from the α ray. The β ray almost certainly consists of charged particles and in many respects resembles the more familiar cathode rays. Its speed, however, is amazing and may amount to as much as 180,000 miles per second—only slightly less than the speed of radio and light waves.

There is yet a third type of emanation from radium and this is the one with which we are most concerned. It is unaffected by magnetic fields and has enormous penetrating power. It is, in fact, a kind of super X-ray and by passing it through crystals and observing the results photographically it can be shown that the γ ray (as it is called) resembles light and X-rays, but has a very much shorter wavelength. On an average these rays are about 1/100th the length of X-rays, though their frequencies vary over a very wide range.

The whole process of radio-activity includes many stages—all successive steps in the change of atoms of uranium (the heaviest atom) to the stable substance lead. Radium is merely a stage, probably the fourth of these stages, and nine more have been distinguished.

Each of the stages has its own period of disintegration and its characteristic emissions. It is rather surprising to find that the speeds of all these processes are quite independent of external effects—for example, temperature has no effect on the projection of α, β and γ rays from radium. In a milligram of radium, approximately 500,000,000 atoms disintegrate every second—nothing apparently can be done to change this. Philosophers have spent many hours speculating on why certain atoms in a pinch of radium salt are due to disintegrate during any particular second—it appears, as they say, to be an effect without a cause. Likely enough there is some cause as yet not revealed to the scientist, and Einstein has already offered one explanation. Incidentally, the time taken for a mass of radium to disintegrate to half its amount is 1,690 years; the corresponding figure for uranium being 4,700,000,000 years.

As I have already mentioned, the energy of an electro-magnetic wave can be shown to be proportional to its frequency and it seems obvious, therefore, that the γ rays emitted from radium must possess enormous range. This is further borne out by experiments on their power of penetration—they have 100 times the penetrating power of β rays and 10,000 times the penetrating power of α rays.

It is interesting to speculate on the possibility of using rays of this kind for communication. To concentrate the radium rays into a narrow beam would not seem difficult—the real difficulty would be in the design of the receiver. By pressing the knob of an ordinary electric torch we have a highly efficient transmitter working on a frequency of about 500,000,000,000 kilocycles per second. It would be little use, however, without that even more efficient receiver, the eye. A sensitive thermopile will detect the heat from a candle a number of miles away, but so far the design of instruments for detecting γ rays lags far behind the natural transmitters which are for ever working on these frequencies.

We have nearly reached the limit of the known frequency spectrum.

Cosmic Rays

For many years it was thought likely that other rays were striking the earth's atmosphere beyond those which had been identified, but not until some 12 years ago were these rays trapped and analysed. When at last this became possible it was revealed that a continuous bombardment was taking place at all points of the earth's surface by rays of enormous penetrating power and possessing energy beyond anything previously conceived. There is still much to learn of the nature of these cosmic rays, as they are called, but their independence of the time of day certainly indicates that they do not originate in the sun. Owing to their enormous energy it is possible that these rays have been flying through space for many millions of years and some scientists consider that they may have had their origin in vast accumulations of matter which are either beyond the range of our finest telescopes or have become completely disintegrated during the passage of time. Radiation of such intensity could hardly be produced even by a combination of all the celestial bodies known to the astronomer.

To quote Sir Arthur Eddington: "If I am right" (he says) "cosmic radiation is a museum—a collection of relics of remote antiquity. These relics are stamped with an inscription indicating the dimensions of the world in its earliest ages. Whoever ultimately identifies the sub-atomic process originating the rays will be able to read the inscription and tell us just how much the universe has expanded since then."

Cosmic rays are found to be more intense at high altitudes, and when places at sea-level are compared the concentration becomes greater as one moves away from the equator until a maximum value is reached at latitude 50° and this remains constant to the poles. Undoubtedly cosmic rays play their part in effecting the partial ionisation of the atmosphere especially at high altitudes. Recent measurements have revealed that cosmic rays have wavelengths shorter than any previously measured. It has actually been possible to measure cosmic rays with frequencies of 10^{24} and it is probable that this represents the limit of our measuring ability rather than the measure of the limits of frequency of these rays.

The Field Theory

We shall now leave the frequency spectrum and return to the point at which ether was dismissed as a fictitious invention devised merely to explain the propagation of electro-magnetic waves. Let us again ask ourselves the question—what is a wireless wave? Starting from something quite familiar, we shall consider an electric current flowing through a wire. Suspend a tiny magnet near the wire and switch the current on and off—clearly the magnet is affected. To increase the effect, bend the wire into a loop and place the magnet in the centre. When the current flows, the needle will arrange itself at right angles to the wire. How should we describe this phenomenon? We say that the electric current has produced a magnetic field which disappears when the current stops flowing.

Now think of another experiment. A bar magnet is suddenly moved towards a closed coil of wire which contains a device for detecting the passage of an electric current. What happens? An electric current flows round the coil, but stops immediately the magnet comes to rest. How shall we describe this? By saying that there is a permanent magnetic field round the magnet and as its position relative to the wire changes, an electric current surges through the wire.

To summarise: A changing magnetic field is accompanied by an electric field and a changing electric field by a magnetic field.

In these experiments it has been necessary to imagine a magnet used to detect the magnetic field and a current measurer to detect the electric current. Maxwell, who developed the now famous field concept of modern physics, dispensed with these detectors and gave us at once the idea of an electro-magnetic field. This had, he maintained, a real existence quite apart from the presence of wires or needles and upon this idea the Maxwell equations were built up, equations which seem to be verified by all the experimental work since carried out. Every change in the electric field is accompanied by a corresponding change in the associated magnetic field—the two are, in fact, inseparable.

To visualise the propagation of an electro-magnetic wave we may imagine a tiny charged sphere moving to and fro at very high speed. As the electric field changes position a changing magnetic field is produced, and this process is rapidly repeated. From Maxwell's equations it is evident at once that an electro-magnetic wave will be produced which travels outwards at a definite speed. According to the field theory, the electro-magnetic wave spreads in empty space and has an independent existence. It is exactly similar to a wave of light. We speak of waves, but this is only the very inadequate description of a phenomenon not fully understood. We have already seen that waves in many ways resemble streams of particles—in truth the radiations are certainly nothing like either. We cannot see reality, but only the evidence of it like dim shadows (as Plato said) on the walls of our cave. The real world of events is for ever hidden from us.

Before leaving this subject, it will be interesting to see what bearing it has on the modern conceptions of space and time.

Relativity

Einstein's relativity principle states that " nature is such that it is impossible to determine absolute motion by any experiment whatever." It is, in fact, equally true to say that " the sun revolves round the earth," as to say that " the earth revolves round the sun." It would be equally true to say that when a radio signal is transmitted from England to Australia, the electro-magnetic waves remained stationary while England and Australia changed places with the speed of light. In other words there is no fixed point in the universe to which all movement is related.

The theory of relativity goes a stage further—it states that it is impossible to separate entirely space and time. Instead we must imagine what is termed a " four-dimensional continuum " consisting of three dimensions of space and one of time. The only true way of picturing electro-magnetism accordingly is in terms of the four-dimensional continuum. This is, of course, a very difficult conception. We have, in our thoughts at least, always separated time and space—we are now asked to weld them into a new inseparable compound. It is only with the aid of mathematics that we can hope to make any progress in this direction. With mathematics striking confirmation of the validity of Einstein's theory has appeared, and the old Newtonian laws of gravitation and force have been scrapped, though, of course, they are sufficiently accurate for everyday usage and for the consideration of familiar occurrences.

If we accept Einstein's theory, mathematics reveals at once that space, once thought to be infinite is in reality curved. It would seem likely, in fact, that space is spherical—a phrase which we obviously cannot fully comprehend. Nevertheless there is experimental evidence of the truth of this suggestion and it explains, for instance, the apparent bending of the light from stars when this passes close to the sun.

In our ignorance we say : " But if space is spherical, there must be something outside ! " It is only our inability properly to picture spherical space that makes us ask this question. In reply I would suggest that you imagine a fly crawling round a paper sphere and saying to itself, " I'm bound to come to the edge of this sheet sooner or later."

When the Doppler effect is observed on distant galaxies, collections of thousands of millions of stars, millions of light years distant from our own galaxy, the results suggest that all the distant galaxies are moving away from our own at terrific speeds—the further they are away the faster they are going. Sir Arthur Eddington describes this apparent recession of the galaxies in his book " The Expanding Universe." In the same book he considers the argument in favour of regarding space as spherical in which case the whole tribe of galaxies may be regarded rather as points on an expanding soap-bubble. From any point on the bubble, other points would naturally recede and the furthest point would move away most rapidly.

But without their mathematical background these considerations seem almost fantastical. With the aid of mathematics they become real and understandable. Calculations have been made on the size and mass of the whole universe as contained in spherical space. The presence of matter in the universe is the cause of its curvature—without matter, space would stretch out infinitely without bending. All forms of wave-motion, as well as the presence of matter, are described as irregularities and folds in space. A stone falls to the ground because of the curvature of the continuum.

But we must return to earth. Concluding this section let me add that it can be calculated that a radio signal transmitted in space would in 6,000,000,000 years return to its starting point. As light travels at the same speed it may be assumed that a view of the transmitter would arrive back at the same instant. Astronomers have sometimes been led to wonder if some of the distant stars they see are really the ghost images of other stars whose light has, as it were, travelled round space in the opposite direction.

The New Physics

Before bringing this rather rambling talk to a close, there are one or two new conceptions in physics which I would like to mention, chiefly in order that we may avoid bringing old-fashioned and discarded notions into our discussions on radio.

The first is the conception of mass. The old physics regarded mass and energy as two entirely separate things. Mass had weight—energy had not. Mass was substance—energy the force wrapped up in the mass. The modern scientist does not take this view. The relativity theory finds no definite distinction between mass and energy. Energy has in fact mass. Heat and light have weight though this is so small that it cannot be measured in the ordinary way. You probably remember the old law of the conservation of mass proved by burning a candle in a large jar on a balance. The conclusion was, in fact, wrong. A hot body is heavier than a cold one. The law of conservation of mass should be the law of conservation of mass-energy. The sun loses mass from the light and heat rays it emits—the earth is made heavier by the sun's rays ; the sun is gradually shrinking.

Turning again to electrical phenomena we have said much about matter and electro-magnetic fields. The old physics regarded matter as solid particles—hard " bits." Now that we have succeeded in splitting the atom, our whole concept of the word " solid " changes. Matter appears to be nothing but particular arrangements of electrical charges. A large number of electrons or negative charges whirling in wide orbits round a central nucleus or proton gives us an up-to-date picture of the constitution of the atom. The discovery of positive electrons (or positrons), first detected in cosmic rays, has led us to believe that the structure of the atom may be even more complex.

Again, let me remind you that in all probability the picture which to us seems most accurately to represent the facts is probably a long long way from the ultimate reality—it is just another of the shadows thrown on the walls of our cave by events occurring in the world of reality beyond.

The atoms and molecules which we call matter when present in vast conglomerations are then like enormous constellations of stars and planets—they are so many closed electrical systems. What then is the distinction between matter and field ? Both matter and field have energy and mass. Where does matter end and field begin ? The modern view tends to the idea that matter is merely where the concentration of energy is great—field is where the concentration is small, but we have yet to obtain definite proof that matter is only another name for a field of great intensity. In all these things it is well for us to remind ourselves that we are at all times limited in our knowledge of the world by our senses. A certain frequency spectrum affects our eyes and by a complicated process in our heads we get the sensation of sight. Had our eyes been adapted to receive larger waves we should have seen radio transmissions with equal ease and relied on the selenium cell I suppose for receiving light signals.

(*Continued on page* 128.)

THE SYNTHESCOPE

A Description of a New Instantaneous Method of Harmonic Analysis by Single Sideband Scanning

By R. H. Hammans (G2IG.)

THE practical problem of separating and measuring the series of harmonics in low frequency waves is generally complicated and requires the use of expensive apparatus. Wave analysers as supplied by the well-known manufacturers of radio measuring instruments are very costly and laborious to operate if changing waveforms are to be observed.

The Synthescope* however provides an inexpensive, simple and instantaneous means of analysing audio frequency waves. Auxiliary apparatus consists of a selective receiver, incorporating a crystal filter, and a cathode ray oscilloscope with time base adjustable down to about 5 c./s.

General Description of Method

In brief, the method employed is the slow speed "scanning" of the sidebands of an oscillator, amplitude modulated by the waveform under examination. The receiver is employed as a highly selective amplifier which conveys a pulse of voltage to the oscilloscope as each of the sidebands, due to the audio harmonics, passes through the resonant frequency of the receiver.

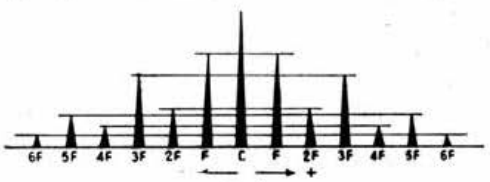

Fig. 1.
C = Main peak due to oscillator carrier.
F = Main sidebands due to audio fundamental.
2F, 3F, 4F, 5F, etc. = 2nd, 3rd, 4th, 5th, etc., audio harmonic sidebands.

In practice, the selective amplifier is fixed in frequency and the modulated oscillator is swung through it several times a second. The deviation of oscillator frequency will depend upon the separation between the carrier and the sideband due to the highest harmonic to be observed. For instance, suppose a 1 kc/s. wave is to be analysed, and data is required on all harmonics up to and including the 20th, then the sidebands of the oscillator to be scanned extend to plus and minus 20 kc/s. on the carrier frequency.

Each set of sidebands—those above and below the carrier frequency—are identical, so that only 20 kc/s. of deviation will be needed to include everything from carrier to the 20th audio harmonic. Since the carrier is not required, in fact only 19 kc/s. deviation will scan fundamental, 2nd, 3rd . . . 20th harmonics.

It is clear therefore that for a wave of fundamental frequency $F_{kc/s.}$, measurements up to the *nth* harmonic demand a deviation of $n \times F_{kc/s.}$. Thus, a deviation of 200 kc/s. allows measurement of all harmonics up to the 20th of a 10 kc/s. wave, or the 200th of a 1 kc/s. wave, and so on. This example shows that such a deviation as 200 kc/s. is usually adequate for most purposes, but no rigid limit exists as to the extent to which the deviation may be taken.

A more exacting limit is imposed on the lowest frequency which may be analysed. The frequency difference between adjacent harmonics is, of course, equal to the frequency of the fundamental wave. In consequence, a low frequency wave will have harmonics separated by a low frequency, and the selective amplifier will have greater difficulty in separating the individual harmonics. Hence the need for a crystal filter.

Waveforms having a frequency of 0·5 kc/s. or less, will require a more selective amplifier than the average communications receiver can provide, even when the crystal filter is at maximum selectivity.

For measurements down to about 50 c/s., it is necessary to use an amplifier and crystal of a lower frequency than the conventional 465 kc/s. I.F. of most receivers, in order to obtain the greater available selectivity.

An amplifier using 110 kc/s. I.F. transformers and a 100 kc/s. crystal is probably not beyond the resources of most home laboratories, and the very high selectivity possible will allow waveform analysis down to about 50 c/s.

Detailed Description

The method of selectivity curve-tracing on the cathode ray oscilloscope was fully described in the article on the Synthescope. Calibration of the frequency base by amplitude modulating the frequency-swung oscillator with a known audio frequency was also discussed.

Now suppose that the audio calibrating source contains an infinite series of harmonics all of equal amplitude. The main selectivity curve of the receiver or selective amplifier is then accompanied by a symmetrical series of secondary peaks all of equal height and spaced at equal intervals along the

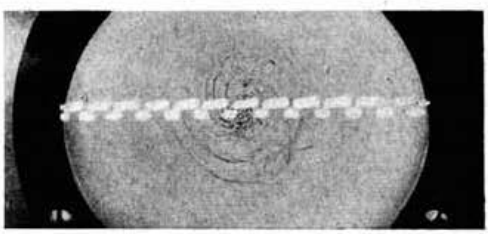

Fig. 2.
Photograph of tube face illustrating square-wave form from a multivibrator of 5 kc/s. taken on normal time-base.

frequency-base stretching to infinity on both sides of the main peak. This spacing-distance is proportional to the frequency of the calibrating source, and the ratio of the amplitudes of secondary to main peaks is a measure of the depth of amplitude modulation.

The case quoted above of a waveform having an infinite series of equal harmonics is, of course, purely hypothetical. In a practical case the harmonics will extend each way, as far as they have appreciable amplitude, and will have individual heights, which give an accurate measure of their values relative to the audio fundamental.

Fig. 1 illustrates the duplication of sidebands due to double sideband modulation. All the information concerning the audio waveform is contained in that part of the diagram between F and 5F (or further if an harmonic higher than the 5th is to be measured).

* R.S.G.B. Bulletin December, 1943.

In view of the limited diameter of the cathode ray oscilloscope screen it is clearly advantageous to restrict the length of base line to that which just includes the peaks of fundamental and relevant harmonics; this avoids overcrowding of peaks and permits a smaller frequency deviation of the swinging oscillator.

The centring condenser on the Synthescope allows the selection of any given part of the series, while the frequency modulation control potentiometer gives any desired bandwidth; thus, adjustment of both together provides a means of examining any part and any width of the spectrum under consideration.

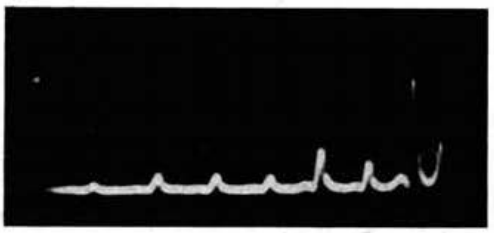

Fig. 3.
Analysed result of square-wave form illustrated in Fig. 2. The left-hand peak is the fundamental, those from left to right are 2nd to *nth* harmonics in ascending order.

For any given waveform, the absolute amplitude of a harmonic is unimportant–only the relationship between fundamental and harmonic is required. Similarly, if the ratio of *nth* harmonic to fundamental is known, and the ratio of *nth* to $(n + x)th$ is also known, then the amplitude of the *xth* is known in terms of fundamental. This point is valuable when dealing with high-order harmonics which may have low amplitude. The procedure is then to measure, say, the 7th harmonic against the fundamental;

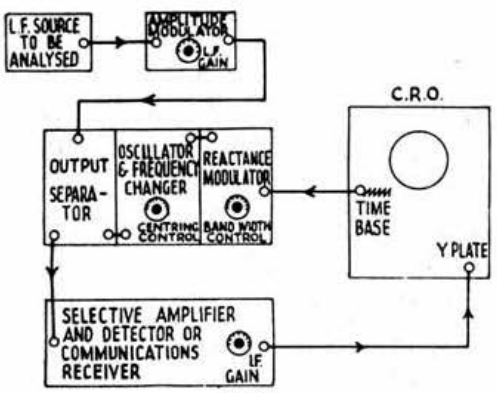

Fig. 4.
Illustrates the process of wave-form analysis.

adjust the centring trimmer until all harmonics lower than the 7th are no longer swinging through the selective amplifier (*i.e.* off the screen of the cathode ray oscilloscope) then increase the gain of the amplifier until, say, the 14th harmonic is measurable against the 7th and so on.

In this connection it is important that no part of the selective amplifier is overloaded. For this reason it is best to "de-centre" or tune-out the lower harmonics when observing high-order weaker ones, as the amplifier gain can be higher without overloading.

Instantaneous Comparison

So far quantitative measurements have been considered, but the greatest value of the device used in the foregoing manner lies in its ability to show instantaneously the behaviour, relative to its neighbours, of any harmonic in a selected band.

For instance, in multivibrator experiments it is possible to watch the 5th harmonic disappear and the 12th grow in amplitude simultaneously as circuit variables are changed. Likewise one may observe the balance of a push-pull amplifier by "phasing-out" the even harmonics, or demonstrate the "growth" of harmonics as a sine wave is distorted in an overloaded amplifier.

Two photographs of the cathode ray tube are shown in Figs. 2 and 3. Fig. 2 is a square waveform from a multivibrator of 5 kc/s., taken on a normal time base. Fig. 3 is the analysed result, the left-hand peak being the fundamental and those from left to right being 2nd to *nth* harmonics in ascending order.

Precautions for Accuracy

Certain precautions are necessary if accuracy of measurement or comparison are desired. Firstly, the linear amplitude modulation of the carrier must be ensured. Care must also be taken that modulation up to ± 200 kc/s. on the carrier does not introduce attenuation of sidebands.

A satisfactory means of achieving both these aims is to apply the audio modulation to the cathode-follower-separator output stage of the Synthescope *via* an audio amplifier valve similarly connected as a cathode-follower separator. Some control over L.F. amplitude is then possible, in addition to ensuring faithful reproduction of the waveform in the modulated envelope. All these points may, of course, be checked before measurements are taken, by the use of the cathode ray oscilloscope in the normal manner.

Time-base repetition speed is almost as important in this application of the Synthescope as for selectivity curve tracing. Indeed, each of the peaks denoting a harmonic is a reproduction of the selectivity curve of the amplifier. However, the true shape of the curve need not necessarily be maintained for the purpose of wave analysis, but unless the repetition speed is kept very low the selective amplifier will reject the rapid changes involved and will cause blurring and overlapping between adjacent peaks if they are closely-spaced, as in the case of a very low frequency waveform. Flicker is prominent under these conditions and it might be worth while using a cathode ray tube with a long after-glow screen to minimise this effect.

Fig. 4 is a block diagram illustrating the process of analysis.

Stray

Mr. R. W. Leader, **G6VL**, Codnor House, Stoke in Teignhead, Newton Abbott, seeks the loan for a few days of the RME 69 instructional booklet. Can *you* help?

Silent Key

We record with deep regret, the passing of Mr. John Edgar Jago, BRS3409, of Exeter. Geography Master at Ladysmith Senior Boys School since its opening, Mr. Jago was an Honours Graduate of London University. One of his keenest interests was the school's adopted ship, the "Orari." He was also interested in school dramatic work. A member since 1938, Mr. Jago had shown especial interest in V.H.F. work. He was serving with the R.O.C. at the time of his death.

The Rev. A. B. Trewin, G2AT (Vicar of Exminster), assisted at the funeral, whilst Mr. H. A. Bartlett, G5QA (Town Representative for Exeter) represented the Society. Floral tributes were sent by Sgt. O. Read, G2FP. and other local members.

Our deepest sympathies are extended to his widow, relatives and many friends.

A Novel Morse Code Practice Set

By R. C. HARRIS (2BAB)

THE following brief description of a novel morse code practice set may prove of interest to those who, like the author, object to the raucous note emitted by the average buzzer.

Before the days of the modern hand-microphone telephone set it will be remembered that a high pitched audio frequency "howl" could be obtained by placing the receiver in close

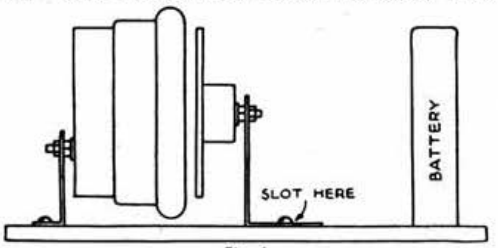

Fig. 1.

proximity to the transmitter insert. This is the principle employed in the code practice set to be described.

A low-resistance single earphone is mounted on two small "L" shaped brass brackets, screwed to a baseboard. Near to this (also mounted on an "L" shaped bracket) is a small carbon micro-

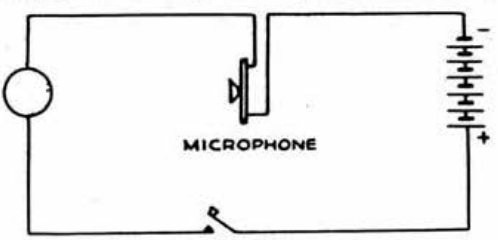

Fig. 2.

phone or microphone button, with a larger diaphragm attached to it. The bracket has a slot cut in its base to permit its position to be altered relative to the earphone. The method of assembly is illustrated in Fig. 1.

The earphone and microphone are connected in series with a key and a 9 or 13½ volts battery, as shown in Fig. 2. With the key depressed, the distance between the earphone and microphone can be varied until the note obtained is of sufficient intensity. If no sound is obtained, reverse the connections to the earphone.

The set should be built into a small carrying case, which can also contain the battery and a receptacle for the key.

The advantages of this device are (*a*) the note is almost identical with the type of signal heard over the air, and (*b*) fast keying can be carried out. The tone can be varied within limits, by screwing up or unscrewing the moulded cover on the earphone. When the cover is unscrewed the pitch of the note is lowered; screwing-up has the reverse effect.

A code practice set of the type described has been in continuous operation for a period of two years, and apart from replacing the batteries it has not given the slightest trouble. It is ideal when no mains are available and where fairly large classes are under instruction.

Trainees who have been given the choice of listening to signals from an ordinary buzzer or from this type of set, have always preferred the note given out by the latter.

Technical Articles Wanted

Members in a position to prepare technical articles are invited to communicate with the General Editor who will be pleased to offer suggestions. "Hints to Contributors" will be sent on request to any interested member.

CAIRO CONVENTIONETTE—DECEMBER, 1943.

A group photograph taken by SU1AX at the Conventionette held in Cairo on December 7th, 1943. How many of your friends can you recognise?

KHAKI and BLUE

"Duration DX-ers"

From H.Q. Air Command S.E. Asia, **G2ZQ** sends the news that an Anglo-American Amateur Radio Club bearing the title "Duration Dxers" has been formed. The Club will meet monthly for the exchange of technical information, tall stories, and DX "dope." The Officers are:—Chairman, W./C. Hunter, G2ZQ; Secretary, Lt. Marshall C. Davie, Jnr., W4GBN (Alabama); Treasurer, Lt. Herman Goodstine, W1XTV (Conn.). Programme Committee:—Capt. A. C. Perrin, W9RKR (Illinois), S./Ldr. H. Edge, G6GD (Manchester), Lt. H. N. McIntyre, W9JPD (Kentucky). Also present at the inaugural meeting were:—Capt. J. S. Schantz, W3FYD, Lt. C. E. Ffoulkes, ex-W4LK, Major E. E. Boyer, W8AJO, Major P. E. Holbrook, W3ATY, Ft./Lt. A. B. Avery, XZ2EX, Major H. Wilson, ex-W2ACA, Col. R. C. Bohannan, W8AV, Capt. R. W. Richmond, ZE1JM, Lt.-Col. B. Sawyer, W6CV, Major H. Hodgman, XU8HM, Capt. H. J. Wolff, Lt.-Col. S. J. Dagg, operator AC4YN, and Lt. P. Jorgensen, W9EYE. Regrets for absence were received from Sq./Ldr. K. Jowers, G5ZJ, VE3AE and VE3WN.

We hope to publish further details of this newly-formed Club at a later date, in the meantime members serving with the S.E. Asia Air Command are invited to contact G2ZQ for dates of meetings.

● We understand from Pte. D. M. Henderson, **BRS4004,** that members of the Royal Army Pay Corps serving in Meerut, India, have also formed a Radio Club. Members serving in or near to that town should communicate with the Hon. Secretary, Pte. A. Hobbs, 7677752, R.A.P.C. (L.B./60/N.), B.A.P.O., Meerut, India Command.

● Ben Wallich, **G6BW,** who receives our warm congratulations on his promotion to Wing Commander, asks to be remembered to all old friends at home and abroad, especially to G2IS, 6VK and W8PEN.

● Members of the Thames Valley Amateur Radio Society will be interested to hear that Les Cooper, **G5LC,** was recently granted a commission in the Home Guard. He is I./c. Signals and Intelligence.

● Ernie Baker's call is **G5OQ,** not 5UQ as given in this column last month. The call **G5UQ** is held by "the Radio Vicar," Mr. P. H. Trafford, who is still engaged on civilian duties with the R.A.F.

● Lt. T. Orr, **G3IV,** now in Forfar, sends greetings to G5FA and others who know h'm.

● Apropos the enquiry published in our last issue, Cpl. D. T. Boffin, **G3HS,** informs us that W./C. Wally Dunn, G2LR, is now C.S.O. No. 5 Group, R.A.F. G3HS sends 73 to G2CL, GG, 3HC, JO, 8BW, PX and VP. His present address is 44, High Street, Winslow, Bucks.

● Cpl. Cadet/Pilot Len Hubbard, **2FRM,** writing from Salisbury, Southern Rhodesia, regrets that due to pressure of work he has been unable to reply to the many letters received from old friends in District 13 and elsewhere. He hopes to return home soon.

● L.A.C. Glassford, **BRS4467,** states that an attempt is to be made to hold a "hamfest" in Darjeeling during the next few months. Members in or near to that town should contact Mr. Ford, VU2CA (who owns a radio store in Darjeeling) for further details.

Congrats

● To A. E. Hochstein, **SU1AX,** who was married in Cairo on January 2. The bride was given away by Cpl. Troy, GM8RJ, and the best man was L.A.C. Arthur Goode, 2DTQ. Mr. Hochstein has been to the forefront in offering hospitality to amateurs serving in Egypt, whilst his help in publicising the Cairo Conventions has contributed materially to the successes which have been recorded.

● To Lt. Rowland Shears, **G8KW** (R. Signals) of New Barnet, who was recently awarded the British Empire Medal for gallant and distinguished service in the Middle East between May 1, 1942, and October 22, 1942. Lt. Shears was mentioned in despatches last year.

● To Captain and Mrs. C. Collins, **G8SC,** who are now the proud parents of a daughter—Nanette Verena.

● To Cecil Bradbury, **BRS1066,** who has recently been granted a commission in the R. Corps of Signals.

● To Alan B. May, **G5AL,** whose wife recently presented him with a junior operator—Ian Barrett.

News from the Kreigies

Letters are to hand from the relatives of three members who were originally in Italian prison camps. Trooper N. Druce, **BRS2600,** is now at Stalag 101, XVIIA, Germany. Capt. G. E. R. Wood, **BERS256,** and L./Cpl. K. N. Smith, **G3RB,** are in transit camps somewhere in Germany. Capt. Wood states "a few hours after Armistice at 4 a.m. the Germans marched into P.G. 21 armed with machine and Bren guns—the Italians gave us no help at all, in fact they have double-crossed us all along." [It is interesting to note that Capt. Wood's letter was passed by both the German and British censors.—ED.]

Unfortunately the kitbags sent from the Society's P.O.W. Fund were not received by members who were in Italian camps, but those members who are in German camps appear to have received both kitbags and suitcases. For instance, Tel. P. B. Briscombe, **G8KU,** writes, "I have received kitbag and case much to the envy of several of my chums. Thank you all very much for the kindness and trouble taken on my behalf. Up to the end of September I had tobacco parcels regularly as well as books and games and wish to express my appreciation to all concerned."

In a letter to G8TL, Lt. S. Heath, **2DKV,** asks that his thanks be sent to all who have made it possible for him to receive parcels from the R.S.G.B. P.O.W. Fund. He also acknowledges receipt of the attaché case sent to him last year.

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

DONATIONS.—The General Secretary acknowledges with thanks on behalf of Council, receipt of donations from:—A. R. Blair, 2724, 5s.; D. Jebbett, 6706, 5s.; C. T. Barrington, G6LY, 15s.; C. Wilson, 4008, 2s. 6d.; F. Barnard, G4FB, 5s.; W. P. Stevens, 4022, 5s.; O. C. Hill, 4044, 10s.; W. T. Burbage, 5929, 6s.; R. H. Drew, G3MD, 10s.; A. Jotcham, 2FWB, 5s.; Hut 6, R.A.F. Station, 16s. 6d.; S. Ince, G6LC, 10s.; T. Emery, 5556, 10s. 6d.; R. Bradbury, 4209, 10s.; Pointe-a-Pierre Amateur Wireless Society, per D. G. Bagg, VP4TO, £7 7s.; W. G. Dobbie, 4912, 10s.; D. Gillies, 2FZT, £1; H. Jefferies, GM8HJ, 4s. 6d.; J. Hunter, GM6ZV, 5s. 6d.; W. E. Beck, 2ALG, 5s.; Coventry A. R. Society, £2; T. W. Readshaw, GM6UU, £1 1s.; H. P. Wiggins, G2CP, 1s. 3d.; Back Room Boys, per 2DUX, £2 10s.; J. A. Broderick, 4709, 5s.; W. J. A. Anderson, GM3TD, £1; P. C. W. Green, 3753, 15s.; H. E. Gill, G8KD, 5s.; W. F. Holdaway, 2CWF, 10s.; District 13, per 3ST, 13s. 6d.; Anon, 5s.; R. W. Leader, G6VL, £1 5s.; C. A. Butler, G2YB, 5s.; No. 1 S.D. Det., per 2BQC, £2; R. Rose, 5164, 5s.; A. G. Davies, G2PC, 2s. 6d.; C. A. Sharp, G6KU, 4s. 6d.; E. T. James, GW5TJ, £2 2s.; H. Binns, G8TF, 8s.; V. R. Ledger, 2FKY, £1 5s. 6d.; G. Velux, BERS.536, 6s. 6d.; A. E. Clipstone, G8DZ, 10s.; F. Crocker, G2NN, £1 5s. **Receipts to date, £1058 9s. 9d. Expenditure to date, £492 19s. 4d. Balance in hand, £565 10s. 5d.**

DESPATCHES.—Parcels to the value of approximately £1 per member were despatched in November and December. Parcels to the value of approximately £1 10s. per member were despatched in January. No invoices have yet been received for these despatches, but the estimated cost is expected to be £90, which will reduce the balance in hand to approximately £470.

WHAT OFFERS?—Mr. Paul H. Smith, **2FWV,** has donated to the Society a collection of 47 back issues of THE BULLETIN (4 volumes) covering the period July, 1938–June, 1942. These will be sold to the highest bidder and the proceeds given to the R.S.G.B. P.O.W. Fund. Closing date for bids, February 29. Thanks Paul.

News from DX.

Doug. Edwards, **G3DO,** sends news of several well-known pre-war DX'men. W6OI, now a Lt.-Col., is at an Army Air Forces School of Applied Tactics in Florida. W7BVO, now married, has a one year old son whom he has named Dave after W6OI. W6IKQ is in charge of electrical plant at shipyards in California. All the above send greetings to their friends in England as does Dorothy Hall, W2IXY, who is now working with the New York Fire Department.

Missing

We record with regret that F./Sgt. James Wood, **5420,** of Dundas, Scotland, and Sgt. Gordon Zedy, **3732,** have been reported missing from air operations over enemy territory.

Speedy Recovery

● To R. Coulson, **BRS4572,** of Sunderland, who is in hospital with a fractured spine caused as the result of a mining accident.

● To F./Lt. Dudley Nourse, **VK2DQ,** who, at the beginning of January was in R.A.F. Hospital No. 5, M.E.F., recovering from a "prang" which put him into plaster for some weeks. He wishes to be remembered to all old friends.

Silent Keys

We record with deep regret the names of the following amateurs who have been killed on Active Service:—

Captain Alexander Cattenach, **GM2TQ,** Seaforth Highlanders.

Flying-Officer Robert Millar, **GM6ND,** Royal Air Force.

We offer sincere condolences to their relatives and friends

BRITISH ISLES NOTES AND NEWS

DISTRICT 1 (North Western)

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

Ashton-under-Lyne.—A good attendance was recorded at a meeting of the Ashton-under-Lyne Society held on Sunday, January 23. Welcome was extended to two new members from Hadfield.

The next meeting is fixed for Sunday, February 20, 2.30 p.m., A.T.C. H.Q., Thompson Cross, Stalybridge.

Bolton.—Attendances at the last two meetings have shown a slight improvement. At the December meeting we were pleased to welcome two Service members, 2BIK and BRS7329, whilst our latest recruit, Mr. Shuttleworth (Jr. Ass.) made his bow to the members last month. As no date has yet been fixed for the March meeting, those interested are asked to contact 2DVQ, 32 Bromwich Street, Bolton. G6CX.

DISTRICT 2 (North Eastern)

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

The D.R. contemplates arranging a P.D.M. in Leeds during May. Those who will support this event should please send a P.C. to 6KU. He also hopes to arrange a meeting in Bradford shortly. Local members are invited to write him offering support and suggestions.

Morley.—The Morley and District Radio and Television Society held a successful meeting on December 12. Those present included Mr. Hunter, M.I.E.E. (President), 6NP, 6PL, 6QO, 5YV, 2CGR, 2FFU, 5893 and 6441. 5YV plans to build a super-converter for 28 and 56 Mc./s and requires two "acorns" for this job, any offers? 6QO is building a talkie amplifier. 8WP is believed to be in the Orkney Islands. 3NU was recently married. 8KP is now a proud father. We welcome to membership F./Sgt. Gould, 2FQH. The T.R. recently received a visit from 6655. 5893 is trying out various 56 Mc./s super regen circuits and hearing a number of signals around 50 Mc./s.

Sowerby Bridge and Halifax.—2DUX recently made a collection for the P.O.W. Fund which produced the sum of £2 10s. 0d. He wishes to thank all who subscribed and 8CB for his assistance. The T.R. and 6455 seek news of Reg. Pohlmann (2DOR). 6455 is with the R.A.F. in GI.

Sheffield.— 6PJ(R.A.F., India) wishes to hear from old friends, especially G5OU and CT2BM. He reports fit and well and states that 3JG, 8IJ and 5337 are at his station. 3RU (Lieut., R.E.M.E.) now near Bournemouth, sends 73 to his friends.

General.—Congrats to 4412 on his promotion to F./Sgt. 8BA has recently returned to G after visiting 15 countries. He would like to hear from 5GJ and 8IJ. We are sorry to learn that 3HA is in hospital again. He recently met 8RY and 3UP. 5GJ is at a gunnery school in GW. 5718 is building a 5-valve receiver and 20 watt amplifier. A hearty welcome is extended to the 34 District 2 members listed in the January BULLETIN. They should contact their T.R. or the D.R. G8UO.

DISTRICT 3 (West Midlands)

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

Birmingham.—At a meeting of M.A.R.S., held on Sunday, January 9, Mr. Shaler gave an interesting lecture on detection. Four R.S.G.B. members and one U.S. visitor were welcomed.

Reference the paragraph in the December BULL that a letter had been received from Sgt. K. R. Best—this should have read Sgt. K. R. Boot, Royal Corps of Signals, India.

An airgraph has been received from Ldg. R./Mech. R. P. Latham, R.N. L.A.C. Surman now back in this country after a lengthy stay in Rhodesia, is looking forward to contacting old friends. 2FDR.

DISTRICT 4 (East Midlands)

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

Important Announcement.—A Provincial District Meeting will be held at the Magna Cinema, Wigston Magna, near Leicester, on Sunday, March 12. It is hoped that the President and General Secretary will attend. For details see special announcement.

Derby.—G2OU reports that the December meeting was not a very great success; it appears that when the three members arrived at 3OZ's for the meeting he was out. 8SI is now at Scarborough.

Leicester.—Only seven members were present at the meeting held on January 30 at BRS5605. Local members are urgently requested to attend the meeting to be held at G2IX on February 27. News has been received from 6274, now in the Mediterranean area. BRS5605.

Mansfield.—The T.R. Mr. J. E. Davies, 18 Farndale Road, Sutton-in-Ashfield, is still waiting to hear from local members.

Nottingham.—Membership and activity is still on the increase. At the January meeting 16 members were present including 8OZ and 2BKF, who were on leave. The Radio Quiz resulted in a tie; there were some very interesting answers to questions. This was the first meeting to which the ladies were invited and those present were entertained by Mrs. 8DZ. The sum of 8s. was raised for the P.O.W. Fund by means of a novel scheme suggested by 7416. The next meeting will be held at Beeston and details of this and other local events can be found under "Forthcoming Events."

Peterborough.—The January meeting—the first held here for some time—was poorly supported, only one member attending besides the T.R. Better support for the February meeting is solicited. G8DZ.

DISTRICT 5 (Western)

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

Swindon.—BRS5254, R. Sigs., stationed in Kent, has been undergoing radio instruction at a training school. While on leave he met 5518, R.A.F., who is completing a W./Op's course. G3JO, stationed near Gainsborough, states that G8BA and 3750 are with him at the same W.T. section. He gives the following items of local news:—3JO and 2CGN promoted to F./Sgts., 3NC now L.A.C., 2BUJ in England. 2CGN is constructing a super amplifier. 3HS is stationed near him in the Leighton Buzzard district.

Hereford.—BRS7280 inquires if there are any members in his locality. Address is T. B. Atkins, Grafton Lodge, Hereford.

Bristol.—There was a most welcome increase in attendance at the January meeting. Especially welcome were G15HV, 6YS, 2CPI and 7383. The next meeting will be held on Sunday, February 27.

G5WI has written regretting inability to attend meetings, but he still shows his old enthusiasm. Another airgraph from 5UH gives the news that he attended the last Cairo Convention and had a good time. He reports a contact with 6GI, a Bristol amateur he had worked but never met. Congrats to 2BYU on obtaining his commission in the H.G. G6RB.

EAST MIDLANDS PROVINCIAL DISTRICT MEETING

to be held on

SUNDAY, MARCH 12th, 1944

at the

Magna Cinema, Wigston Magna, Leicester

PROGRAMME

ASSEMBLE	1.30 p.m.
BUSINESS MEETING	2.15 p.m.
AFTERNOON TEA	4.15 p.m.
TECHNICAL TOPICS	5.30 p.m.

INCLUSIVE CHARGE 3/6

Reservations to Mr. A. E. CLIPSTONE G8DZ, 14 Epperstone Road, West Bridgford, Notts., by not later than March 6th, 1944

ALL MEMBERS CORDIALLY INVITED TO ATTEND

DISTRICT 6 (South Western)

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

Exeter.—It was reported in THE BULLETIN last month that Mr. J. Jago, was seriously ill. We now very much regret to announce that he has since died in Exeter hospital. On behalf of members in District 6 we extend our deepest sympathies to his relatives. We are glad to know that it was possible for a number of members to attend the funeral.

Torquay.—The D.R. was interested to receive recently a Xmas card sent by 2FNY—from Moscow!

The next meeting for this area has been fixed for Sunday, February 27, 3 p.m., at the home of G2GK, 106 Warbro Road, Babbacombe. It is hoped that all local members who are free on that day will make a point of attending.

North Devon.—In another "illuminated" air mail Xmas greetings letter to G3BO, 3AM states that he is fit and well and still has hopes of returning home soon—complete with "fotos." The T.R. was glad to see 8US at Xmas and to learn that he is making good progress after a recent spell in dry dock with pneumonia.

3GH reports a visit from 2DOW. All who knew 4CW will be sorry to hear that he has recently undergone a serious operation. Good Luck OM; a speedy and complete recovery. G5SY.

DISTRICT 7 (Southern)

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

Croydon.—In an airgraph, 4150 (B.N.A.F.) mentions that he is now Tradesman, 2nd Class. 2FXT, too busy to attend local meetings hopes to do so in the near future. 5BT's new receiver is now "delivering the goods." 2FWA has returned to the air—through the B.B.C. however—he was ploughed by the 10s. question in the "Double or Quits" programme. See "Forthcoming Events" for details of next meeting. (*via* G2DP.)

Coulsdon.—2ANR (Malta) says that in the Xmas soccer match the C.O. and N.C.Os were defeated 2–1 by other ranks. Ex-VE3ABW is now a member of the local H.G. Welcome to new members—6946, 7149, 7203, 7351 and 7417. (*via* 3003).

Bournemouth.—VE3ASJ (R.C.C.S.) after a year in this country, has made first contacts with 2HNO, 2NS and 4MY. 3RU, Sheffield is now stationed locally in the R.E.M.E. 4MJ has been on leave. A welcome is extended to all new members. (*via* 2HNO.)

Reading.—In spite of bad weather a very successful initial meeting was held in January. Among those present were 2YI, 2BTY, 2DIO, 3BN, 4573, 5WP, Dr. Moss and Mr. Deadman. Monthly meetings were decided upon and Dr. Moss (Cossor's) agreed to give a series of talks on the theory and application of C.R. tubes. This promises to be an interesting and instructive series, which will commence after the next meeting which will be held at 6.30 p.m. at The Comrades' Club (first floor), Oxford Street, Reading on Saturday, February 26th. G5WP.

Forthcoming Events

Feb. 20	District 4, 6.30 p.m. at 32 Lime Tree Avenue, Peterborough.
Feb. 25	District 12, informal meeting, 7.30 p.m. at The Cock, Cockfosters.
Feb. 26	District 7, 6.30 p.m. at The Comrades Club (1st floor), Oxford Street, Reading.
Feb. 26	London Meeting, 2.30 p.m. at Institution of Electrical Engineers. Lecture "Quartz Crystals and their Applications to Amateur Radio Purposes," by E. A. Dedman, G2NH.
Feb. 27	District 4, 2.30 p.m. at G2IX, 19 Francis Avenue, Braunstone, Leicester.
Feb. 27	District 4, 2.30 p.m. at The Lad's Club, Station Road, Beeston, Notts.
Feb. 27	District 5, 3 p.m. at 17 Colston Avenue, Centre Bristol.
Feb. 27	District 6, 3 p.m. at G2GK, 106 Warbro Road, Babbacombe, Torquay.
Feb. 27	District 12, 3 p.m. at BRS3412, 18 Sandfield Road, St. Albans, (turning off main Hatfield Road, between St. Paul's Church and Rats Castle P.H.).
Feb. 27	Scotland "A" District 3 p.m., in the Royal Technical College, George Street, Glasgow, enter by Montrose Street.
Mar. 4	District 15, 3 p.m. at The Excelsior Hotel, 1 Ladbroke Gardens, Ladbroke Grove, W.11.
Mar. 5	Districts 13 and 7. Combined meeting, 3 p.m. at the Y.M.C.A., North End, West Croydon.
Mar. 12	District 4, Provincial District Meeting, 1.30 p.m. at Magna Cinema, Wigston Magna, Leicester. (See special announcement.)

DISTRICT 9 (East Anglia)

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

Norwich.—G2MN reports a visit from 5UF and a meeting with 5LW, back from the Middle East and now out of the Army. L. R. Richardson, BRS3558, who is stationed in the far North would like to find more to read of local happenings.

Kings Lynn.—We were very pleased to welcome back to this country Gerald Verry, 2DCQ, and trust that he will remain nearer home for a good spell. G2XS.

DISTRICT 10 (South Wales & Monmouthshire)

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

A hearty welcome is extended to new members who are cordially invited to communicate with the writer, who will be pleased to give any information on District activities.

GW5BI, writing by Airgraph from India, has received no BULLETINS for two years. 4FW has been discharged from the R.A.F. and can now be reached *via* his home address. 2DOS sends greetings by Airgraph from the M.E.F. 4467 and 6898, stationed in India, have met several VU's, G3VU and a W8. They hope to arrange a hamfest at Darjeeling in the summer. 8SO recently underwent a successful spinal operation and has now recovered. He sends greetings to all old friends.

Cardiff.—Owing to the indisposition of GW8UH, no meetings have been held for the past two months; arrangements for the next are now being made and particulars can be obtained from the writer. GW4KQ.

DISTRICT 11 (North Wales)

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

BRS5520 reports meeting GM2CU (BRS3571) at Crewe station whilst travelling. GM2CU was going on leave after a leg injury. He has eight amateurs at his R.A.F. Station. 2DAH is now fit after a spell in hospital. How about some news to keep members informed of *your* whereabouts and activities?

BRS1060.

DISTRICT 12 (London North and Herts)

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

North London.—G5QF, 8SK, 2DHF, 2DWV, BRS3386, 4249 and 4486 were present at the January meeting held at BRS3386 when a pleasant afternoon was spent in discussing many radio topics. Our thanks to Mr. and Mrs. Laister for providing tea. A meeting will be held at "The Cock," Cockfosters, on February 25. Those wishing to partake of the evening meal should notify the D.R. by the 21st inst.

St. Albans.—Several new members are expected to attend the next meeting, to be held at the home of the T.R., BRS3412. BRS7097 has promised to bring along for display a number of receivers. See "Forthcoming Events" for details. G5QF

DISTRICT 13 (London South)

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

Eleven members attended the special Christmas meeting held at 3 Englewood Road, Clapham South. As the only entrant for the "Ann" Cup was BRS4324 (who displayed a nicely constructed oscilloscope) it was decided that he should retain it for the present. It has been suggested, however, that in future the Cup should be competed for by all members of Districts 13 and 7.

Airgraphs and greetings cards have arrived from Cpl. Dunn, R.A.F., C.M.F., Cpl. C./Pilot L. B. Hubbard, R.A.F., Salisbury, S. Rhodesia, Lt. J. Bousfield, R.N., and Ken Hubbard, R.A.F., as well as a letter from R. H. F. Arney, BRS7186, to whom as a new member we extend a hearty welcome.

* *

Fourteen members attended the January meeting, held at the Y.M.C.A., Croydon, when an interesting and instructive talk was given by E. W. Fair, BRS4095, on relays of all types. As relays will be used a great deal in the future we are grateful to Mr. Fair for his talk.

Mrs. Gilmour (wife of G2VB) has been in hospital recently. We wish her a speedy recovery to good health.

The writer has now practically finished building a simplified communications superhet. This will be shown and demonstrated as soon as possible. G3ST.

DISTRICT 14 (Eastern)

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

The combined Chelmsford-Romford Meeting, held at Romford on January 30, was a great success, twenty members being present. A Question Bee covering non-technical radio matters, devised by the Scribe, and competed for by teams representing Chelmsford and Romford, ended in a draw. This event proved very popular, and caused much amusement—one member could not give the call-sign of the R.S.G.B. Secretary. How are the mighty fallen!

A long discussion on post-war Amateur Radio found the meeting in overwhelming favour of a mild technical examination for *all* would-be Licence holders, pre-war and post-war. Some members expressed the view that such an examination in pre-war years would have found only a handful of licences active in 1939

—an opinion shared by the Scribe, although he also agrees with G3CQ that such an unhappy state of affairs would have robbed the country of a vast number of self-trained technicians and operators during one of our most critical periods of history—the view being taken that most people learn their radio "gen" through *practical* amateur activity.

A collection on behalf of the R.S.G.B. P.O.W. Fund realised 25s., and the meeting closed with Mr. Witt, 2FXM, being elected as T.R. for Romford.

The enthusiasm displayed at the meeting is a fine portent for the future, and proves again the truth of the saying that you cannot keep a good Amateur down. G6LB.

DISTRICT 15 (London West, Middlesex and Buckinghamshire)

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

Headline.—Ham marries Ham's sister—our congratulations and good wishes to "Dud" Charman, G6CJ and G2OL's sister, who were married early this month.

A surprise visitor to the January meeting was G6CL, whom all were pleased to see. Others present were G4AD, G5LN, 8KZ, 2BQC, 3318, 5301 and 7359.

From India comes news of 8FA, who sent Christmas and New Year Greetings *via* 8KZ. 5JL in a letter from Italy tells of making P.A. equipment and sends greetings. 2BMY reports by airgraph from India and 7235 writes from Guards Signals with the Home Forces. 8MA, now on the Air Ministry Staff in Scotland, intends rejoining. 3XI is home on leave from Italy.

BRS 4781, writing from High Wycombe, reports that Mr. Newton Wade, ex-WRX-6PC-VS4A, was a visitor to the last meeting. Others present were 6IF, 2ADL, 4781, 4782 and 5666. Mr. Newton Wade displayed a number of home-made Abacs, and 4781 demonstrated his 112 Mc./8 receiver. To 2AVU who is convalescent after being in hospital, we send 73.

Our thanks to G5LN and 4782 for the use of their homes for meetings and to their ladies for providing refreshments.

G6WN.

DISTRICT 17 (Mid East)

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

2BUV, now back in England after a lengthy spell in Iceland, has gathered another stripe. 2BQC, still in London area, had a word on phone with D.R. 2DRT, with R.A.F. in Surrey, wishes to be remembered to all. G6GH, *via* airgraph, wishes District 17 members a pleasant 1944. G5LL has had a spell in hospital; the only ex-amateur he has met was an Italian prisoner! G8ON has been unable to organise Cranwell meetings recently owing to Service pressure, and the moving of his helpmate, Cpl. Ball, to hospital. G5BD.

DISTRICT 18 (East Yorkshire)

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

Beverley.—The T.R., 3271, reports a welcome visit from 2DBK and acknowledges a card from 4894, who is believed to have left the district. (*via* 3271.)

Hull.—G3PL reports contacts with 2FGQ, now in the Orkneys, 4530 still waiting to commence his air-crew training, 8UL and 6895. 2FQJ is expected on leave shortly. We welcome 7816 as a new member though not as a newcomer to amateur radio. 3PL will be pleased to see any member who cares to call at 79 Hayton Grove any Monday evening after 7 p.m. (*via* 3PL.)

York.—Further interesting details of recent activities of the Archbishop Holgates Grammar School Radio Club are reported by the President, Mr. R. Walwork, 7128. We also learn of his efforts to start local meetings. So far the response has been very disappointing and a few lines from those interested to him at 103 Holgate Road, would be appreciated. 7128 has received a letter posted in Baltimore from 6103, who is serving as a ship's radio officer.

We welcome the following new members:—S. B. Reeder, 7070 (York), D. Thorne, 7335 (York), B. C. Foster, 7259 (Muston, Filey), J. Hindshaw, 7419 (Pickering), and G. L. Fish, 7345 (Hull).

G6SO.

DISTRICT 19 (Northern)

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

Newcastle-on-Tyne.—From the T.R. we learn that BRS6243 is at present attached to the U.S. Army in Italy, where he has met W1MAR, W2NHQ, G3YM and G4LZ. G4LX is in Ceylon with the R.A.F. and sends 73 to his friends. 3779 is doing plenty of operating with local Home Guard.

As the monthly meetings which the T.R. has tried so hard to organise have had to be abandoned owing to lack of support, he is to try quarterly meetings as a last resort. The next will be on Wednesday evening, March 29. Look out for an announcement in "Forthcoming Events."

Sunderland.—BRS5164, with the M.E.F., sends 73 to old friends and reports that Sicilian wine is pretty potent especially the stuff with egg in it!

Stockton-on-Tees.—The D.R. received a Christmas Card from 8HQ, who is in Egypt with R.A.F. G2FO.

Northern Ireland

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

Belfast.—A warm welcome is extended to G3PY and 4CJ, both of whom have visited the Y.M.C.A. Radio Club. Morse classes continue and attendances are fairly good. W8VVH is a frequent visitor. GI5UW having almost completed his super test-meter hopes to submit a description for publication shortly.

Londonderry.—The newly formed N.W. of Ireland Amateur Radio Society continues to make good progress. Meetings are held on Tuesday evenings and Morse instruction is given on Sunday afternoons. BRS677, 3051, 5556, 5796, 7131, VE5AJV and W9IEX are in attendance at each session. Mr. W. B. Brown, G6QY, and his wife, BRS677, recently entertained other members of the new Society and gave them a most enjoyable evening. A message of greetings to the Society received from EI9F was warmly appreciated. The T.R. (2DHB) seeks news of 2BGM and BSWL876. GI5QX.

Scotland

"A" District.—Following the January meeting a visit was paid to the telephoto room of a local newspaper where Mr. D. Scarle demonstrated the apparatus and described its operation. This visit was greatly enjoyed by the members and thanks are due to Mr. Scarle. A strong appeal is made to all members of "A" District to attend at the Royal Technical College on February 27, when a committee will be elected to assist the D.O. in general welfare work and in drawing up a summer programme. Members unable to attend are especially requested to send suggestions and comments to 6ZV *before* the meeting. GM6ZV.

Letters to The Editor

Historic Photographs required for Society's Library of Lantern Slides

DEAR SIR,—Whilst lecturing to other societies recently, I have been struck by the interest evinced in lantern slides showing early amateur equipment and stations of historic importance. As the years pass, and younger men come forward, this interest may be expected to increase, whilst early photographs will become more difficult to obtain; and I feel that this is the time to build up, and complete as far as possible, the valuable collection of slides already owned by the Society.

May I take this opportunity of inviting all Members, or their friends, who have photographs of genuine historic interest to lend these to the Society for a few weeks, so that, if they are suitable, slides can be made? Photographs dating before the last war would be particularly valuable, especially if they show complete station equipment, or relate to any outstanding amateur achievement. Has anyone a photograph of our first President, the late A. A. Campbell Swinton, or of apparatus used by him?

I suggest that those willing to lend photographs might write to me in the first place c/o R.S.G.B. Headquarters, mentioning what they have available, so that they may be saved the trouble of sending in subjects already covered in our collection.

Yours faithfully,
E. L. GARDINER, G6GR (*President*).

Appreciations

DEAR SIR,—May I address through you my compliments and thanks to Mr. Hammans for his first-rate article on the "Synthescope"? Here is an article which "has everything"—a real practical usefulness, a touch of novelty, excellent explanatory detail. Anyone who has twiddled a "sig.-gen." from high to low, to high again and low again while trimming and tracking a complicated receiver will know what a boon the "Synthescope" is going to be. As for the frequency-modulator part—anything that encourages the use of the oscillograph around the amateur station does a good job towards ensuring better signals when we begin to make signals again!

Would it be too much to hope that Mr. Hammans will give us another page later, adding amplitude modulation to the resources of this instrument?

Yours faithfully,
E. HAYTER SIMMONDS, G8QH.

The Future of Civilian Wireless Reserves

DEAR SIR,—Having read with great interest your editorial in the October issue of THE BULLETIN, I should like to associate myself with the proposal to equip post-war R.A.F. Reserve Stations with the new G-P set. This set is very popular among radio amateurs now serving in the R.A.F., and I am sure that if the proposal is carried into effect there will be no shortage of trained personnel ready and willing to pass on their knowledge to the lads of the Sea, Army and Air Cadet Corps.

Whilst I realise that these sets will eventually become obsolete, I agree with you that it will be far better to equip reserve stations with them, rather than allow dealers to buy them up to sell at large profits.

If it is not found possible to adopt your suggestion, would it not be reasonable to give amateurs the first chance of purchasing *any* surplus radio equipment that may be put up for sale? I am certain every amateur would appreciate the opportunity.

Yours faithfully,
BRS6837.
(R.A.F., M.E.F.)

HEADQUARTERS CALLING

COUNCIL 1944

President:
ERNEST LETT GARDINER, B.Sc., G6GR.

Executive Vice-President: S. K. Lewer, B.Sc., G6LJ.
Honorary Secretary: H. A. M. Clark, B.Sc., G6OT.
Honorary Treasurer: A. J. H. Watson, A.S.A.A., G2YD.
Honorary Editor: A. O. Milne, G2MI.
Immediate Past President: A. D. Gay, G6NF.

* *

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

General Secretary: John Clarricoats, G6CL.

December Council Meeting

*Resume of the Minutes of a Council Meeting held at New Ruskin House, Little Russell Street, W.C.*1, *at* 6 *p.m. on December* 15, 1943.

Present.—Messrs. A. D. Gay (President), E. L. Gardiner, H. A. M. Clark, S. K. Lewer, F. Charman, D. N. Corfield, G. R. Scott Farnie, G. Jessup, W. H. Matthews, W. E. Russell, W. A. Scarr and John Clarricoats (General Secretary).

Apologies were received from Messrs. Hunter, Simmonds, Watson and Watts.

1. It was unanimously resolved to elect 118 Corporate Members and 6 Associates (25 applications for Corporate Membership were accompanied by references, whilst the remainder were sponsored by Corporate Members).

2. It was reported that the Inland Revenue authorities had agreed the Society's liability to Income Tax for the year 1944/5 in the sum of £717—the figure provided for in the audited annual accounts for the year ended September 30, 1943. In connection with this liability it was agreed to purchase Tax Reserve Certificates to the value of £700.

3. It was agreed to produce 5,000 small-size emergency membership certificates to the design submitted. It was also agreed to print the following conditions of issue and exchange on the back of the certificate :—

(*a*) *This certificate is the property of the Incorporated Radio Society of Great Britain, and must be returned to the Society when the holder resigns or relinquishes his membership.*

(*b*) *This certificate is not transferable and may only be used by the person named on the front.*

(*c*) *On application to the Society after the war this temporary certificate will be exchanged for a full-size engraved certificate.*

4. The President agreed to write a letter of thanks, on behalf of Council, to Mrs. Woollatt (wife of F./Lt. Woollatt, G3ZI) for her kindness in donating £30 to the R.S.G.B. Prisoners of War Fund. This sum represented the proceeds of a Sale of Work organised by Mrs. Woollatt and Mrs. Woollatt, Senior.

5. A Parliamentary Report was read dealing with the post-war disposal by the Government of surplus goods and factories.

6. An appeal was made for lectures for London meetings during the first half of 1944.

7. It was reported that the Ballot for Council was approximately three times heavier than in any previous year.

8. It was reported that Mr. H. F. Adams and Mrs. I. M. Adams had offered the Society a Trust Deed with a view to effecting a permanent memorial to their son, the late Pilot Officer Norman Keith Adams, R.A.F.V.R., G5NM, of Finchley, London, who lost his life on active service on August 22, 1942. It was unanimously resolved to accept the principles of the Trust, and to appoint a Committee to meet Mr. Adams. with a view to completing the final details.

The meeting closed at 7.45 p.m.

Presidential Address and Presentation to Mr. A. D. GAY

At a meeting of the Society held on Saturday, January 29, 1944, in the Lecture Theatre of the Institution of Electrical Engineers, London, Mr. A. D. Gay, G6NF (Immediate Past President), formally installed his successor Mr. E. L. Gardiner, G6GR, into the Presidential Chair. Following the installation Mr. Arthur Watts, G6UN (President 1934, 5, 6, 8, 9, 40), proposed that a hearty vote of thanks be recorded to Mr. Gay for his services to the Society during the past three years. Mr. H. Bevan Swift, G2TI (President 1931, 2, 3), seconded the motion which was carried with acclamation.

The President, on behalf of the Council and Headquarters Staff, then presented Book Tokens to the value of ten guineas to Mr. Gay in warm appreciation of the able manner in which he had carried out his duties as President. Mr. Gardiner explained that due to prevailing conditions the presentation had been confined to Council and Headquarters staff.

Mr. Gay, after thanking all who had been responsible for the presentation, expressed the hope that his successor would, during his term of office, witness the coming of peace and with it a complete restoration of amateur radio facilities.

Mr. Gardiner then delivered his Presidential Address which will appear in an early issue of this journal.

London Meeting

Mr. E. A. Dedman, G2NH, a Director of Quartz Crystal Company, New Malden, will lecture on "Quartz Crystals and their applications to Amateur Radio purposes" at a meeting of the Society to be held on Saturday, February 26, 1944, at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, S.W.1. The meeting will commence at 2.30 p.m. Tea will be served free of charge at 4 p.m.

I.E.E. Wireless Section

At the I.E.E. Wireless Section meeting to be held on February 23, Mr. R. J. Edwards will read a paper entitled "A Survey of the Problems of Post-war Television." At the meeting to be held on March 1, Mr. A. J. Maddock, M.Sc., will speak on "Applications of Thyrotrons in Radio Engineering." Tea will be served from 5 p.m. and the meetings will commence at 5.30 p.m. By courtesy of the Council of the I.E.E., Society members are invited to attend.

Association of Scientific Photography

Meetings of the above Association will be held at The Caxton Hall, Westminster, S.W.1, on the following dates :—

February 26.—Subject : "Mass Radiography."

March 25.—Subject : "The Assessment of Lens Performance."

Commence at 2.30 p.m.

Australian Broadcasting Commission Writer's Competition

The Australian Broadcasting Commission announces a competition for original literary works dealing essentially with Australian life, history or characters. Prizes to the total value of £1,000 will be awarded to the successful competitors. Entries are eligible from persons of British nationality (by birth or naturalisation) and from Nationals (by birth or naturalisation) of English speaking countries.

Entries close on June 30, 1944, for Plays, Documentary Features, Short Stories, Poems and Discussions. Closing date for novels is September 30, 1944.

A copy of the rules and entry form can be obtained from the London Representative, Australian Broadcasting Commission, Australia House, Strand, W.C.2.

Headquarters Address

A considerable amount of official correspondence continues to be sent to the General Secretary's private address. Members are asked to note that the address of the Society is now : New Ruskin House, 28/30 Little Russell Street, London, W.C.1. Those who act as sponsors to applicants for membership are kindly requested to record the above address on the application form, if the latter bears the temporary war-time address of the Society, *viz.* 16 Ashridge Gardens, Palmers Green, London, N.13.

Changes of Address

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

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

Technical Publications

Members are again reminded that no facilities exist at Headquarters for obtaining technical publications other than the A.R.R.L. and Radio Handbooks listed in the August issue of this Journal. Considerable inconvenience is caused by members who send cheques and postal orders for other publishers' books when forwarding either their subscription or an order for American handbooks.

Cash Sales Department

The following items are now in stock at Headquarters :—

Members' Notepaper (new style), 100 sheets	3s. 6d.
Car Plaque of Emblem	3s. 6d.
Rubber Stamp of Emblem	3s. 0d.
Kilocycles to Meters Conversion Booklet	1s. 6d.

All the above items will be sent post free to any address in Great Britain on receipt of remittance. Orders for Eire are despatched *via* the Censorship authorities.

RADIO AND ITS RELATIONSHIP TO KINDRED SCIENCES—*Continued from page* 119

Mind or Matter ?

Everything comes to our mind through our senses. We detect the presence of a flower in the garden by seeing it, feeling it or smelling it. These operations convey impressions to the brain and we say, " Ah, a crocus ! "

What does the philosopher say to this ? He will probably ask us what we mean and explain to us that all that is really there is the idea of a crocus, to which we reply, " Well, whose idea is it anyway ? " " The Creator's," he replies. We ponder awhile and then, looking thoughtful say, " Well, really there isn't any difference, is there ? "

EXCHANGE & MART—ADVERTISEMENT RATES

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

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

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

ALL-WORLD Battery 2. S/W set, 65s. In crackle cabinet, 75s.—" J. W.," 15 Belgrave Close, Chelmsford, Essex.

CALL-BOOK (*1938 or 1939 Edition*) urgently required. State price.—WALLICH, G6BW, The White House, Adelaide Close, Stanmore, Middlesex.

FOR SALE.—Quantity of radio components, valves, meters, speakers, condensers, etc. Wanted : Service sheet for Ekco type AD.65, buy or borrow. Write for list of components, enclose S.A.E.—G. T. FRANCIS, 46 Junction Road, Andover, Hants.

HAM expecting to remove in the near future is open to dispose of National H.R.O. with D.B.20 and complete set of spare valves. Avo Universal 47 range meter. Hallicrafters 5-10 receivers. Cossor 3339 oscilloscope, transformer, power packs, etc. Offers considered for the lot or separate. Do not be in a big hurry for replies, as I am a busy man and only limited time to attend to inquiries. S.A.E. with all replies.—Box 294, PARRS, 121 Kingsway, London, W.C.2.

HAVE your photo done in colour. Bring out that hidden beauty. Forces portraits a speciality. Copying and enlarging. Prices moderate. Inquiries invited.—CORBETT FORD, 2DWW, John Street, Duncon.

KEEN young Ham, under military age, wanted for radio laboratory—Watford area. Box 300, R.S.G.B., New Ruskin House, Little Russell Street, London, W.C.1.

MALLETT, *Telegraphy and Telephony*, recent edition wanted. Also Herbert's Telegraphy, 5th edition. G3LF, 16 Greenhill Crescent, Harrow, Middlesex.

RME 70 with DB Preselector and Loudspeaker for sale. Purchased December, 1939. Requires overhaul—probably valve defective.—Offers by letter to JACKSON, G6ZU, 54 Prince's Street, Stockport.

SALE.—High performance 8-valve superhet, C.R. tuning indicator, B.O. and A.V.C. Switching, Range 28, 14 and 7 Mc coils. As described in A.R.R.L. Handbook 1938-39. Heavy duty power pack 200-240v 50 cycles, A.C. beautiful construction, complete with 10 new valves. Cost £40. Best offer over £30 secures. Sacrifice, owner going abroad.—Offers to G5TZ, W. GEARING-SHERRATT, 93 Pyle Street, Newport, Isle of Wight.

SALE.—New copy Everetts *Communication Engineering*.—Offers to Box 290, PARRS, 121 Kingsway, London, W.C.2.

SALE.—12 used valves, £2. Pair LS6A's unused, 30s. Meters 0-1 m/a, 35s. 0-30 m/a, 20s. 0-50 m/a, Weston, 30s. Power pack. Input 230v A.C. Output 750v 250 m/a and 200v 60 m/a D.C. 4v 8a. 4v 6a. 4v 2a. A.C. complete with rectifier. High grade components throughout. Offers to Box 286, PARRS, 121 Kingsway, London, W.C.2.

SALE.—Weston Flush Type Galvo, model 375, 40s. Heaybeard batt. charger A 05, 2, 6, 12v land 2 amp. 230v input, 50s. Valves : 6A6, 42, slightly used, 5s. each.—Box 287, PARRS, 121, Kingsway, London, W.C.2.

WANTED.—BULLETINS prior to Volume 13. Ferranti AF5C transformer ; Eddystone components ; two microdensers cat. 1093, coil bases 949 and 969 and 6 pillars 1029.—BECK, 31 Ridgefield Road, Oxford.

WANTED.—Volumes 1 to 9 of THE BULLETIN. Good price offered.—Write Box 285, PARRS, 121 Kingsway, London, W.C.2.

WANTED.—DB 20-70 Preselector, also Hallicrafter Model HT-7 frequency standard. Both complete and in good condition.—Box 282, PARRS, 121 Kingsway, London, W.C.2.

WANTED.—Receiver AC/DC or A.C. 230v Domestic type. State make, number of valves, must be in perfect working condition. Details and price delivered London, to Box 297, PARRS, 121 Kingsway, London, W.C.2.

WANTED.—Multi-range AC/DC meter (Taylor or similar), also *QST*, Jan., Feb., '43.—2DVQ, 32 Bromwich Street, Bolton.

WANTED.—Crystal pick-up, preferably Rothermel astatic, Taylor 86G JRS ; *Wireless World*, February to July, 1942.—G8JI, 391 Rednal Road, Birmingham, 31.

WANTED.—Push-pull O.P. Transformer, Thordarson T.9008, T.6754 or similar.—OLIVER, Wellesbourne, Millisons Wood, Allesley, Coventry.

WANTED.—Thordarson T57A41 and T-19M14 in good condition. State price.—F. E. ROSE, 2FHV, 6 Culduthel Road, Inverness.

YL SPRING CLEANS ! Assortment 15 transformers, 2s. each. 36 fixed condensers, 6d. each. 20 variable condensers .0003 etc., 2s. 3d. each. One 3-gang, 8s. One 2-gang, 6s. Assortment dials knobs, 5s. Two L.F. chokes, 100 henrys 3 mA, 2s. One Pye 20 henrys, 3s. 6d. Assortment chokes, 5s. Lot, £5 10s. Two 6L6Gs, 6s. One new K5OM, 8s. One 38, 5s., including holders ; lot £1 2s. 6d. 7-pin American holders, 10d. 4, 5, 6-pin British, 7d. 4-pin old type, 4d. One Telsen 2-range S/W coil (screened), 5s. Two Ediswan coupling units and coil, 4s. Assortment 10 B/C coils, 7s. 6d. lot. Five L/S units, no cones, 5s. lot. One D.C. eliminator, 4s. 6d. Two multi, one D.P.D.T. switch, 2s. 6d. Assortment differential, reaction condensers and switches, 5s. Wooden cabinets, length, height, depth, $12\frac{1}{2}" \times 15" \times 7"$. Portable frame aerial, handle, £1. $16 \times 9\frac{1}{4} \times 8$ ebonite panel slightly drilled, 9s. One each $21 \times 9 \times 11$, $10 \times 13 \times 6$, $13 \times 7\frac{1}{2} \times 8\frac{1}{2}$, $15 \times 7 \times 10$, 7s. 6d. carriage extra. 1943 R.S.G.B. BULLETINS, 7s. 6d. Shov' halfpenny board, 18s. 6d. Telephone : Dummer 56. —HALL, G8LY, N. Waltham Rectory, Basingstoke, Hants.

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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