

R S G B

FEBRUARY, 1959

BULLETIN

2/6 Monthly

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

VOL. 34, NO. 8

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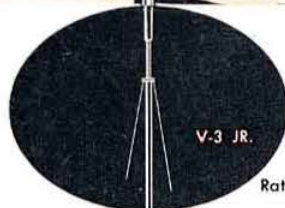
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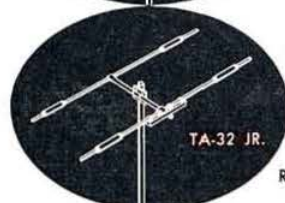
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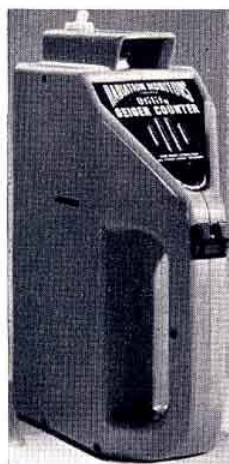
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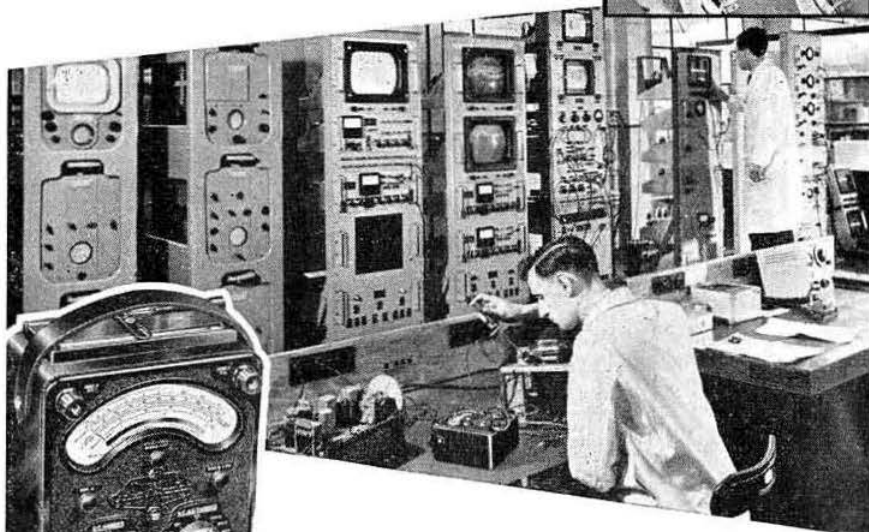
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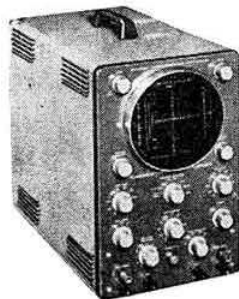
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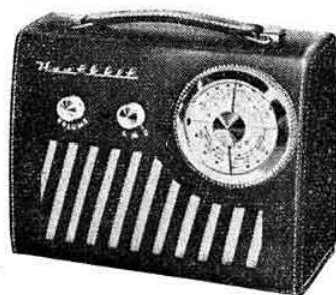
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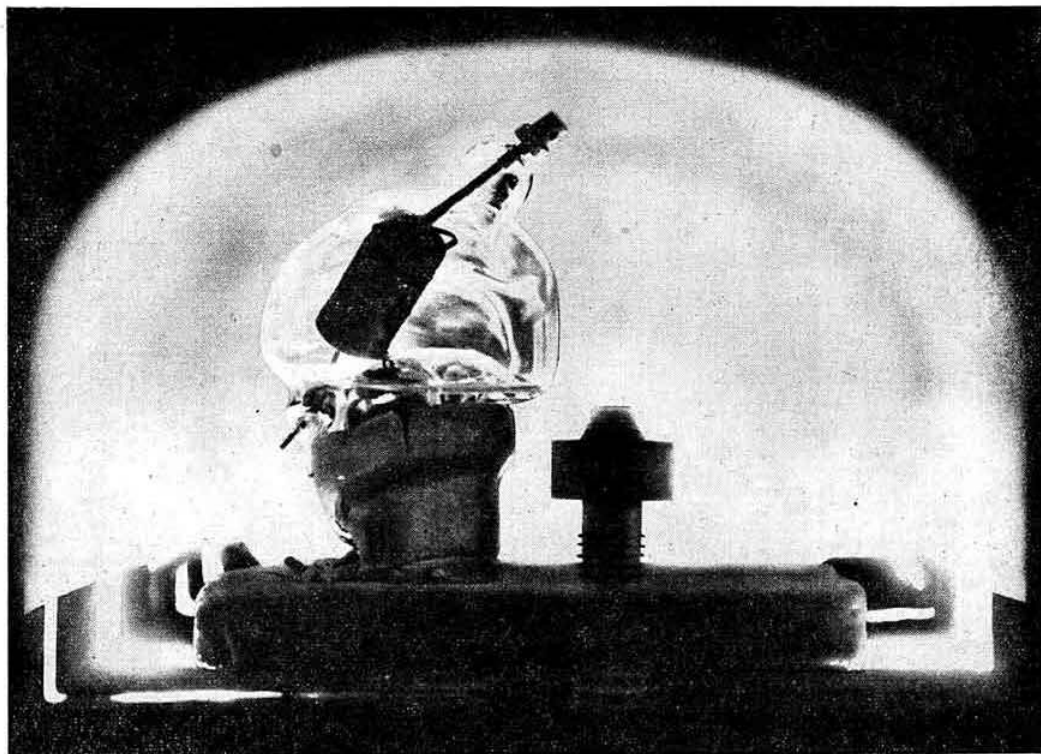
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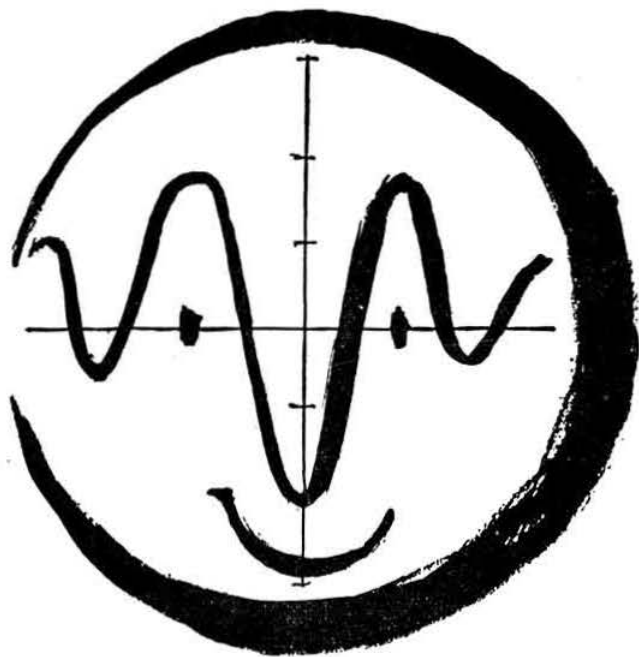
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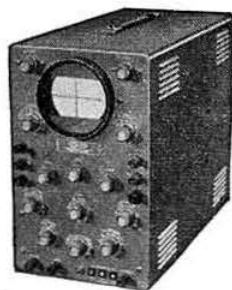
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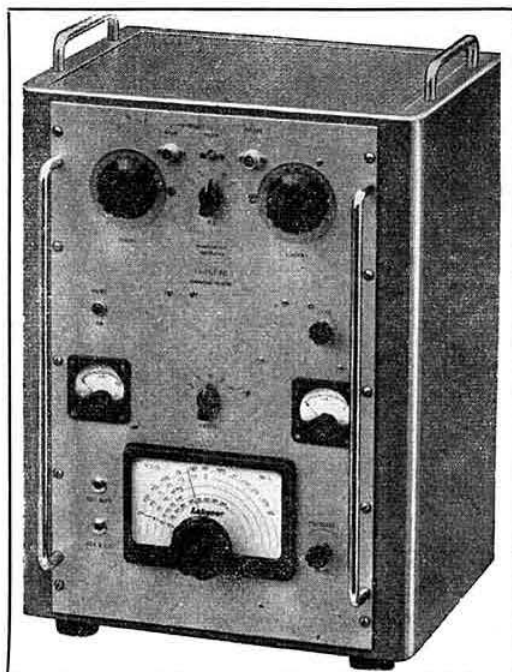
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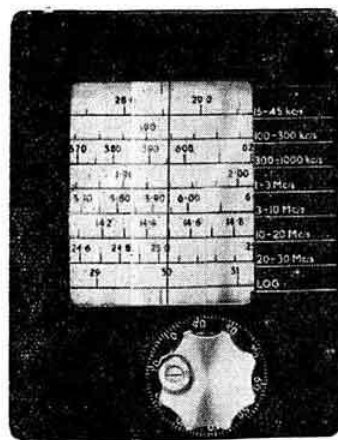
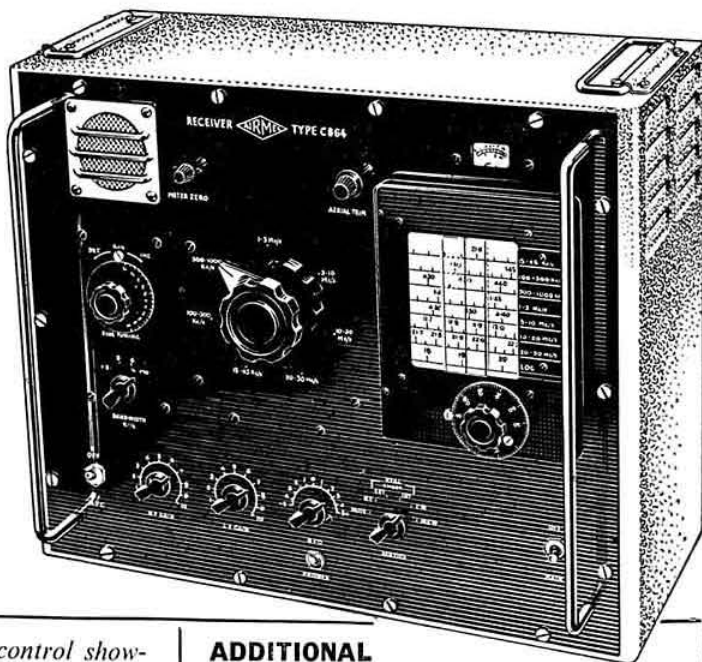
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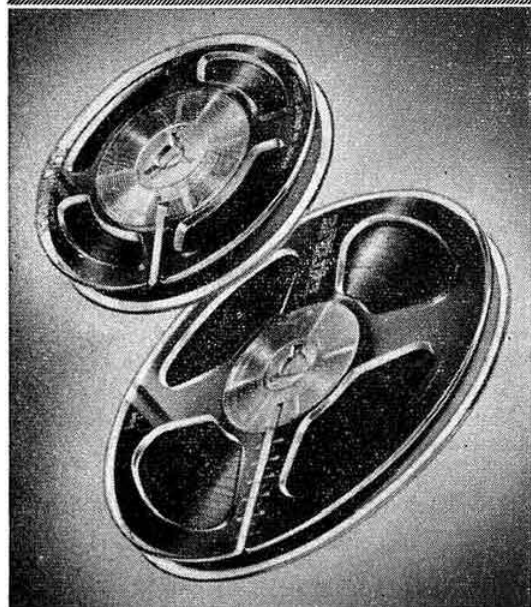
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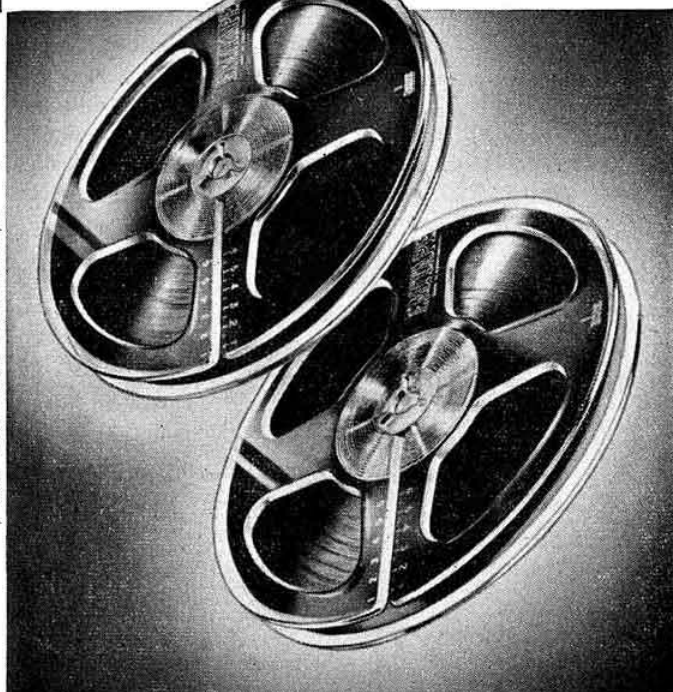
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Current Comment

discusses topics of the day



Geneva Ahead

SO that the interests of radio amateurs in Region III (Asia and Australasia) shall be adequately safeguarded at the forthcoming Radio Conference in Geneva, the Council of the Wireless Institute of Australia has decided to apply to the Australian Government for one of its most experienced amateurs—Mr. J. Moyle—to be attached to the official delegation.

The cost of sending an Amateur Radio delegate from Australia to the Geneva Conference is expected to be in the order of £A2,500, the bulk of which has already been subscribed voluntarily by public-spirited members of W.I.A. and others interested in the Amateur Radio movement in Australia. But how pleasing it is to learn from *Break-in*, the official journal of the New Zealand Association of Radio Transmitters and from the *News Letter* of the Hong Kong Amateur Radio Transmitting Society that members of both those organisations are also making voluntary contributions to the fund opened by W.I.A.

For the benefit of newer members it is of interest to recall that it cost nearly £1,500 to send two representatives of the R.S.G.B. to the Atlantic City Conference in 1947. They went as official I.A.R.U. observers but the whole cost was borne by the R.S.G.B. No contributions of any kind came from other Societies; I.A.R.U. Headquarters, as such, has no funds.

How different is the picture today, thanks to the foresight of the R.S.G.B. in suggesting to the other National Societies in Europe shortly after the Atlantic City Conference that an I.A.R.U. Region I organisation should be set up to prepare for future International Radio Conferences. As an outcome of that suggestion there now exists in Region I a fund which should prove adequate to cover the expenses of the two I.A.R.U. Region I observers to the Geneva Conference. This fund has been built up over the years by those societies who subscribe to the objects of the Region I Division as it is called. Societies with a large number of licensed members contribute more each year than do those with a smaller number. This pooling of resources is in the best traditions of Amateur Radio.

The amount standing to the credit of this special fund had reached the sizeable total of £1,360 at the end of April last year since when it has been augmented by a number of further contributions.

Very shortly now we shall know what proposals are to be made at the Conference which may affect the Amateur Service. Those which appear to be aimed at a reduction of our present rights will be challenged with vigour.

1913-1963

D R. SMITH-ROSE in his Presidential Address—reproduced on another page—reminds us that in four years' time the Society will have been in existence for 50 years. Although 1963 may seem remote at this time it is really so very far away if the Society is to lay plans which will enable it to mark that historic occasion in a fit and proper manner?

Those with experience of organizing even small local events know only too well that a great deal of preparatory work must be done if the function is to succeed. How much more onerous and exacting will be the task facing those who are given the responsibility of planning the Society's Golden Jubilee celebrations? Our President's remarks lead us to pose the question "what form shall those celebrations take?"

The correspondence columns of the BULLETIN will remain open for the next six months to receive the views of readers with ideas for celebrating the greatest event in the Society's history. Shall we be hearing from you—and you—and you?

R.A.O.T.A.

LAST October 73 members of the R.S.G.B. met in London on the occasion of the third Old Timers' Dinner. During the evening the proposal was made that a Radio Amateur Old Timers' Association should be formed to keep alive, for as long as possible, the pioneer spirit of Amateur Radio. At the same time a suggestion came forward that the Association should institute a Benevolent Fund which would help any old timer who is in need of financial assistance. Although R.A.O.T.A. is not an official R.S.G.B. organization it is worthy of record that no less than nine Past Presidents supported the dinner in addition to several Vice-Presidents and other distinguished members.

In the five months that have passed since R.A.O.T.A. came into existence the Benevolent Fund has reached the highly satisfactory total of £160.

R.A.O.T.A. will regard it as a proud privilege to play some part in the Golden Jubilee celebrations of the R.S.G.B., for among their number are some who can claim to have been members of the Society prior to World War I.

J.C.

Presidential Address

Delivered at a meeting of the Society held at the Institution of Electrical Engineers, London, W.C.2, on Friday, January 23, 1959.

By R. L. SMITH-ROSE, C.B.E., D.Sc., Ph.D., F.C.G.I., M.I.E.E.

In the first section of the Address an outline is given of the early days of the Society. Reference is then made to international radio organizations—including the I.A.R.U.—and to the forthcoming Administrative Radio Conference due to take place in Geneva later this year. In the second section the function of the Radio Research Board with particular reference to the work being done at the Radio Research Station, Slough, is discussed. The back-scatter method used for the preparation of frequency predictions is then considered in some detail.

MY first duty tonight is to thank you, Sir, the Council and the members of the Society, for the honour you have all done me in electing me as President for the ensuing year. As you know, Sir, when we first discussed this matter some time ago, I said that I thought the Society ought to have a practising amateur at its head. But I had to admit that one can be engaged professionally in the science or practice of radio and still remain an amateur—a word which is derived from the Latin “amo” to love, and indicates a person who cultivates any study, art or science from sheer attachment or devotion to it. I am told that among my claims to distinction in this office is that I am one of the few surviving members (but by no means the oldest, as I learnt at a recent dinner) of the London Wireless Club which was founded in 1913 by Mr. Rene Klein; and which, before its first formal meeting in January 1914, had changed its name to the Wireless Society of London.

The Early Days

I have few personal records of the early history of the Society, but those who are interested may be reminded that the proceedings of the Society were for some years published in *The Wireless World and Radio Review* as a well-known British technical publication was then called. From this source I find that it was at the Ordinary Meeting of the Society held on September 27, 1922 that it was decided to change the name to the present one, and this persists today in being known by the initial letters R.S.G.B. Incidentally, at the following meeting on October 25, 1922 my colleague, Dr. R. H. Barfield, and I were privileged to read our first paper before the Society on “The Effect of Underground Metalwork on Radio Direction Finders.” The meeting was of especial interest to us as it was conducted under the chairmanship of the Society's President, Admiral of the Fleet, Sir Henry B. Jackson, who was also chairman of the Radio Research Board which has been the advisory body on radio matters to the Department of Scientific and Industrial Research since its formation in 1919.

Coming-of-Age Celebrated

On July 5, 1934 the Incorporated Radio Society of Great Britain celebrated the 21st anniversary of its formation by the publication of a special commemorative issue [1] of its BULLETIN.* The issue contained a congratulatory message from the Patron of the Society, H.R.H. the Prince of Wales, together with contributions from many of the Past Presidents and other prominent members in the radio field. The same issue of the T and R BULLETIN—as it was then called—also contains an historical review of the Society's twenty-one years of progress to that date. I commend this issue to the attention of the younger members of our Society who may

like to understand something of the excellent work carried out by the pioneer members who provided the foundation upon which the Society has built its reputation in both the national and international field. Since its foundation in 1925 the BULLETIN has continued to provide a running commentary of the activities of its members to the present time. For those interested in more details of the early work and development of the Society, I refer them to an excellent series of articles [2] by Mr. C. H. L. Edwards. These articles review the progress made and the widespread activities engaged in by members during the period 1925 to 1950; and the story they tell surely demonstrates the full justification of the existence of Amateur Radio as a most interesting and satisfying hobby. You, Sir, in your Presidential address a year ago gave an excellent presentation of this theme. If I may have your permission, I should like to re-echo your thoughts by quoting from the closing words of this address. “Our grand hobby has no equal; it is worth every effort to ensure not only its continuance, but its future growth. Let us be sure that individually and collectively we play our part and do not rest on the achievements of a receding past to see us through.”

Towards the Golden Jubilee

I do not propose to spend any more time in this address in reviewing historical developments, except to draw to the attention of the younger members, that it must fall upon them to prepare for the Golden Jubilee celebrations which will undoubtedly be called for in 1963, when the Society will have become 50 years old. The history that will have to be prepared for this occasion will contain an embarrassing list of historic firsts; I wonder who will be the first to establish a two-way contact between the earth and another planet, the exchange of messages with an unmanned artificial earth satellite having already been accomplished by our friends on the other side of the Atlantic Ocean.

International Radio

Before turning to the more technical part of this address, I would like to say a few words on a subject which is very close to my heart and towards which all who are engaged in radio research and experimental work are directed sooner or later. I refer to the question of international associations in radio affairs. Few amateurs can pursue this hobby for long before coming into contact by speech or Morse signals with their fellow enthusiasts in other countries. The exchange of messages is followed by the exchange of QSL cards and this inevitably leads to an increased knowledge of geography and, for the real enthusiast, of other languages. In due time contemporary amateurs visit and meet one another, not only on their own soil but also in other countries; and this leads, apart from an actual exchange of technical knowledge and experience, to a wider and better understanding of the conditions and problems encountered by our fellow beings in

* See references at end.

other countries. Some of you become representatives of your country and society at international discussions and conferences, where you have the responsibility of upholding the interest of your own nation and also of understanding the problems of those in other lands. In this way the hobby of Amateur Radio, while being entirely non-political in its aims and associations, can continue to make an important contribution to the peace of the world, and the happiness of the individuals in it.

The year 1959 will indeed be an historic one as far as international radio matters are concerned. Not only will C.C.I.R. be holding its 9th Plenary Assembly in Los Angeles in April; but an Ordinary Administrative Radio Conference under I.T.U. auspices will take place in Geneva later in the year. At this conference the existing Atlantic City Regulations and Frequency Allocations will be revised and brought up to date.

It may be of interest here to describe briefly the organization of international affairs on the scientific and technical sides of radio communications. In another publication [3] I have described the general constitution and activities of the International Scientific Radio Union (U.R.S.I.), which operates under UNESCO, and the International Radio Consultative Committee (C.C.I.R.) which is a technical advisory body of the International Telecommunication Union (I.T.U.). Amateurs do and can continue to make some contribution to the work of both these bodies. For example, one group of enthusiastic members of our Society, led by Messrs. G. M. C. Stone and C. E. Newton, has been conducting some interesting and useful work in connection with the International Geophysical Year with the encouragement of a committee of the Royal Society associated with U.R.S.I. On the more practical side, the R.S.G.B. is represented by Mr. J. Clarricoats, our General Secretary, on the appropriate Post Office committee through which the British representation to C.C.I.R. is obtained. Similar representation exists on the Frequency Advisory Committee set up last year by H.M. Postmaster General.

The I.A.R.U.

But an important function of our own Society is to participate in an effective organization of radio amateurs on an international basis. This is done through the International Amateur Radio Union (I.A.R.U.).

The I.A.R.U., which is a union of national radio societies, is permitted to appoint observers to attend meetings of the International Telecommunication Union. These observers work in close collaboration with government delegations and are thus able to make known the wishes and aspirations of amateurs in the all-important matter of frequency allocations. Mr. A. E. Watts attended the I.T.U. conferences in Madrid (1932) and Cairo (1938) as an I.A.R.U. observer, while Mr. Clarricoats and Mr. S. K. Lewer (then President of the Society) attended the conference held in Atlantic City in

1947 in similar capacities. They played their part in securing the various bands of frequencies which have been available to amateurs for the past decade.

Prior to each I.T.U. conference the R.S.G.B., in common with other national societies, discusses its problems with representatives of the G.P.O. and other government departments. That procedure is being followed at the present time in preparation for the I.T.U. conference in Geneva later this year.

An article by Mr. Lewer [4] describing the activities of the I.A.R.U. during the first twenty-five years of its existence was published in the BULLETIN for April 1951. The Union is an organization without funds of its own, and much of its progress to date has been due to the generosity of the

American Radio Relay League, through which, in effect, their journal *QST* became the official organ of the I.A.R.U. [5]. Shortly after the Atlantic City conference the R.S.G.B. took the initiative to organize and promote the interests of I.A.R.U. Societies in Region I (Europe, Africa and parts of Asia). This Region I Division, as it is called, was established at a conference held in Paris during 1950 to mark the 25th anniversary of the foundation of the I.A.R.U. Subsequent meetings have been held at Lausanne in 1953, at Stresa (Italy) in 1956 and at Bad Godesberg (Germany) in 1958. On the last occasion it was decided to hold the next conference in this country during 1960. It is gratifying to note that our Society is held in such esteem by the representatives of other countries, that at the Bad Godesberg conference our Mr. Clarricoats was elected secretary of the Region I Division and appointed to represent the I.A.R.U. at the forthcoming I.T.U. conference. It is hoped that the R.S.G.B. will be separately represented by my predecessor Mr. L. E. Newnham.



Dr. R. L. Smith-Rose, C.B.E.

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The D.S.I.R. Radio Research Station, Slough

I propose to devote the remainder of this address to giving you a brief account of some aspects of the work of the Radio Research Station in studying the characteristics of the ionosphere and the manner in which high frequency radio waves are propagated over world-wide distances. In the first place, let me explain that the Radio Research Station [6] is one of a number of specialized research laboratories organized under the Department of Scientific and Industrial Research; and it is actively engaged on an expanding programme of research which was formerly conducted in the Radio Division of the National Physical Laboratory at Teddington. A major part of this programme is designed to assist those responsible for developing and operating radio services in the fields of communications, broadcasting including television, and aids to aerial and marine navigation.

The efficient and economical use of the radio-frequency spectrum depends to a large extent on a detailed understanding of the modes of propagation of waves of all

frequencies and for all conditions of transmission over the ground and through the upper and lower atmosphere. Research is also undertaken on atmospheric noise with the view of minimizing its effect as a source of interference. To assist in the conduct of this work on a world-wide basis, observatories or substations are staffed and maintained at Inverness, Singapore and at Port Stanley in the Falkland Islands. Direct co-operative assistance is also provided for similar observatories installed at University College, Ibadan, Nigeria, and at Port Lockroy, Grahamland, Antarctica.

Special assistance has also been given to the Royal Society's expedition to Halley Bay in the Antarctic, where a special programme of ionospheric measurements has been carried out during the International Geophysical Year. With the launching of artificial earth satellites by the U.S.A. and U.S.S.R. authorities, observations have been made at Slough and Singapore and these have led to the formulation of a new programme of space research for the future.

Apart from this extensive study of radio wave propagation, a study is made of certain characteristics of semi-conductors, magnetic materials and transistors in order to gain a better understanding of their suitability at increasingly higher radio frequencies.

The Radio Research Station is also responsible for developing secondary standards and the associated techniques for measuring power, field strength and other quantities at very high radio frequencies. The results of this programme of research are described in papers published in the proceedings of scientific societies, technical institutions and in various periodicals. In addition a continuous series of abstracts and references to the world's radio literature is published monthly in *Electronic and Radio Engineer* (London) and *The Proceedings of the Institute of Radio Engineers* (New York).

Propagation of High Frequency Waves

As already mentioned, the Radio Research Station is responsible for the maintenance of seven observatories—two in the United Kingdom and five on British territory overseas—which make a continuous study of the characteristics of the ionosphere by vertical sounding technique. In this procedure a pulse of radio waves is emitted vertically upwards and a photographic record is made of the time taken for the echo pulse to return to the ground after reflection at one or other layers of the ionosphere. By varying the frequency of the radio waves, a direct measurement of ionospheric conditions over the observing station is carried out at frequent intervals day and night. The results obtained at our own observatories are exchanged with those of other national administrations, and in this way a continuous picture is obtainable at over 200 points in the ionosphere throughout the world. From a continuous study of these observed results over one or more sunspot cycles, each of about eleven years' duration, forecasts are prepared of the expected state of the ionosphere all over the world, six months in advance. By interpolation between the points where measurements have been made, corresponding forecasts of radio transmission conditions are made and supplied to the operators of all types of radio services for organizing their future schedules. This interpolation, however, must assume a knowledge of ionospheric conditions over large areas of the world where no observatories exist, including the oceans; and experience has shown that these conditions are subject to irregularities in both space and time which are difficult to take into account and thus place a limitation on the accuracy of forecast of the transmission or propagation conditions.

Two lines of research are being pursued at the Radio Research Station with a view to removing this deficiency, for the direct measurement of ionospheric conditions at points in the ionosphere remote from the observing station. In the most recently developed technique, a special transmitter was set up in Malta to sweep over the frequency band of

5.5 to 25 Mc/s in steps of 20 kc/s, each step lasting 0.4 seconds. The receiver at Slough sweeps over the same band, the two sets of equipment being kept in synchronism by very stable crystal clocks. Observations of the signals received under these conditions provide a useful means of studying the ionospheric conditions near the midpoint of the path some 2,000 km in length. Plans are in hand for extending the work to greater distances in the future. The alternative method of observing the mode of propagation of radio waves over distances of several thousand miles has been developed to a great extent in this country and in the U.S.A. The work for which the Radio Research Station is responsible is described in more detail in the next section.

Application of Back-Scatter Technique

This method makes use of what is termed the "back-scatter" phenomenon, whereby some of the energy of radio waves sent from a transmitter is scattered back from a distant point and the resulting signals may be received near the transmitter and even on the same aerial. The fact that radio waves could be scattered from clouds of ionization in the E region was reported by Appleton and his collaborators [7] during the second International Polar Year and has since been investigated by several workers. Later, T. L. Eckersley [8] made a comprehensive analysis of scattering effects in radio transmission and identified two main categories of echoes received by wave scattering, when operating at frequencies above the normal incidence critical frequency of the ionosphere.

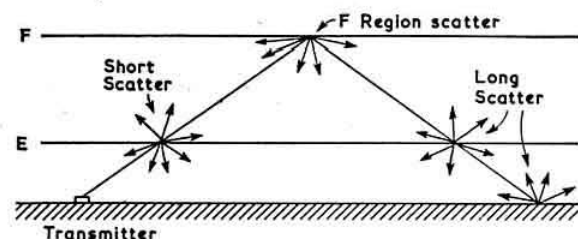


Fig. 1. Sources of scatter.

The main features of the phenomenon of wave scattering are illustrated in Fig. 1. The three types of scattering which affect high-frequency propagation are (i) short scatter from ionic clouds in the E region illuminated by upgoing radiation from a transmitter, (ii) scattering from the F region when it is turbulent, such as during a storm in the ionosphere, and (iii) long scatter from the ground or from E region clouds illuminated by down coming radiation from the F region. In each case, as indicated in the figure, some of the energy scattered by these processes is returned along the incident path and can be detected by a receiver near the transmitter and within the skip zone.

If pulse-modulated signals are radiated by a transmitter, and the received echoes are displayed on a linear time base on a cathode-ray tube, the pattern seen will be as illustrated in Fig. 2. For frequencies below the critical value, a succession of normal echoes reflected from F region by one, two, and three hops are received, and it will be noticed that the echo due to the second-order reflection (2F) is accompanied by some scattered echoes of smaller magnitude. There is also noticeable a small amount of scatter from the E region. As the critical frequency is approached, the delay time of the normal F-region echoes, expressed in terms of the equivalent path,* increases; when the frequency is above the critical frequencies for all modes, the echoes that remain are due to

* In view of the lack of uniformity among different observers in expressing their results, it may be pointed out here that a time delay of 10 m-sec. corresponds to an equivalent path from source to point of reflection or scattering of 1,500 km.

the short and long scatter (see Fig. 2). It will be observed that the long scatter can arise either by reflection from a distant ionic cloud in the *E* region, or by scattering from the ground at a somewhat greater distance.

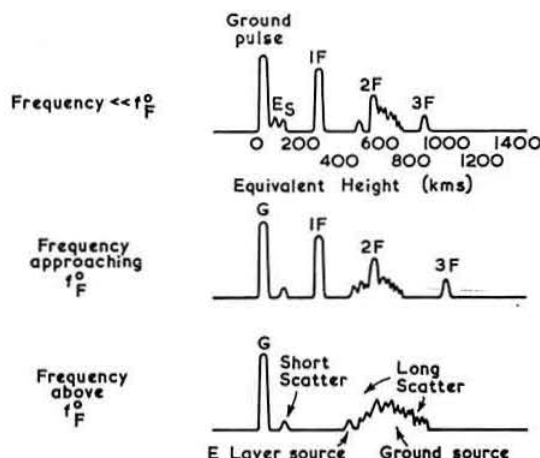


Fig. 2. Echo patterns seen on a time-base display.

This double source of the long-distance scattered echoes was clearly recognized by Eckersley, who concluded that scattering from the *E* region was more common than from the ground. Later investigations, however, conducted in Europe and America have demonstrated that this is not normally the case. For example, experiments made at the D.S.I.R. Radio Research Station, [9] Slough, England, have shown that the ground-scattered type of echo predominates. The results of an experiment made in June 1949, demonstrating this are displayed in Fig. 3. By varying the transmitted frequency and measuring the time delay of the leading edge of the scattered echo, results were obtained which are seen to lie on a straight line which is tangential to the *2F* reflection curve at the point representing the minimum delay for the critical frequency. If the reflection had been from the *E* region on

this occasion, the delay would have been less as indicated by the lower straight line which does not meet the *2F* reflection curve.

A number of records taken at Slough [10] in a study of the variation of path length with frequency show close agreement between the calculated and observed path lengths on the basis of scattering at the ground. Path lengths were observed both longer and shorter than the theoretical ground-scatter value with the mean values lying between ± 2 per cent. The corresponding path length for *E*-region scatter would lie between extremes of -11 and -18 per cent. Random differences between the calculated and observed path lengths were to be expected, since the ionosphere is rarely, if ever, uniform over an area of 500 km radius, which was used in these experiments.

The general conclusion from these experiments was, therefore, that the sources of the scattered echoes were mainly, if not entirely on the ground and not in the *E* region of the ionosphere. As a result of calculations of the intensity of the echoes for a thin reflecting layer in the ionosphere, it is concluded that, to a first approximation, the irregularities present on land and sea are fully sufficient to account for the echoes observed.

So far, consideration has been confined to ground or *E*-region scatter reflected by the *F* layer. Echoes are frequently seen, however, and particularly in summer, which are due to energy scattered by the ground and reflected on the outward and return journey by the *Es* (or sporadic *E*) layer. Such echoes can be identified on the photographic records by the emergence of the scattered echo from the *2Es* vertical-incidence echo, and increasing in range in accordance with the target relationship with the appropriate *Es* height frequency curve.

In much of the work so far discussed, the comparison between experiment and theory has been based on the assumption that the earth and reflecting layers are plane, and this is a reasonable approximation to make for ground ranges up to about 900 km. To provide for the extension of the work to greater distances, Shearman [10] has examined the corresponding conditions for a curved earth, and also for a thick, reflecting layer with a parabolic distribution of ionization against height. Under these conditions it is necessary to consider the effect of ray focusing on the echo intensity; and this focusing effect has been shown to result in a threefold increase of field strength at the skip distance over that obtained from a thin reflecting layer.

Shearman (10) has also presented the results of further investigations and an analysis of a year's observations of long-range back-scatter at Slough. A pulse transmitter of 150 kW peak power coupled to alternative directional aerials was used, and transmissions were made at noon each day on a number of frequencies between 10 and 27 Mc/s. With the increased transmitter power available, single-hop echoes could be received from ranges up to 3,000 km (1,900 miles), and multihop echoes from ranges up to 11,000 km. (nearly 7,000 miles). There was thus a considerable difference in the geographical position of the reflection point for different directions of propagation, and since conditions in the ionosphere vary

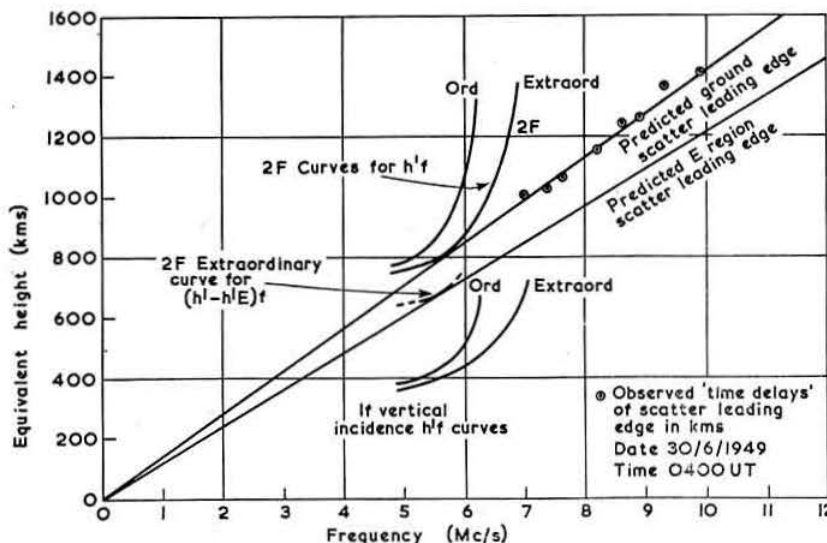


Fig. 3. Time delays of leading edge of long-scatter groups.

greatly with latitude and longitude, there was a marked variation of skip distance with bearing.

The idea that the use of back-scatter techniques could be applied to sounding the ionosphere under oblique incidence conditions and for predicting the maximum usable frequencies for radio transmission appears to have been due to Newbern Smith of the National Bureau of Standards, U.S.A. It is clear that the scope of such an investigation of ionospheric conditions can be considerably extended by using a rotatable directive aerial system. The conception of the use of a radar-type plan-position indicator (PPI) for skip-distance indication is also attributed to Newbern Smith, and this method has now been developed by a number of investigators.

At the Radio Research Station a rotating aerial and PPI system has been in use on a frequency of 17 Mc/s before and during the I.G.Y. in an investigation of the diurnal and seasonal changes in back-scatter conditions in the south-east of England. By superimposing an outline map on the face of the cathode-ray tube, the zones of the earth from which echoes are being returned, and to which radio communication is therefore possible, are at once obvious. Photographs of the screen of the tube can be taken and these show the regions of the earth from which the scattered radiation is returned as dark zones. When the frequency of transmission was 17 Mc/s (which is above the maximum frequency for which oblique rays could be reflected by the ionosphere at night) it may be low enough for reflection to take place from those areas of the ionosphere illuminated by the sun.

By using cinematograph film technique, photographs of this type can be taken for each rotation of the aerial and time base at one revolution per minute. After processing, the exposed film can be projected at the normal speed of 16 frames per second, so that the changes occurring during 24 hours may be seen in $1\frac{1}{2}$ minutes. In this way a very interesting and vivid display can be produced of the changes in ionospheric conditions around the observing station. The study of such films, taken at regular intervals, provides a quick and efficient means of investigating the diurnal and seasonal changes in the ionosphere and should do much to assist in the application of the technique to forecasting communication conditions on a short-term basis.

It is clear from the experience already obtained that the back-scatter technique is not a substitute for the present practice of making predictions based upon the results obtained from the world-wide network of vertical incidence ionospheric observatories. Rather it is to be regarded as a

supplementary device for assisting in the assessment of the effects of short-period fluctuations of ionospheric conditions and possibly as a better means of indicating the onset of storms or turbulence than is at present available. With a realization of its limitations, however, there is no doubt that this use of wave scattering phenomena has provided the radio scientist with a powerful new tool which in time will be of great assistance to the engineer responsible for planning and operating radio communication systems around the world.

(A film displaying the features to be observed by this back-scatter technique was shown at the end of the Presidential Address.—EDITOR.)

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Mr. W. H. Allen (G2UJ) elected a Vice-President

AT its meeting on January 22, 1959, the Council elected Mr. W. H. Allen, M.B.E. (G2UJ) a Vice-President of the Society in recognition of his outstanding services to Amateur Radio over a period of many years.

Mr. Allen joined the R.S.G.B. as B.R.S. 1441 in 1934 and was first licensed as G2UJ in January 1935. He was a member of the pre-war R.A.F. Civilian Wireless Reserve and became an "Early Bird" with 60 Group R.A.F. (W.I.S.) in September 1939. He was later transferred to Signals Intelligence. After ten months attachment on special duties to the British Legation in Stockholm prior to VE Day, for which work he was awarded the M.B.E., Mr. Allen left the R.A.F. in November 1945 with the rank of Flight Lieutenant. He has for long played a prominent part in the affairs of the Society and was for some years the R.S.G.B. V.H.F. Manager. Mr. Allen is a member of the Handbook, Publications, Technical and V.H.F. Committees. He is President of the West Kent Radio Society and a member of the London U.H.F. Group.

Moon Used as Relay

TESTS using the moon as a passive relay have resulted in the transmission of radioteletype in the u.h.f. region of 1000 Mc/s over the nearly 500,000 mile distance from the earth to the moon and back. The tests were conducted at Fort Huachuca in Arizona. The transmitting station for the tests was located at Fort Huachuca, and the receiver was at Encino (New Mexico). The frequency of 810 Mc/s was utilized in order to increase the effectiveness of the aerial systems and to take advantage of lower signal losses in the transmission path.—*Telecommunications Reports*, quoted by the *I.T.U. Journal*.

PEIPL receives v.h.f. signals from U.S.A.

On January 27 and 28, 1959, the Dutch Government Experimental Station PEIPL received signals on 151 Mc/s from a station in New Jersey, U.S.A., via the Moon. The transmitter had an output power of 50 kW c.w. and the strength of the received signals was 0.2 μ V.

V.H.F. and U.H.F. Converter Design*

By C. D. DE LEEUW (PA0BL)†

RECEIVER sensitivity is an important aspect of receiver design in the v.h.f. and u.h.f. region. It is the key of the door to success or failure in present day long distance communication. The minimum radio signal which may be detected at frequencies within the v.h.f. or u.h.f. regions is not so much a function of various types of external noise, which cannot be controlled, but is more a function of internal receiver noise, which may be minimized by the use of proper converter or front-end design techniques. For this reason, special efforts have been made in recent years to design valves which will contribute a minimum amount of noise to the received signals.

The essential components of a v.h.f. or u.h.f. communication circuit are: (a) the transmitter, which includes a form of modulation or a keying system, (b) the aerial, (c) the transmission path, (d) the aerial at the receiving site and finally, (e) the receiving equipment, which includes a suitable demodulating system to recover the transmitted intelligence. Each of these components is important and the operation of each affects the overall efficiency of the circuit.

Signal-to-Noise Ratios

The desired quality of reproduction determines how much stronger the signal must be compared with the noise level. The term signal-to-noise ratio (s/n) is used to define how many times the signal level exceeds the noise level and is usually expressed in decibels (db). In a circuit of minimum performance, such as occurs in amateur communications where weak signals are acceptable and reliability is not so important, it is possible to work with signal-to-noise ratios of 3db or less. On the other hand in certain commercial circuits it is not uncommon to operate a circuit with a s/n ratio of 60db or more. Naturally the power and transmission path requirements in this case become more demanding than in amateur communications.

Background noise level manifests itself in the receiving equipment as a part of the detector output, and is usually a random series of impulses scattered across that portion of the frequency spectrum passed by the detector and subsequent stages. Audibly it is identified as a hiss or rushing sound. The majority of noise at the receiver output comes from one or more of the following sources: shot effect in the early amplifier stages of the receiver; thermal agitation noise generated in the aerial and first tuned circuit; static discharges in the atmosphere, galactic noise and, finally, man-made interference.

At v.h.f. and u.h.f. it is very important to choose a low noise valve for the first (and second, if used) r.f. stages of the receiver (or converter plus h.f. receiver), as these stages will largely determine the overall noise factor of the receiver. The noise factor is a figure of merit used to evaluate the performance of the receiving equipment and represents the ratio between the noise at the output of the receiver under consideration and that at the output of a perfect receiver when connected to the same signal source.

Receiver Bandwidth

A second factor which influences the overall efficiency of

the communication circuit is that section of the spectrum which is allowed to pass the output terminals of the receiver, i.e. the receiver bandwidth. It is important to keep this to the minimum necessary, since the signal-to-noise ratio is directly affected by the bandwidth of the receiver. This is true since the external noise level is received over a wider portion of the spectrum in a receiver of broad bandwidth, and the noise output of the receiver is in direct proportion to the bandwidth. The signal output does not increase if the bandwidth is increased beyond the minimum necessary for the form of modulation employed. Only audio frequencies in the range 300 to 4000 c/s are required to transmit and receive speech of good intelligibility. The well-known Dutch station PE1PL uses a bandwidth of 4000 c/s for telephony and 800 c/s for telegraphy.

First R.F. Stage

As implied previously, the noise factor of the first r.f. stage of a receiver or converter will generally determine the overall figure of merit. Any noise generated in the first stage is of major importance because it is amplified by subsequent stages in the receiver. Noise generated in successive stages is of less consequence as the signal level becomes sufficiently high to override the noise generated in these stages. Thus the ability of a v.h.f. or u.h.f. receiver to resolve weak signals is effectively limited by the noise produced in the first stage, assuming adequate overall amplification. The noise factor, which can also be considered as a measure of the degradation of the s/n power ratio as the signal passes from the aerial through the receiver, provides a convenient method of specifying the noisiness of that receiver. When the minimum usable signal is determined by the receiver noise, a reduction in noise factor is equivalent to an actual increase in transmitted power. Therefore, in designing a v.h.f. or u.h.f.

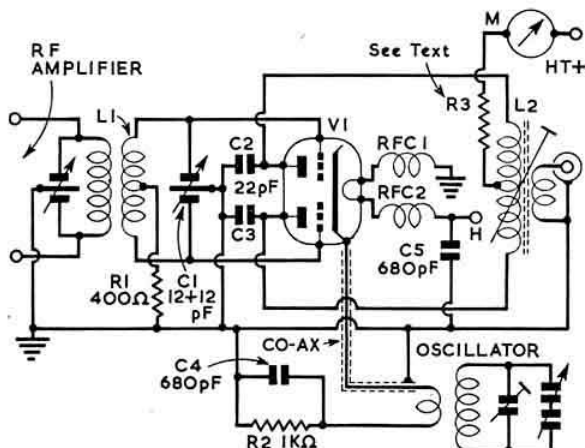


Fig. 1. Balanced triode mixer circuit for 144 Mc/s. C1, 12+12pF split stator (Polar); C2, 22pF mica or ceramic type soldered direct to the pins of V1; C4, 5, 680pF mica or ceramic; L1, 144 Mc/s coil; L2, i.f. transformer; M, 0-15 mA; RFC1, 2, v.h.f. chokes; V1, 6J6 or ECC91. The coupling coil to the oscillator should have 1 or 2 turns.

* Based on a lecture at the Fourth International V.H.F./U.H.F. Convention in London on May 17, 1958.

† Frans Halskade 50, Rijswijk, Z.H., Holland.

radio frequency amplifier stage, attention must be directed primarily to achieving a minimum noise factor for this stage.

Obtaining Low Noise Factor

In order to obtain a low overall noise factor it is essential that the incoming signal be amplified sufficiently in the first stage to override the noise levels of the succeeding stages. By this means a minimum of additional noise is added to the signal by the remainder of the receiver. To realize this requirement both the input impedance and gain of the first stage should be high. Given a high input impedance, e.g. by using a grounded cathode amplifier, a voltage step-up may be realized in the input circuit. This in itself is an aid to improving the performance of the input stage as the signal voltage at the grid is increased relative to the r.f. stage valve noise. Similarly, the higher the voltage amplification of the r.f. valve itself, the less will be the effect of the noise contributed by the succeeding stages. These considerations dictate the minimum gain which must be realized in the r.f. stage in order to improve the overall noise factor, and explain why two stages of grounded grid amplification are necessary to replace a grounded cathode stage at frequencies where the latter is not suitable or appropriate valves cannot be obtained.

The grounded grid amplifier has a low input impedance and so the input tuned circuit gain cannot be realized; therefore another similar grounded grid stage has to be used in cascade. The upper frequency limit of a grounded grid amplifier using conventional valves is in the region of 800 Mc/s or so, at which point the valve efficiency drops because of the transit time loading effects. Valves which lend themselves well to the grounded grid amplifier circuit include the 6J4, 6AJ4, 6BC4, PC86 and EC80. There are also various versions of the disc seal valves, e.g. the 6BY4, 7077 and 6442, EC56 and EC55.

Valves for Cascode Stages

The overall noise factor of a cascode r.f. amplifier depends upon the choice of the input valve, and a high mutual conductance valve having lowest possible interelectrode capacitances should be chosen. Some of the better valves for this application are the GL-6BY4, EC56, ECC88, E88CC, WE417A/5842, PC86, 6J4, 6AJ4, EC92 and 6BC4. Certain double triodes such as the 6BQ7A, 6BZ7, 6BK7, ECC84, ECC88 and E88CC are specially designed for cascode circuits. Each triode section of these valves has a separate cathode and the two units are electrically independent; to minimize coupling between the units an internal shield is located between them, which may be earthed to r.f. So much for the valves which can be used.

Constructing V.H.F. and U.H.F. Equipment

It is a fascinating task to construct v.h.f. and u.h.f. equipment. The necessarily small components and midge tuned circuits can be combined to produce good-looking and efficiently operating equipment. With proper design, items of v.h.f. and u.h.f. equipment do not require a machine shop and a collection of many tools for fabrication and assembly. The exact adjustment of a converter can be achieved by means of a grid dip oscillator and a noise generator (it is impossible to obtain the lowest possible noise factor without a noise generator).

Converter Design

The best type of converter has a stable oscillator and high sensitivity and works into a good low frequency receiver. Many advantages are realized when this combination is employed. The higher frequency local oscillator can be crystal controlled to provide excellent stability. The first intermediate frequency should be between 5 and 30 Mc/s, depending upon the operating frequency of the converter.

This permits a high order of rejection of image and other spurious responses outside the normal passband of the converter.

Special attention should be paid to the method of connecting the converter to the receiver as it is necessary to prevent the communications receiver picking up spurious signals when it is tuned over the intermediate frequency range of the converter. Many strong signals occur between 5 and 30 Mc/s; if these signals are allowed to reach the input circuits of the main receiver, they will ride through and show up as "birdies" within the v.h.f. and u.h.f. amateur bands. It is desirable therefore to use shielded cable for the i.f. connection between converter and receiver, e.g. 70 ohm coaxial cable, to reduce spurious pickup. The shielding of the cable should be well bonded to the chassis of the units at each end. If possible, the chassis of the converter should be physically attached to the chassis of the receiver to ensure that both are at the same i.f. earth potential. In some instances power to operate the converter may be taken from the power supply in the communications receiver but converters employing four or more valves usually impose too great an additional burden upon the receiver and therefore require a small power unit of their own.

Frequency Conversion

Frequency conversion is a noisy process. Valves used as mixers have, in general a much higher noise level than r.f. amplifier valves and exhibit a conversion conductance of about one-third the mutual conductance obtained when the valve is used as an amplifier. Multi-element mixer valves such as the 6BA7 and 6BE6 are especially noisy and should be avoided since they require an extremely high input signal to overcome the electron noise generated by the mixing process.

Triode mixers are employed with good results in the v.h.f. and u.h.f. region. The noise factor of such mixers is measurably lower than that of the pentode type, but not as low as when the same triode is used as a r.f. amplifier. The balanced triode mixer using the 6J6 for use on the 144 Mc/s band is shown in Fig. 1. The adjustment of this circuit is not critical. Without oscillator injection the anode current will be about 4 mA and can be adjusted by selecting a suitable value of resistor (R3) in series with the h.t. line. When the oscillator is switched on, the mixer anode current will rise to about 6 mA. If necessary the anode current may be set

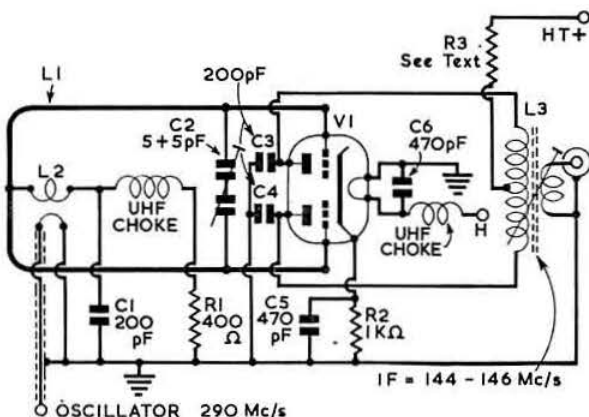


Fig. 2. The balanced 6J6 mixer for 420 Mc/s used at PE1PL. C1, 200pF ceramic; C2, 5+5pF butterfly; C3, 4, 22pF mica or ceramic soldered direct to the pins of V1; C5, 6, 470pF ceramic; L1, 420 Mc/s hairpin loop; L2, coupling loop; L3, i.f. transformer; V1, 6J6 or ECC91.

to this value by adjustment of the coupling between mixer and oscillator.

For the 70cm band it is preferable to use a triode mixer instead of the popular silicon diode. The diode does not amplify, whereas a triode mixer will give conversion gain up to about 1000 Mc/s. Fig. 2 shows the famous 6J6 balanced mixer in use at PE1PL. A self-oscillating mixer with a new type of triode (PC86), also suitable for 70cm operation, is shown in Fig. 3.

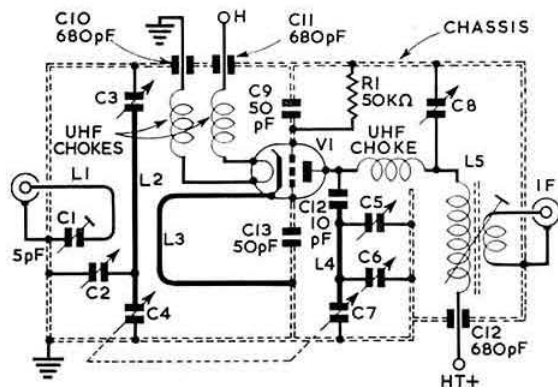


Fig. 3. Self oscillating mixer for 420 Mc/s. C1, 2, 3, 5, 6, 5pF max. trimmer (Polar); C4, C7, ganged (approximately 2pF swing per section for 420 Mc/s); C8, 2-8pF Philips trimmer (i.f. output tuning); C9, 13, 50pF disc ceramic; C10, 11, 12, 680pF feedthrough; L1, 1 turn loop; L2, $\frac{1}{2}$ wave coaxial line; L3, coupling loop; L4, oscillator $\frac{1}{2}$ wave coaxial line; L5, i.f. output transformer; R1, 50 K ohms $\frac{1}{2}$ watt; V1, PC86.

Another form of self-oscillating mixer for the 144 Mc/s band, using an EC92, is shown in Fig. 4. This is the circuit used in the author's own converter and the stability of the oscillator has been found to be excellent. The method of alignment is as follows, commencing with the mixer/oscillator circuit. The amplitude of oscillation is first determined by measuring the grid current in the usual manner, and should be between 2.5 and 3.5 μ A. The oscillator tuning capacitor (C16 in Fig. 4) is set to its mid-position. The air trimmers (C11 and C20) are then adjusted to bring the oscillator frequency to 134.1 Mc/s, assuming a

mean i.f. of 10.9 Mc/s. The capacitance of C20 together with the output capacitance of the EC92 should be equal to the capacitance of C11 at the specified frequency. The optimum grid current can be obtained by adjustment of the dust core in L3/L4. H.t. to the r.f. stage should be disconnected during these operations. The adjustment of the neutralizing coil (L7) is quite simple. The grid and anode circuits of the r.f. stage are loaded with resistors of about 150 ohms and, with h.t. still disconnected from the r.f. stage, a strong local 145 Mc/s signal is tuned in on the converter. The dust core of L7 is then adjusted for minimum signal on the receiver. Having found the correct inductance of the neutralizing coil, the r.f. signal circuits may be aligned in the normal manner. By the use of a noise generator it is possible to obtain a noise factor of around 4db. In terms of signal readability this is approximately equivalent to saying that a signal of 0.05 μ V will be R5 on c.w.

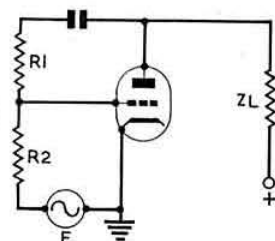


Fig. 5. Equivalent circuit of a triode mixer showing voltage negative feedback.

Triode Mixers

It is possible to improve the operation of a single triode mixer in respect of noise factor by increasing the conversion gain. A higher effective conversion conductance can be achieved by the introduction of controlled positive feedback at the intermediate frequency. The mechanism of this artifact may be explained as follows.

The effects of the i.f. component of the anode current, which develops an i.f. voltage across the primary of the i.f. transformer can be divided into two parts: (i) a proportion of the anode r.f. voltage, having an i.f. component, appears via the grid/anode capacitance of the valve on the grid as an additional input voltage added to the amplified signal voltage passed on by the r.f. stage preceding the mixer. In this circuit the signal voltage is the smaller of the two voltages present at the grid; (ii) the anode r.f. voltage controls the

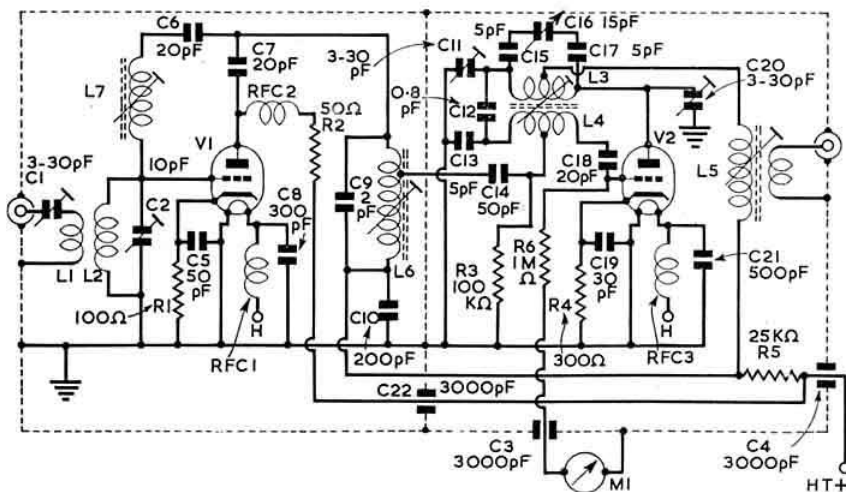


Fig. 4. Grounded cathode r.f. amplifier and self oscillating mixer for 145 Mc/s.

C1, 11, 20, 3-30pF Philips trimmer; C2, 10pF trimmer; C3, 4, 22, 3000pF feedthrough; C5, 14, 50pF ceramic; C6, 7, 18, 20pF ceramic; C8, 300pF ceramic; C9, 2pF ceramic; C10, 200pF ceramic; C12, 0.8pF ceramic; C13, 15, 17, 5pF ceramic; C16, 2-15pF trimmer (oscillator tuning); C19, 30pF ceramic; C21, 500pF ceramic; L1, 3 turns 31 s.w.g. 8mm diameter; L2, 4 turns 19 s.w.g. 8mm diameter; L3, 3 turns 33 s.w.g. 8mm diameter; L4, 4 turns 19 s.w.g. 8mm diameter, centre-tapped; L5, 10.9 Mc/s i.f. output transformer; L6, $\frac{1}{2}$ turns 19 s.w.g. on 7mm iron cored former, tapped $\frac{1}{2}$ turn from top; L7, 11 turns 25 s.w.g. on 7mm iron cored former (neutralizing coil); R1, 100 ohms $\frac{1}{2}$ watt; R2, 50 ohms $\frac{1}{2}$ watt; R3, 100 K ohms $\frac{1}{2}$ watt; R4, 300 ohms $\frac{1}{2}$ watt; R5, 25 K ohms 1 watt; R6, 1 Megohm $\frac{1}{2}$ watt; RFC1, 2, 3, 30 turns 33 s.w.g. 6mm diameter, air wound; V1, 2, EC92.

cathode current of the valve in a similar manner to the grid voltage, except that its effect is $1/\mu$ times less than the grid r.f. voltage, where μ is the amplification factor of the valve. The controlling effect of the anode voltage is in antiphase with that of the grid and therefore the effective transconductance is reduced.

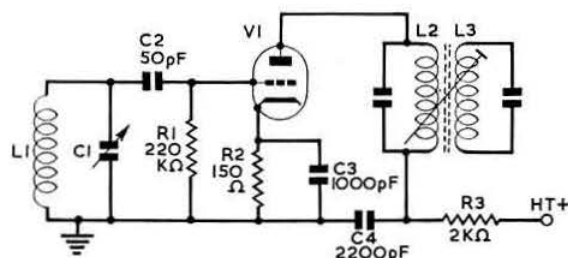


Fig. 6. A simple triode mixer.

L1/C1 is the 145 Mc/s input circuit. C2, 50pF ceramic; C3, 1000pF ceramic; C4, 2200pF ceramic; L2, 3, i.f. transformer; R1, 220 K ohms $\frac{1}{2}$ watt; R2, 150 ohms $\frac{1}{2}$ watt; R3, 2 K ohms $\frac{1}{2}$ watt; V1, EC92 or $\frac{1}{2}$ 12AT7.

This type of voltage negative feedback will also reduce the effective internal resistance of the valve and so increase the loading across the primary of the i.f. transformer, thereby reducing the i.f. load impedance. An approximate equivalent circuit is shown in Fig. 5. The resistor R1 represents the reactance of the capacitance C_{ag} . For the purposes of determining the magnitude of the feedback, R2 is considered to represent the total impedance to i.f. between grid and ground, i.e. R_{in} plus the impedance presented by the signal circuit to earth in parallel. If an EC92 is used as the mixer, the effective value of r_a is around 26 K ohms with μ about 60; the grid-anode capacitance is approximately 2pF. The coupling capacitor (C2 in Fig. 6) may be assumed to be the only component in the grid circuit having appreciable reactance at i.f. so that the i.f. voltage at the grid will be determined by the potential divider consisting of R1 and R2 where the feedback factor

$$a = \frac{R1}{R1 + R2} \approx \frac{R1}{R2} \quad (\text{Fig. 5}).$$

Taking a value of 50pF for C2, $a \approx 0.04$, and the modified anode resistance

$$ra^1 = 28 \text{ K ohms} \times \frac{1}{1 + 0.04 \times 60} = 8 \text{ K ohms}.$$

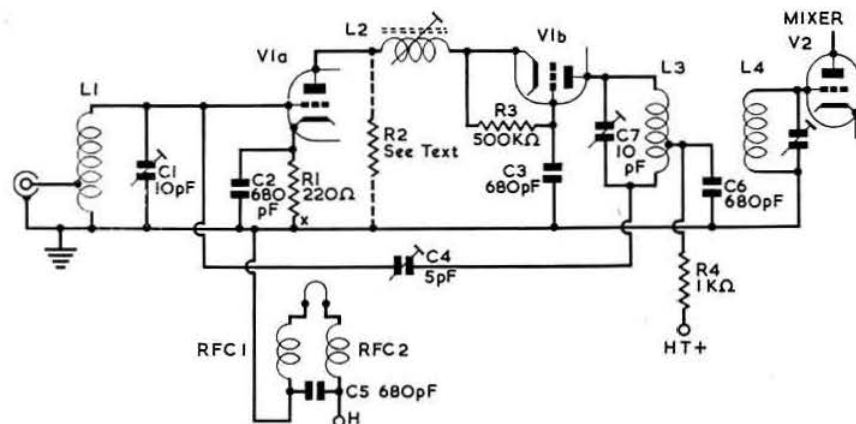
This will exert a considerable loading effect on the transformer. Increasing the value of C2 to 150pF makes $ra^1 = 15 \text{ K ohms}$. It follows therefore that the optimum result is achieved by omitting the coupling capacitor C2 altogether and connecting the tuned circuit directly to the grid. If this is not possible due to excessive stray capacitance, the effects described above may be neutralized by the application of a small i.f. component to the grid which is out of phase with that fed back via C_{ag} . This has been done in Fig. 4, where capacitor C10 has appreciable reactance at the intermediate frequency.

R.F. Stages for 144 Mc/s

The requirements of the r.f. stage have already been discussed to some extent and it has been seen that a good valve and circuit combination is required for an r.f. amplifier in the v.h.f. and u.h.f. region. The inescapable noise characteristics of the pentode valve indicate that triode amplifiers must be employed for the best low noise performance. In view of the previously mentioned gain requirements and assuming the order of mutual conductance now obtainable from modern triode construction, two stages of triode amplification would seem to be in order. These two stages may be arranged in a variety of ways. Theoretical and experimental investigations indicate that the combination of a grounded cathode stage followed by a grounded grid stage yields optimum performance. It can be shown that this combination produces the high amplification and stability of a pentode and yet has the desirable low noise characteristic of a triode.

The arrangement has been called the "cascode amplifier" and was first described by Wallman in America. It provides an excellent noise factor. The term "cascode" is now generally used to describe a combination of a grounded cathode triode followed by a grounded grid triode. The circuit provides the desirable features of a pentode (low output to input admittance, i.e. good isolation between input and output, high input impedance and the low noise performance of a triode). For optimum results (i.e. lowest noise factor) neutralization of the input triode is required. This neutralization is not too critical at any one frequency and can be achieved by an inductance which is effectively in parallel with the grid/anode capacitance of the first valve. The inductance is tuned to parallel resonance with the anode/grid capacitance, thereby providing a path of maximum impedance between input and output.

Fig. 7 shows one of the new circuits developed for use with special twin triodes such as the 6BQ7, ECC88 or ECC84. For identification purposes this particular circuit is called



the driven grounded-grid circuit, although the term is also descriptive of the inverted amplifier and original cascode circuit using two separate valves. Neutralization in this circuit is achieved by means of a bridge configuration commonly employed with single triode valves. This method of neutralization has the distinct advantage of being relatively independent of frequency, provided the connecting leads in series with the neutralizing capacitor are short. To adjust the inductance of L2, between the anode of the first unit and the cathode of the second, the cathode resistor of the first unit is disconnected near point "x" and a resistor placed between the anode of the same unit and earth. The value of R2 is selected to permit the original anode current of the combination, approximately 9 mA, to flow through the grounded grid stage. L2 is then adjusted for minimum noise. This is the only adjustment necessary; the alignment of the

use in the cascode circuit is the Western Electric 417A (5842), which has a mutual conductance of 25 mA/V. The next best are the double triodes PCC88, ECC88 or E88CC. A suitable circuit for use with the E88CC (mutual conductance of around 12.5 mA/V with a noise factor of about 3.5db) is shown in Fig. 9. The adjustment of the series coil L2 is carried out as described for the circuit of Fig. 7. The cathode resistor is again disconnected near point "x." The neutralizing procedure is also similar. The layout requires some care in this circuit as there must not be any coupling between the various coils. There are several tricks which may be performed in order to obtain the best noise factor; for example, different types and values of capacitors for the cathode of the grounded cathode unit, and variation of the tap on coil L1. A little capacitive detuning of trimmer C1 will also improve the noise factor as also will correct

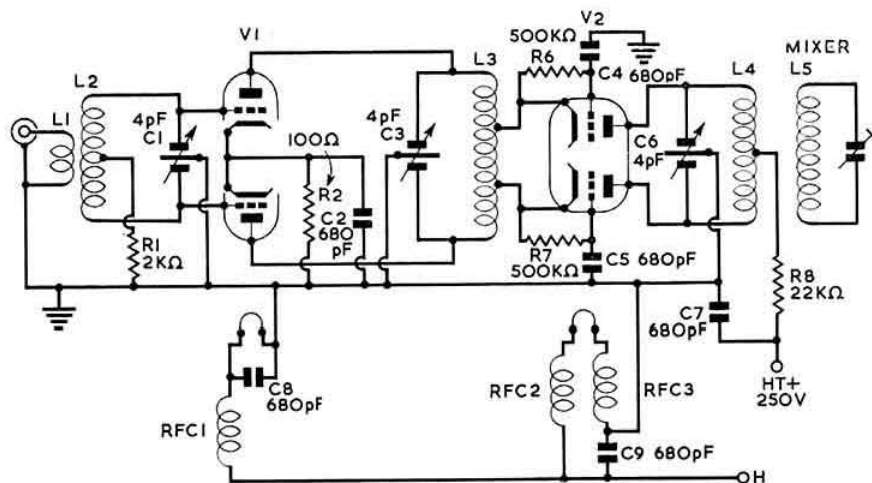


Fig. 8. Balanced cascode for 144 Mc/s using 6J6 and 6BQ7 or 6BQ7A valves.
C1, 3, 6, 4pF trimmer; C2, 7, 8, 9, 680pF mica; C4, 5, 680pF button type; L1, 2 turns 31 s.w.g. 8mm diameter; L2, 5 turns 19 s.w.g. 8mm diameter; L3, 5 turns 19 s.w.g. 8mm diameter, tapped 1 turn from each end; L4, 6 turns 19 s.w.g. 8mm diameter; L5, mixer grid coil; RFC1, 2, 3, 4, v.h.f. chokes; V1, 6J6 or ECC91; V2, 6BQ7 or 6BQ7A. C1, 3, 6, should be 8 + 8pF split stator capacitors.

remainder of the circuit is carried out in the normal manner.

The balanced cascode is given in Fig. 8. The adjustment is not critical and has the advantage of high voltage gain in the 6J6 amplifier stage. The noise factor is also a little better than the normal cascode amplifier.

When high mutual conductance triodes are used for the first unit of a cascode, noise factors of between 3 and 4db at 144 Mc/s may be obtained. One of the best triodes for

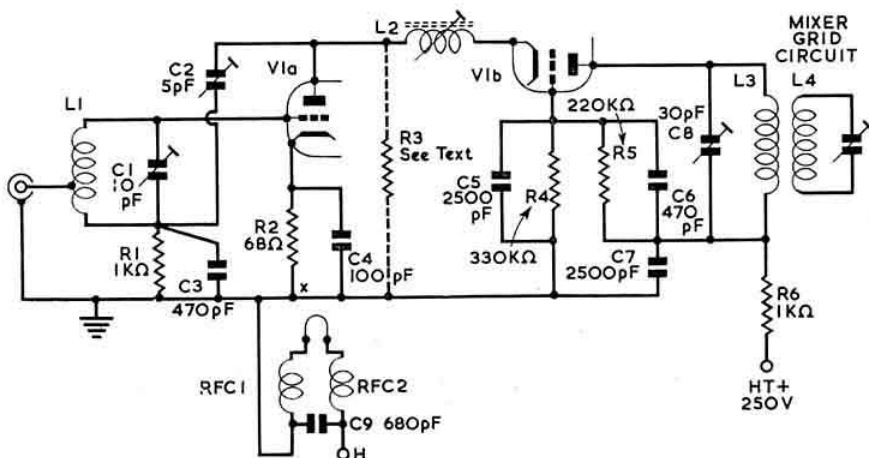
neutralization. All these points apply to every grounded cathode pre-amplifier for the v.h.f. bands.

R.F. Stages for U.H.F.

The next problem is the choice of r.f. amplifier valves and circuits for the u.h.f. bands. A grounded grid amplifier before the mixer will provide the best possible noise factor at these frequencies. Suitable valves for the 70cm band are

Fig. 9. The E88CC cascode circuit for 144 Mc/s.

C1, 10pF trimmer; C2, 5pF trimmer (Polar); C3, 6, 470pF ceramic; C4, 100pF button type; C5, 7, 2500pF ceramic; C8, 30pF trimmer; C9, 680pF ceramic; L1, 3½ turns 19 s.w.g. 10mm diameter, tapped ½ turn from earthy end; L2, 12 turns 19 s.w.g. on 8mm iron cored former; L3, 3 turns 19 s.w.g. 10mm diameter; R1, 6, 1000 ohms ½ watt; R2, 68 ohms ½ watt; R3, see text (approximately 10 K ohms 1 watt); R4, 330 K ohms ½ watt; R5, 220 K ohms ½ watt; RFC1, 2, v.h.f. chokes; V1, E88CC or ECC88.



the EC56, EC55, EC80, PC86 and GL-6442. When a grounded grid amplifier stage is used in front of a 6J6 balanced mixer, it is possible to obtain noise factors of the order of 5 to 7db. The circuit of Fig. 10 is typical and uses a PC86* with pi-section input and coupling networks. These

should be made in stiff wire to reduce vibration effects. The mechanical stability of air-wound coils can be improved by securing the turns of the coil with polystyrene strips. Silver plated copper tube coils are even better.

An excellent overtone crystal oscillator circuit is shown

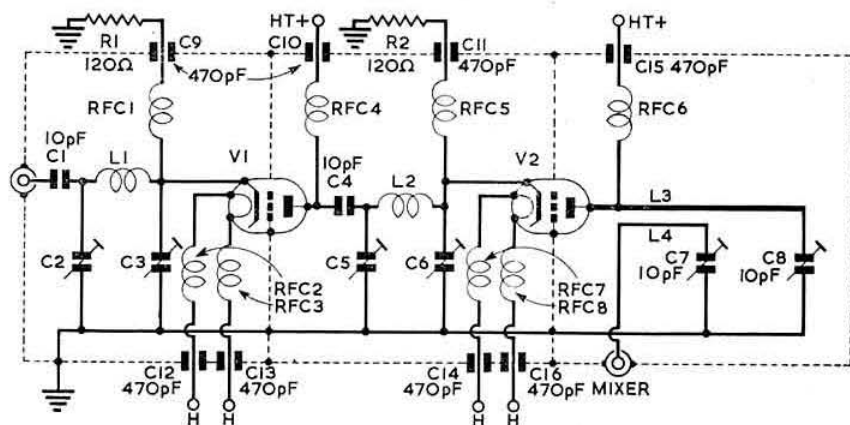


Fig. 10. Double grounded grid circuit using two PC86 valves. C1, 4, 10pF ceramic; C2, 3, 5, 6, trimmers (about 5pF); C7, 8, 10pF trimmers; C9, 10, 11, 12, 13, 14, 15, 16, 470pF feedthrough; L1, 2, tuned to signal frequency with C2, C3 and C5, C6 respectively adjusted for optimum matching. Half wave coaxial lines may be used; L3, $\frac{1}{2}$ wave coaxial line; L4, output coupling loop, coupled to nodal point on L3; R1, 2, 120 ohms $\frac{1}{2}$ watt; RFC1, 2, 3, 4, 5, 6, 7, 8, 10 turns 3mm diameter 32 s.w.g.; V1, 2, PC86 (slope 12 mA/V).

networks appear physically as $\lambda/2$ coaxial lines with a square cross section dimensioned to give a suitable characteristic impedance.

Local Oscillators

When a high selectivity i.f. system is employed, the stability of the oscillator is extremely important. Slight variations in

in Fig. 11, and is self-explanatory. When setting up the circuit, a 0-15 mA meter is connected in series with the h.t. supply. Adjustment of the core of L1 will produce a kick in anode current when the crystal commences to oscillate at the overtone frequency. Listening to the oscillator at the fundamental or a harmonic frequency will determine whether the oscillator is crystal controlled. There should be no more than a slight shift in frequency (1-2 kc/s at the most) as the hand or a metal object is moved near to the anode circuit. Some increase in the capacity of C1 is required if there is any tendency to uncontrolled oscillation.

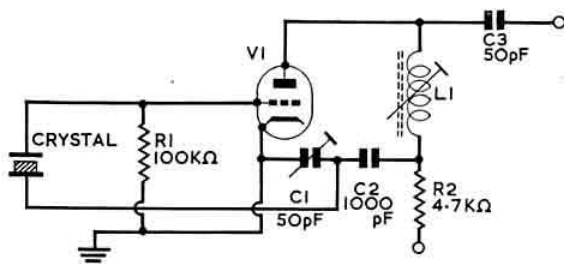


Fig. 11. The "Robert Dollar" overtone oscillator. C1, 50pF trimmer; C2, 1000pF ceramic; C3, 50pF ceramic; R1, 100 K ohms $\frac{1}{2}$ watt; R2, 4.7K ohms $\frac{1}{2}$ watt; V1, half 12AT7. L1 is tuned to the overtone frequency.

oscillator frequency which would not be noticeable when a broadband i.f. system is used become intolerable when the pass-band is reduced to crystal filter proportions. The crystal controlled oscillator is the solution to this problem, in conjunction with frequency-multiplier stages if required. Tuning is then carried out by varying the i.f. to cover the desired frequency range. If a tunable oscillator and a fixed i.f. must be used then special attention must be paid to the oscillator design to ensure that it is mechanically, and of course electrically, stable. The tuning capacitor should be solidly built and preferably of the double bearing type. A butterfly capacitor is excellent for this purpose. Connections

* Telefunken Application Bulletin—The use of the PC86 valve in u.h.f. television tuners. (In German.) Obtainable in the U.K. from Tellux Ltd., 146 New Cavendish Street, London, W.1. The basic design for Fig. 3 was derived from this bulletin and the information given therein will clarify a number of points in connection with the mechanical construction. Full data on the PC86 is also given. (A certain amount of commonsense is required to interpret the data but one does not need to be a technical German linguist.) The EC92 and PC86 are both obtainable from Tellux Ltd.

Spotlight on B.B.C. Television

SPOTLIGHT on B.B.C. Television is the title of a new 24-page booklet, published by the B.B.C. for the benefit of readers with little or no technical knowledge but who are interested, nevertheless, in learning something about what goes on behind the scenes in television, and in getting the best out of their television sets. It is enlivened by a number of humorous drawings.

The booklet describes in simple terms "How Television Works" and gives advice about the reception of B.B.C. Television. Problems of interference are discussed (with illustrations) and there is a practical section on "How to Adjust your Television Set." The booklet concludes with some Do's and Don'ts for television viewers.

Spotlight on B.B.C. Television is available through newsagents and booksellers, price 9d.

New Mullard Film Strip

"THE History of Radio" is the title of a new filmstrip just issued by Mullard Educational Service. Produced with the co-operation of the National Committee for Visual Aids in Education, the filmstrip (No. E.50) is the first of a new series intended mainly for secondary modern school use.

The strip reviews the progress in radio communication up to the present time and explains some of the more important fundamental principles involved. Produced in colour it comprises 35 frames.

Part of the strip is devoted to early telegraph and telephone systems, building up to a consideration of the relationship between electricity and magnetism. A description of how electric oscillations are generated introduces a section on electric wave propagation.

The strip is available from Unicorn Head Visual Aids Ltd., 42 Westminster Palace Gardens, Victoria Street, London, S.W.1. The price (35/-) includes a set of comprehensive lecture notes.

Modifying the Army W.S. 19 for Amateur Bands Operation

By D. P. J. MEAD (G3IDM)*

THE advent on the surplus market, in brand new condition, of quantities of the No. 19 Set (an Army transmitter-receiver used mostly in tanks and Army transports) is a somewhat mixed blessing. There is no doubt that a lot of them have been bought by people who have not the slightest qualifications to use them, which has made it extremely easy for the potential pirate to get on the air with the minimum of trouble. However, the fact remains that the 19 Set is a most attractive "buy" at the current price, in which connection there should be no need to remind readers that a transmitting licence is necessary before going on the air!

The power input to the p.a. is normally 15 watts on m.c.w. and phone and 30 watts on c.w.

The number of modifications that can be carried out vary from the barest essentials to get "on the air" to more elaborate structural alterations. The first essential is to strip out the "B" set and the "I.C." amplifier. This is quite simple. All of the gear to the left of the above-chassis screen and the below-chassis relays (looking at the front panel) can be taken out and put in the junk box, as it is quite useless for amateur use as it stands. The leads to the plugs can be clipped off close to the pins except for those connected to pins 1 and 4 on the 12-way plug, and pins 3, 4 and 6 on the 6-way plug. On the 12-way plug, pin 1 is the microphone lead and pin 4 is the lead for the headphones, while on the 6-way plug, pin 3 is the l.t. positive (12 volts), pin 4 is the 500 volt h.t. positive line and pin 6 is the 275 volt h.t. positive line.

Unless one is lucky enough to have the necessary flexible sockets to match the original plugs, it is better to remove the two existing ones and fit a Belling Lee 5-pin plug to the top hole and transfer all the connections to that, blanking the lower hole off, if external power supplies are to be used. It is better, however, to make the set self-contained by building a power pack in the case.

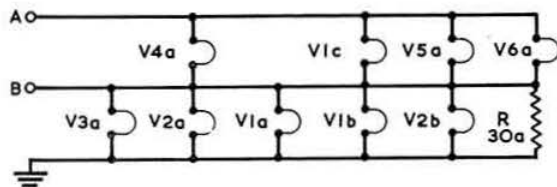


Fig. 1. Circuit diagram of the heater connections. Originally A was the 12 volt supply point but by earthing A and supplying 6 volts to point B modification for 6 volt operation becomes easy.

Power Supplies

The power requirements are 275 volts at about 80 mA, 500 volts at 70 mA (for c.w.) and either 12 volts at 2 amps. or 6.3 volts at 4 amps. While these voltages can be supplied from external sources, the removal of the "B" set and "I.C. Amplifier" leave a space that begs to be used for an internal power pack.

The heaters should first receive attention. The valves are wired up as shown in Fig. 1. By taking the 12 volt lead to chassis and supplying 6.3 volts to the centre "rail" the conversion to 6.3 volts is easily effected. A readily accessible point for this modification is the 807 valveholder: the heater pin that carries 12.6 volts should be earthed and the 6.3 volt line connected to the other.

The necessary h.t. voltages can be obtained in various ways. Fig. 2 shows the conventional circuit using full wave rectifica-

tion. It will be noticed that no smoothing choke is used in the 500 volt supply, as it has been found from experience that no ripple is noticeable on the carrier using only an 8 μ F reservoir smoothing condenser, even when only half wave rectification is used. Metal rectifiers could, of course, be used if desired and would save generating excessive heat—a serious consideration in the confined space of the cabinet.

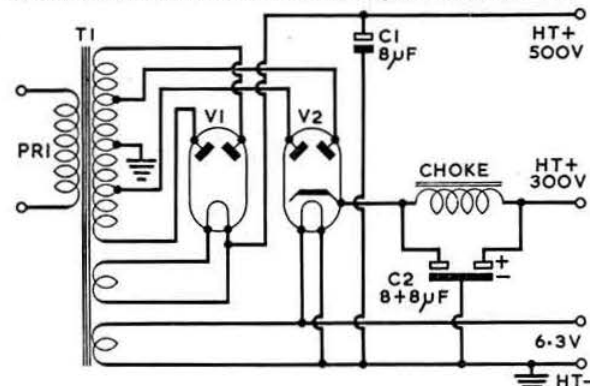


Fig. 2. Conventional type of power supply for operating the 19 Set from the mains. T1 should provide 500-300-0-300-500 volts at 100 mA, 6.3 volts at 4 amps. and 5 volts at 2 amps.

Fig. 3 gives an alternative circuit, using bridge rectification and a normal mains transformer. Here, metal rectifiers are used in half the bridge, and could be substituted for the valve rectifier shown. A further possibility is shown in Fig. 4 where half wave rectification is used.

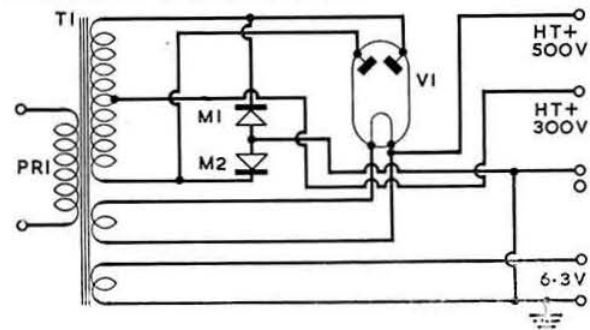


Fig. 3. Bridge type power supply. The smoothing circuit has been omitted for clarity. M1, M2, 300 volt 100 mA metal rectifiers. T1, 300-0-300 volts, 5 volts at 2 amps. and 6.3 volts at 4 amps.; V1, 5U4G. Metal rectifiers could also be used in place of the 5U4G.

All these circuits have been tried and proved, and while the circuit of Fig. 2 is now in use at G3IDM as being the most satisfactory, any one of those shown could be used with equal success. Attention should be paid to the power capabilities of the transformer when used under conditions other than that for which it is designed. For instance, in Fig. 4 only one quarter of the rated d.c. power can be supplied by half wave, instead of full wave, rectification. If lower input power is required, a single h.t. voltage of 300-350 volts can be used, when about 8-9 watts phone is to be expected, and a correspondingly higher power input on c.w. The left-hand switch of the two at the bottom centre can be used as a mains on/off.

* "Hamsden," 28 Hillcrest Avenue, Chertsey, Surrey.

Relays

The relays are designed for 12 volt operation, but it has been found that they will work on 6 volts providing a 6 volt rectifier of a fairly low resistance is used with an adequate reservoir condenser of about 100 μ F. Alternatively the relays can be removed and the solenoids rewound with as many turns of 36 s.w.g. enamelled wire as can be accommodated on the former. Series operation from the 275 volt h.t. line through a 2200 ohm resistor should then be possible. Although one of the relays only is used to control the "A" set, it is advantageous to modify and leave them both *in situ* as the unused one can be pressed into service in later modifications. Two spare sets of contacts, one normally closed and one normally open, can be wired to a Belling Lee five-pin socket in the hole in the upper left-hand corner to provide control for external circuits if required.

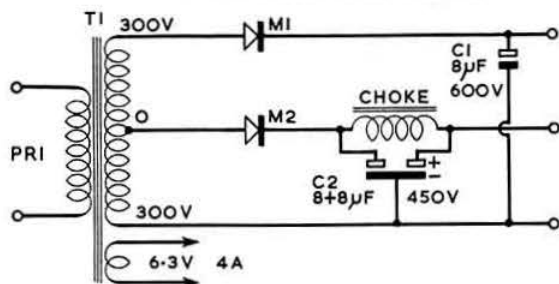


Fig. 4. Half-wave rectification power pack.

The double pole switch to the right of the bottom centre of the panel can be used as a "send/receive" switch as this already has the 275 volt h.t. connected to it. All that is necessary is to earth one side of the relays, which are wired in series, and connect the other side through the 2200 ohm resistor to the switch.

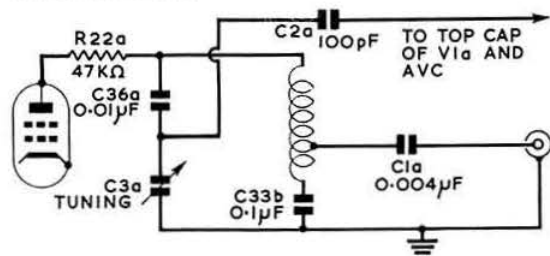


Fig. 5. The unmodified p.a. circuit in the 19 Set.

P.A. Modifications

The first essential modification to the circuit itself concerns the power amplifier, an 807. In the original arrangement (Fig. 5) part of the r.f. output was rectified and fed back through the output line to the panel meter. Unless all the attachments are available this is inconvenient, but the output can alternatively be fed through a 20,000 ohm resistor to a rectifier circuit and then to the appropriate tag on the meter switch (Fig. 6).

The p.a. tank circuit itself can be modified in various ways. First C36A, C1A and L2B should be stripped out, and C1A replaced on the tagboard mounted on the p.a. tank tuning condenser (Fig. 6). The tank coil should then be disconnected but temporarily left *in situ*. The first of several possible alterations is to use a pi section tank circuit. This can be done by connecting the coil (the tapped point should be ignored) between C1A and the aerial plug, the other side of C1A going to the anode of the 807, while the anode is fed with h.t. through a r.f. choke from the live end of C33B. A

fixed condenser of 0.001 μ F capacity is soldered between aerial and earth. Providing that a low impedance aerial or aerial tuning unit is used this should prove satisfactory. It may be found that the p.a. coil needs to be of greater inductance and a coil of about 40 turns of 24 s.w.g. enamelled wire, close wound, 1 in. in diameter, may be substituted for the existing p.a. coil. Reference should be made to G2HW's article on pi-couplers in the April 1952 issue of the R.S.G.B. BULLETIN. This system (Fig. 6) is in use with every success at several stations known to the writer.

Secondly, a normal link coupling can be used in place of the tapped coil; a winding of about four turns will give an output impedance of 80 ohms. If a dummy load with an r.f. ammeter in circuit is fitted to the aerial socket, the

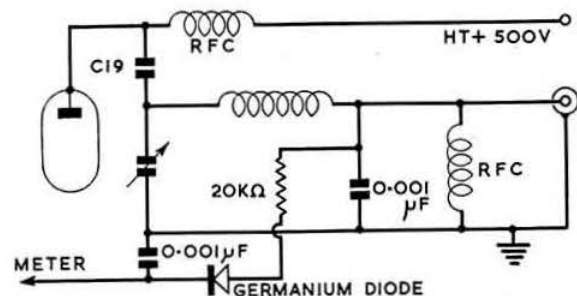


Fig. 6. Circuit of the aerial voltage meter arrangement and pi section p.a. If the link coupling of Fig. 7 is used, the 20 K ohms resistor should go to the aerial terminal in the same way.

number of turns of the link winding can be adjusted for the maximum r.f. output. This is the method of coupling used at G3IDM. It is advisable to modify the circuit of the p.a. to parallel feed (as for the pi section modification) to remove h.t. from the coil and to minimize the possibility of accidents. It is also advisable to use an aerial tuning unit of some sort to add further selectivity to the transmitted signal, because, owing to the method of obtaining the transmitter drive frequency, there is a tendency to transmit signals at 465 kc/s intervals either side of the wanted frequency. Any normal system can be used—pi section, tapped tuned circuit, link coupled, or Z match, etc. (Fig. 7).

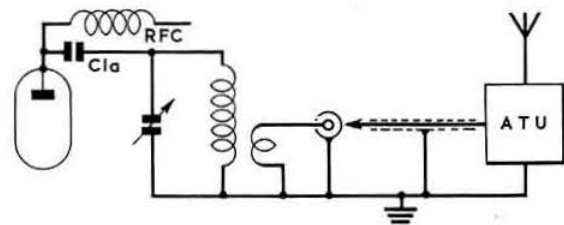


Fig. 7. Circuit of a link coupled p.a. for use with an external aerial tuning unit to suit individual requirements.

The p.a. circuit can be used in its original form quite successfully, but most amateurs will no doubt wish to modify it to one of the more accepted arrangements suggested here.

Loudspeaker

A loudspeaker of 2½ to 3 in. diameter can easily be fitted. Although the output of the receiver is intended for moving coil phones of about 45-50 ohms impedance, it is quite adequate for a small loudspeaker.

The handle on the left of the panel and the bakelite watch case (the latter, incidentally, makes a good hand microphone case!) are removed and the handle refitted at the edge of the panel to correspond with the one on the right. A hole of

sufficient size for the speaker is then cut in the panel just below and to the left of the meter. This aperture can be a series of small holes drilled by a hand drill, or cut out with a "Nibblette" tool. If the edges of the hole are irregular, as they probably will be, they can be hidden by an escutcheon of some sort. At G3IDM a small cream plastic air vent cover of the type found in kitchen cabinets is used.

It is essential that the speaker be removed from the circuit on "send" and the second relay can be used for this purpose. The speaker can be wired in series with two contacts that make on "receive" and break on "send." A resistor of such a value that it does not impair the depth of modulation can be soldered across the contacts, and will still permit the output modulation quality to be readily monitored in the phones.

Headphones

A short circuiting phone jack plug can be fitted in place of the original quench control and wired so that the insertion of the phone jack disconnects the loudspeaker.

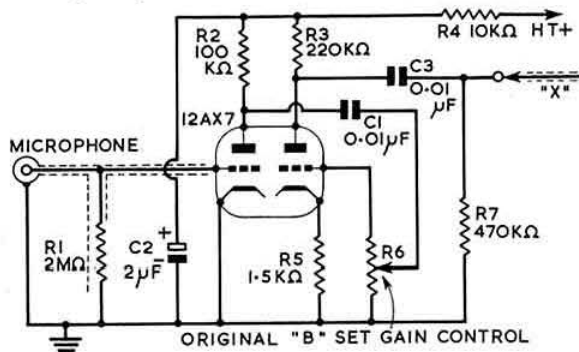


Fig. 8. Speech amplifier for use with a crystal microphone. "X" is the re-routed screened lead to the 6B8G modulator valve.

Speech Amplifier

The quality of the phone transmission can be greatly improved by the use of a crystal microphone and a speech amplifier. A suitable circuit is shown in Fig. 8. The unit can be built on a small bracket and placed under the chassis in a convenient position near the original "B" gain control which is now the "Modulation Depth Control."

The original microphone transformer, mounted on the rear of the screen between the four gang tuning condenser and the 6B8G modulator/output valve, is removed and the screened lead to it pulled back under the chassis, enough slack being allowed to enable it to be connected to the output from the speech amplifier. The "B" set aerial Pye socket can be used for the microphone. Screened wire should be used to connect the socket to the grid of the speech amplifier valve. It should be noted that the Pye socket is insulated from the panel so either the screening should be bonded to the outside of the plug or the insulating bush should be removed. The latter is probably the best course. This modification, with a crystal microphone will provide more than adequate modulation depth and will greatly improve the quality.

If it is desired to use a moving coil microphone, a transistor amplifier could be used to save power and space, the circuit shown in Fig. 9 giving a gain of up to 300 times.

Selectivity

The first i.f. transformer is over coupled, so an increase in the distance between the coils will improve the selectivity. First remove the screen that runs along the back behind the i.f. transformers and the two screws at the back of the trans-

former itself. Next remove the two nuts securing the transformer can to the chassis. The can should now be free and can be drawn off of the coils. These coils are fixed in slots, and by loosening the screws that hold the formers to the paxolin strip, the coils can be separated to the full extent of the slots and the screws retightened. The screening can should now be replaced and the i.f. transformer realigned.

Range Alterations

By soldering a 150 pF close tolerance silver mica condenser across each section of the four gang condenser Top Band and 80m can be covered quite conveniently. The two ranges now become approximately 1.8 to 3 Mc/s and 3 to 5 Mc/s. This also enables a frequency check at 2.5 and 5 Mc/s to be made from the transmitted standard at MSF. The p.a. coil will have to be suitably altered to cover the new frequency ranges. In this case a pi section tank circuit is probably the most useful. By using a fixed condenser of 0.001 μF capacity as an output loading capacitance, both bands should quite easily be covered.

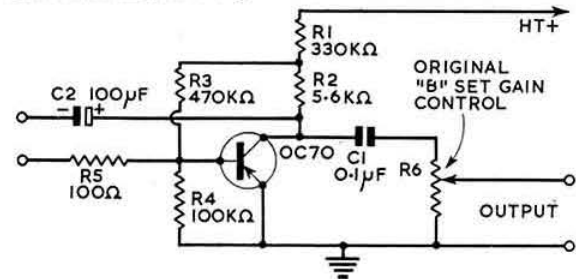


Fig. 9. Transistor speech amplifier for use with a moving coil microphone. In this case, the "B" set aerial socket, if used for the microphone, should be left insulated from the panel and care taken not to short-circuit the input to earth. The input impedance is 200 ohms and the output impedance less than 10 K ohms.

Bandsread

By far the most useful and yet satisfying modification is the introduction of bandsread. The first operation is to remove all the moving vanes from the four gang variable condenser except for one in each section. This should be done very carefully. Use a thin hacksaw blade (one of those sold for the miniature Eclipse spring back saw is ideal) to cut through the metal strap that connects the vanes together at the tip, and then grip the separated vane firmly with a pair of long nosed pliers and, with a steady pull (not a jerk) peel the vane off the spindle. Do not attempt to take off more than one vane at a time or the other vanes may be bent. Owing to the close spacing it is not easy to rectify a short between moving and fixed vanes.

When this operation has been completed and it has been ascertained that there is no short circuit, a 50 pF silver mica close tolerance condenser should be soldered across each of the four trimmers beneath the chassis on the 2 to 4.5 Mc/s range. After readjustment of trimmers to align the circuits, it should be found that the 3.5 Mc/s band occupies about three-quarters of the dial.

Forty Metres

The 7 Mc/s band will occupy about half an inch which, while an improvement on the previous one-tenth of an inch, still leaves something to be desired. Experimenting with new windings on the h.f. range, whilst quite satisfactory on the receiver side, has not been a success on transmit owing to the impossibility of maintaining sufficient drive. It is thought perhaps that condensers in series with the tuning capacitance on the h.f. range only might meet the case, but the writer has not had an opportunity to do the necessary alterations.

(Continued on page 393)

Technical Topics

By PAT HAWKER (G3VA)

THE Editor of *CQ*, W2NSD, recently bemoaned that, at least in America, "The number of hams who build any of their own gear (don't try to count kit assembling) is dwindling into one over infinity squared." Furthermore, he adds, the fear of loss of re-sale values inhibits home modifications to commercial rigs. Fortunately, this is not yet the situation over here and we can be thankful that we can still take advantage of the strong constructional side of American and British Amateur Radio journals.

Low Cost Power Unit

For example, WA2ANU (*QST*, November 1958) gives some useful information on "Power Supply Construction" dealing in particular with the choice of suitably rated components—a subject not always treated as fully as its importance warrants. The provision of h.t. supplies for any transmitter running more than about 60 watts is inevitably one of the major items of cost, but there are ways of keeping the outlay within bounds. A circuit, which has been used for some time at G3VA, was taken from the *Radio Handbook* (14th edition) but does not appear to be widely known. This system (Fig. 1) uses two low-priced surplus transformers and two of the large but cheap 1616 rectifiers. The unit delivers either the sum or the difference of the two transformer voltages according to the way in which they are connected; this enables the unit to be used for QRP or tuning up simply by reversing the connections to the primary of one of the transformers. A useful feature of this circuit is that it enables, for example, a 500 volt power unit to be converted for 800 volts for little more than the price of a 300 volt transformer and possibly the rectifiers. The main drawback is that the insulation on T1 must be good enough to withstand the combined voltages of T1 and T2, so that a generously rated transformer is essential. But there are some very fine 330-0-330 and 500-0-500 ex-Admiralty transformers around which seem well capable of being so used. One of the reasons why the price of these transformers stays fairly low is that they often have only one 4 volt heater winding. It has been found that, if this is well insulated, one can be used for the 2.5 volt 5 amp. heater of each 1616, using extended leads to provide the voltage drop. In all valves used as power rectifiers it is important to remember that insufficient heater voltage, measured at the valveholder, is a frequent cause of failure.

Incidentally, a booklet (Publication No. 127) of interest to all users of transformers, chokes, coils and other windings has been issued recently by Haynes Radio Ltd. (Queensway, Enfield, Middlesex). This is crammed with very useful information and data and has many illustrations.

The Mickey Match

Those who use co-axial cables for feeding their aerials are seldom entirely happy about what is really going on inside, but, until recently, the construction of an effective s.w.r. indicator has not been easy. A new design by K6QHZ

(*QST*, November 1958), takes the snags out of constructing an s.w.r. indicator and output monitor. The secret of this modified "Mickey-Match" lies in the use of a 16 in. line section formed from standard co-ax cable, modified by running an insulated pick-up wire under the outer braiding, which can be done by "bunching" the braiding. G6RC, who has built one, says that the only difficulties were in preventing the co-ax braiding from scratching the enamel and so short-circuiting the pick-up wire, and in finding a low value carbon variable resistor (R1). The original article specifies a 200 μ A f.s.d. meter but he used one of the surplus "cross-arm" type of indicator meters which have a full

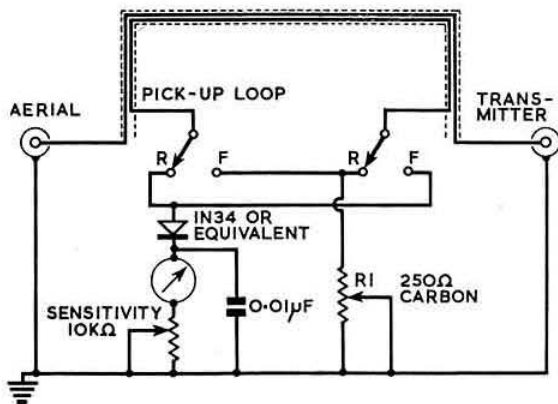


Fig. 2. K6QHZ's "Mickey-Match" s.w.r. indicator and output monitor. The pick-up loop emerges from the co-ax braiding $\frac{1}{2}$ in. from each end. R is Reflected, F is Forward, R1 is adjusted for a null in the reflected power position.

scale deflection of the order of 60 μ A. You will probably need to refer to *QST* for full operational details but Fig. 2 shows how simple it is. Now, G6RC says, he needs another article to tell him how to get rid of the standing waves found with the "Mickey-Match."

Playing Safe with Modern Valves

The low cost of the surplus 807 (a valve type now about 21 years old) has, for years, almost driven out all other types of medium power transmitting valves for normal h.f. work. However, the much newer 6146 (Mullard type QV06-20) is fast gaining ground and is, in fact, used in almost all current American commercially-manufactured and kit transmitters. Its smaller physical size, its slightly higher power (I.C.A.S.) rating (90 watts c.w. apiece), its much higher maximum frequency, and its ability to provide full output at low h.t. are all attractive features. But modern "high perveance" (high cathode emission) valves require some care in use, as more than one amateur has discovered too late. *QST* (November 1958) reprints from *R.C.A. Ham Tips* some ways to ensure longevity for 6146s. These include: check heater voltages at the valve sockets; provide adequate ventilation; do not have shiny shielding surfaces so positioned that they reflect heat back into the valve; use circuits with lowest possible resistance in grid and screen circuits; include overload protection in anode and screen circuits; check that the anode does not change colour at full load; reduce h.t. or insert a screen resistor for tuning under no load conditions; do not overload valves during tuning up; use adequate grid drive (too little drive can cause high anode dissipation); use flexible lead connections to anode caps to avoid strain; and finally keep within the manufacturer's ratings.

It used to be the proud boast of most amateurs that they could get away with about doubling makers' ratings (*pssst*

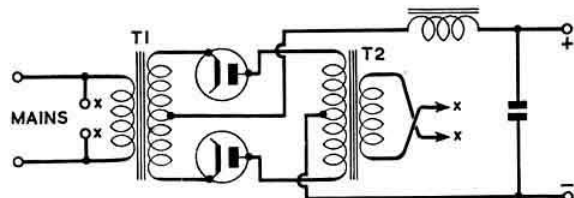


Fig. 1. A useful power supply circuit from the "Radio Handbook."

even the 807 seems to stand 1,000 volts for c.w. if anode dissipation is kept low) but it looks as though we just cannot get away with it on these newer valves.

H.F. Transistors in the United Kingdom

Several of the transistor circuits mentioned in *Technical Topics* have used Philco surface-barrier h.f. transistors, types SB101, SB102 and SB103. Electrical, though not mechanical, equivalents of these types are made in the U.K. by Semiconductors Ltd. (Cheney Manor, Swindon) as types SB344, SB345 and SB346, and their Application Report 311 gives a number of interesting amateur applications for 28 Mc/s including several super-regenerative detector circuits, an a.m. transmitter and a crystal oscillator. The price of these h.f. transistors, though still high in comparison with valves, is in the region of £2; for example, an SB344 suitable for 28 Mc/s costs 38/-.

Screen-grid Modulation

For those who require only occasional telephony, there is much to recommend screen grid modulation with its very modest audio requirements. A simple circuit—see Fig. 3—which overcomes the difficulty of finding correct transformer ratios is described by W7EPM/6 in *CQ* (November 1958). This uses a Heising choke system and if an odd power supply filter choke is used the chances are that its internal capacity will effectively by-pass the unwanted higher audio-frequencies.

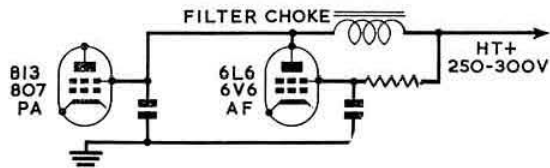


Fig. 3. The "Fool-proof screen modulation" circuit of W7EPM/6

Technical Roundabout

An article "Putting the Helix to Work" by K6QXW in the November *Radio and TV News* describes the advantages of the helix for all bands above 50 Mc/s, with practical winding data. The author claims that the helical aerial is one of the simplest and most effective beam-type aerials. For 144 Mc/s a diameter of 26 in. with 18 in. turns spacing and a minimum ground plane diameter of 41 in. is suggested. A

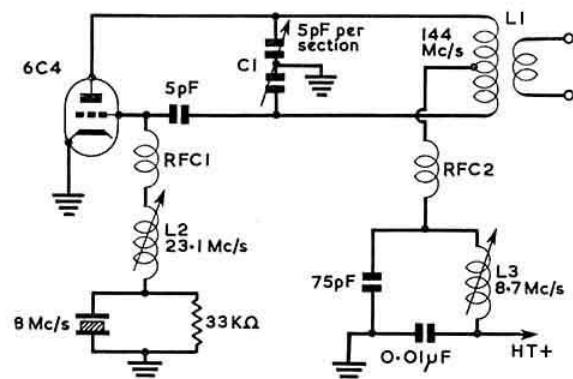


Fig. 4. W6HPH's v.h.f. crystal oscillator circuit giving output on 144 Mc/s from an 8 Mc/s crystal. C1 is a butterfly type capacitor. L1, 5 turns 20 s.w.g., $\frac{1}{8}$ in. dia., $\frac{1}{2}$ in. long, centre tapped, with two turn coupling link; L2, 17 turns 27 s.w.g. enamel, wound on $\frac{1}{8}$ in. dia. slug tuned former; L3, 12 turns 27 s.w.g. enamel, wound on $\frac{1}{8}$ in. dia. slug tuned former. The two r.f. chokes are 30 turns 27 s.w.g., $\frac{1}{8}$ in. dia., $\frac{1}{2}$ in. long.

108 Mc/s helical for satellite tracking is described by W0WVM in the same issue. Also noted for v.h.f. workers is W6HPH's single valve oscillator circuit (*QST*, November) capable of giving sufficient output on 144 Mc/s from an 8 Mc/s crystal (Fig. 4) to enable it to function as a local oscillator for receiving. The overtone crystal circuit "locks" a 144 Mc/s ultra-audio oscillator.

Another useful article in November *QST* is "Recommended Tube Types for Amateur Short Wave Receivers." A simple chart shows the "preferred" types for the various stages in a receiver.

An automatic tracking mobile system—to keep transmitter and receiver on the same frequency in the 28 Mc/s band—is described by W2CTK in the October *Radio and TV News*. This uses a double conversion converter and a mixer in the transmitter to accept control from the same 7 Mc/s oscillator. In passing, this oscillator is of some interest to mobile operators as it uses a coil wound on a high Q ferrite toroid coil which is easy to mount, does not require shielding, and which, it is claimed, completely overcomes the vibration effects of the car in motion.

One of the many technical articles in the bumper November *CQ* "annual" describes how to improve the simple four-valve regenerative superhet by W5DF, already noted in this column. At the other extreme W0DKC/2 tells us how to achieve complete control—via a single pair of telephone lines—over a transmitter, receiver and rotary beam located seven miles away!

International Transistor Exhibition

AN international scientific Convention and Exhibition promoted by the Institution of Electrical Engineers will be held at Earls Court, London, from May 21-27, 1959. More than 70 firms—British and foreign—will demonstrate how rapidly the transistor industry has developed in recent years. There are now at least 800 different types of transistors available.

During the Convention some 30 lectures and 200 papers will be presented by members of the Institution and guest speakers. Among the latter will be Dr. W. B. Shockley, Prof. J. Bardeen and Dr. W. H. Brattain who are credited with the invention of the transistor in 1948. More than 2,000 delegates are expected from almost every country in the world including Russia, East Germany and Poland.

Electrical Engineers Exhibition 1959

THE world's largest electric clock will be one of the outstanding features of this year's Electrical Engineers Exhibition to be held at Earls Court, London, from March 17 to 21. The clock face is 60 ft. in diameter. Another special attraction will be an advanced form of the *Son et Lumiere* spectacle.

Members of the R.S.G.B. may obtain complimentary tickets by writing to P. A. Thorogood (G4KD), General Manager, Electrical Engineers Exhibition (A.S.E.E.) Ltd., 6 Museum House, 25 Museum Street, London, W.C.1.

London Audio Fair 1959

MORE than 60 exhibitors will take part in the Audio Fair to be held at the Hotel Russell, London, W.C.1, from Thursday, April 2 to Sunday, April 5.

Radio Show 1959

THE 26th National Radio and Television Exhibition will be held at Earls Court, London, from Wednesday, August 26 to Saturday, September 5.

Modifying 6 volt Car Systems for 12 volt Mobile Equipment

By C. M. PEARSON, B.Sc. (G3IUQ)*

COMPARATIVELY little 6 volt power supply equipment suitable for amateur mobile gear, appears to be available so owners of cars with 6 volt electrical systems often have difficulty in getting a mobile installation on the air. Some years ago, the author built a small, self-contained low power trans-receiver for 160, 80 and 40 metres; the power supply was designed to operate from mains or a 12 volt battery. This facility was incorporated with a view to portable working. The current drain on battery operation was kept to a minimum and worked out to less than 3 amps for 5 watts input to the p.a. on phone.

When a vehicle was finally purchased much later, thoughts naturally turned to mobile operation but unfortunately the vehicle was a Ford 5 cwt van fitted with a 6 volt system. Having in mind the low operating current of the portable equipment, a 12 volt accumulator was bought and used as a storage supply, charged up at home and then used mobile. The accumulator, incidentally, was originally a 24 volt 11 ampere-hour aircraft battery with one of its straps cut and the two halves paralleled to give 12 volts at 22 ampere-hours. It has given very satisfactory service. Using this accumulator, the equipment could be operated for about seven hours mobile, but after that time exhaustion of the battery was fairly rapid! A petrol electric charging set partially cured the difficulty and allowed the gear to be used at a fixed site for indefinite periods but was far too noisy to be run up while mobile and caused great hilarity amongst other amateurs (those without similar problems, of course!).

The whole question was brought to a head by a decision to construct 2 metre mobile gear. Preliminary design and calculation showed that mobile operation with the existing arrangement of power supply was hopelessly impracticable, as some 10 amps would be required to run a rotary power supply and heaters on transmit for the desired 10 watts of r.f. output. The first solution which sprang to mind was to fit an extra generator to the engine, run off the fan belt. This idea was reluctantly discarded because of the expense of purchasing an extra generator, cut-out and new fan belt, not to mention the difficulty of making a new mounting bracket to take both generators. In the absence of these difficulties this would undoubtedly be the most satisfactory way of supplying the necessary power.

Thoughts were then turned to the existing 6 volt system with a view to "robbing" power. One possible way of voltage conversion which suggested itself was to run a vibrator supply from the 6 volt battery, giving 12 volts d.c. output, but a little thought showed that apart from the complication of producing such a supply, it would be very difficult to obtain more than about 3 amps charging current and the efficiency would be very low. It was felt that a rather more simple method of using the existing car generator would be necessary and much thinking was directed along these lines. First of all the existing installation was examined.

Properties of the Ford 6 volt System

The dynamo is the third brush type, giving constant current charging, no voltage control, but adjustable charging rate, set to give charge balance on full load. This charging rate was just sufficient to balance the full lighting load for

night driving, but during day-time driving in the mobile season the only load from the battery was an amp or two to supply the ignition coil and the battery bubbled continuously. The open-circuit voltage from the dynamo depended on the engine speed but was well over 20 volts at 30 m.p.h. in top gear. On connecting the dynamo to the 12 volt storage battery a very useful charging current of 18 amps was obtained at this speed. It was considered that for daytime driving the car battery could be maintained at a good charge level if supplied from the dynamo for perhaps a fifth part of the running time. The rest of the time the dynamo could then be used to charge the 12 volt storage battery. Assuming 50/50 receive/transmit operation of the mobile gear both batteries would thus be well charged since current demand on reception would be quite low with the rotary converter switched off and the receiver supplied by a vibrator pack.

The only change to the car electrical system necessary to charge the 12 volt battery was to the cut-out. Two cut-outs could be used, one for each battery, but it was found to be quite simple to modify the existing one. There are three connections to a Ford cut-out, two on the top to the dynamo and battery, and one below to earth. The earth connection is the end of the voltage coil and was unsoldered, connected to a length of flex and insulated. With this lead earthed, the cut-out came in when the dynamo output reached about 8 volts. Insertion of a 33 ohm wire-wound resistor raised the operating voltage to about 14 volts.

The necessary wiring was brought to the dashboard where a double pole change-over switch was fitted. One pole of this switch is used to connect the dynamo output to the 6 volt car battery or the 12 volt mobile battery as required while the other pole is used to short out the 33 ohm resistor in the cut-out voltage coil earthing lead when charging the 6 volt battery.

Results

In use the system has worked very well with no signs of dynamo overheating. This is to be expected as the excess voltage output affects only the field coil of the dynamo and this is well cooled by the case. The author has not as yet been left with a flat battery in the car, but a useful accessory would be a voltmeter to monitor battery voltage and give early warning of undercharging. Incidentally, since fitting this arrangement the consumption of distilled water by the car battery has decreased markedly!

One last hint to those at present using a rechargeable storage accumulator; after connecting up to the car dynamo it will almost certainly be necessary to insert filter circuits to reduce ignition and "hash" interference. The author found that apart from the expected dynamo and ignition interference, the power lead to the vibrator power supply was a prolific source of interference although filters had been incorporated in the original construction. This may be reduced if the power leads are twisted together along the whole run.

I.S.M. Equipment

REGULATIONS designed to reduce electrical interference with radio equipment are in the course of preparation following acceptance by the Postmaster-General of recommendations by the Humphries Committee which has been studying interference caused by industrial, scientific and medical equipment.

The Humphries Report recommends that there should be regulations covering the manufacture and use of new electro-medical equipment and on the use of existing equipment of this type. The regulations for dealing with new equipment would come into force one year after being laid before Parliament and those for dealing with existing equipment two years later.

* 37 Vale Road, Bushey, Herts.

THE MONTH



DATE TIME	FREQ.	STATION CALLED	CALLED BY	STATION HEARD OR WORKED			IF QSO RESULTED			REMARKS
				R	S	T	R	S	T	

ON THE AIR

By S. A. HERBERT (G3ATU)*

DURING the past month, conditions have been variable to say the least and one particularly potent sun-spot put paid to DX on the h.f. bands for several days. The appearance of this monster spot coincided somewhat unfortunately with a B.B.C. Television visit to the Science Museum where G5CS had the Museum station GB2SM tuned up on 10m with a W8 standing by, but when the cameras were ready the U.S. band was as dead as a Dodo. Result: a solid QSO—with Reading!

January 17 and 18 saw our own big DX event—the B.E.R.U. Contest—come and go in conditions which could have been very much better. On the Saturday, both 28 and 21 Mc/s seemed much below par, while on 14, although the DX was there, so were short-skip stations in their hundreds, with the result that rarities like VQ8AL soon vanished under a yelling mob of continental callers. Indeed, even the more usual Empire prefixes were harried considerably and the fact that ZC4 and ZB1 stations among others had to cope with calls from dozens of non-contestants after every "CQ BERU" seems to point the fact that to a large proportion of the world's amateur population, the letters "BERU" convey absolutely nothing.

We hope to have more about experiences and results next month; meanwhile, to happenings farther afield.

News from Far and Wide

Misrah Is.: Brian Smith (VS9AS) should now have started a six months' tour of duty on Misrah, an island forming part of the Sultanate of Muscat and Oman and he proposes to use the call-sign VS9OM while there. Operation will be on 14,050 kc/s, c.w. only, with 8 watts input to a 6V6 into a dipole, so the DX brigade will have to listen carefully. As to the necessary permission to operate, the P.M.G. Aden cannot help and previous applications by other amateurs to the Sultan of Muscat have met with no reply. VS9AS will himself make application to the Sultan and should no acknowledgement be forthcoming he will feel entitled to go ahead, as he has his commanding officer's permission to set up a station and would presume that the Sultan was simply not interested in the matter. *Late news:* VS9OM is now active daily from 23.00 G.M.T.

Malta: ZB1BF announces a ZB1 "activity weekend" to be held by the Malta A.R.S. The times are 12.00 G.M.T. on February 28 to 23.00 on March 1 and both phone and c.w. will be used on all bands. The object is to help all who need a Malta QSO. Top Band possibilities sound interesting.

Hong Kong: VS6EF is active again after a spell as ZC5CB (Labuan). Clive, together with VS6ED (Bryn, G3MDD) and VS6EE (Phil, ex-GM3LYZ) are on 14 Mc/s each evening.

Cyprus: G6TA passes news from ZC4BE that the ZC4QL calling himself Paphos on 7 and 14 Mc/s phone (QTH Larnaca) and ZC4YL (Myra) using 7 Mc/s phone, are pirates. Don't work them.

Cyprus on One-sixty metres: G3IGW reports that ZC4IP is on Top Band from 23.00 G.M.T. every Saturday until 01.00 Sunday. George uses 1799 and 1820 kc/s, with 100 watts and a 137 ft. wire. His signals were RST569 in

Halifax while working DL1FF. He has already worked UA9CM and OK, but has heard no Gs as yet. **B.R.S. 20317** has heard ZC4IP (1799, 00-15) and he has some additional information on UA9CM. The UA9 is on 1790 to 1800 kc/s from about 22.00 and will listen on 1850 kc/s by arrangement. Already he has worked UB5KAI, UA3KAF and ZC4IP and he hears GI, GW and GM, so things look promising for some real DX.

Sudan: G3JKO, settled near Khartoum, now signs ST2KO. His QTH, with Omdurman Radio's aerial mast just across the river and the nearest TV set hundreds of miles away, allows him to use a 6AG7/6V6 10 watt rig built on a wooden chassis without a qualm! Michael is mostly on 14,050 kc/s, using a 7025 kc/s crystal. Four weeks activity on 14 Mc/s produced 42 countries in all continents due, he thinks, as much to his being 1,000 ft. a.s.l. as to his DX call-sign. He was surprised to find that the Sudan Government had special forms for Amateur Radio licence applicants—surely they can't use many—and the "ticket" costs £2 1s. 0d. a year. His own station was checked and passed by an army lieutenant, who first made sure the aerial was safe and would not drop on to overhead power cables. QSLs for ST2KO may go via R.S.G.B. Bureau or direct to Dr. M. Dransfield, Cotton Breeding Section, Research Division, Ministry of Agriculture, P.O. Box 30, Khartoum North, Sudan. (For personal reasons ST2KO had to return home during January—more anon about his ST activities—EDITOR.)

U.S.A.: W7YKQ (Las Vegas) with 1 kW on c.w. and s.s.b. is active on 14 Mc/s. He will be glad to work those needing Nevada and is to be found on 14,080 c.w. and 280-297 kc/s s.s.b. on Tuesdays and Thursdays from 06.00 to 08.00 G.M.T. and weekends from 06.00 onwards. K2OEA wants to trace VP8BW (Jack), who was worked during 1957 while in the South Orkneys. DX news from K2OEA mentions the new country status for DXCC purposes recently granted by A.R.R.L. to Danger Is. (Puka Puka) and to the Republic of Guinea. KH6MG/ZK1 and FF8AC/GN were on recently from these places. The San Diego DX Club is to visit Socorro Is. (XE4)—March is a possibility. T8 signals from VP2SH and VP2SK (St. Vincent), around 14,045 kc/s suggest they use the same rig.

Singapore: G3MRC suggests that those needing VS1FW or VS2FW QSLs should write to them c/o his own home address: 53 The Walronds, Tiverton, Devon.

Aden: Iain Dunbar (B.E.R.S. 994) writing from V4 Bandar Sheik, Little Aden, Aden Colony, reports that he has been granted a licence under the call VS9AE. He hopes to be on the air very shortly on 21 and 28 Mc/s phone.

Ten Metres DX

Turbulent solar conditions or no, *ten* has had some worthwhile openings and G3GQK (London, S.E.23) made the most of them by working VQ3PBD, XW8AL (14.00), VS9AS (12.00), VK and 9G1, though "Blondie" could only listen to VS6AD (11.00), G13JIM, TG9AD (15.00), KZ5OB, VQ2VZ and XE2PY (14.00), all on phone.

G3IGW (Halifax) worked CR7BN, ET2HM, FB8CJ, OD5LX and ZD2GUP on c.w. with PJ2MC (St. Martin),

* Roker House, St. George's Terrace, Roker, Sunderland.

W7CKE (Nevada), ZD1FG, ZD3E, ZD6JL and a ZP on phone. Mike's beam has clearly defied the elements! G3LKZ (Cleaton) got ZD2GUP and CN2AQ on the key, while G3MMP (Pinner) raised VS9AQ, 9G1AA, SV0WAD, ZC4 and ZS6 during the R.S.G.B. Phone Contest. Since then, he has fed his 66 ft. aerial in the middle with 300 ohm line; QSOs with XZ2SY (his best yet), VQ3 and ZS6 resulted—S9 reports were given him, too.

A.1798 (London, N.W.10), logged VP2LS, KR6QM and FF8AP on phone, while B.R.S. 21918 (Hayes), heard KR6s (09.00-11.00), JA3IS, VE3EDG/SU (16.00) and VS6 on A3 and HX1HZ (13.00) on A1. B.R.S. 20135 (Newport, I.O.W.) settled for ZL3JO, VE8TO, VP9DC, ZD6RM, MP4BBZ, ZD2CKH, ZD3E, OQ0PD, CT2AH, VK4 and VS6 on phone, while B.R.S. 20317 (Bromley) logged IS1FIC, VP2DW, UO5PK (c.w.) and VK9DB (phone). A.1744 (Galston, Ayr) used a two-element beam to bring in EL2F, FB8ZZ and W7YOH on A3, used also by A.1743 (N. Harrow) to log PJ2MC (18.00), KR6, VQ2, HR2MT plus W7YAT and W7UFB. Derek listens on a simple 0-V-1 with an RF24 ahead on 28/21 Mc/s. This combination, with an 8 ft. indoor wire, has given him 102C/28Z in four months on the bands.

B.R.S. 2292 (Hounslow) mentions CM9AA, CO5CN, CR6DA, HK7LX, VE3CDP/W7 (Utah), VE8SQ, ZD6JL, ZS3AG and ZS4G on phone. A.1657 (Gomersal) is one of the keen members of club station G3MHB, eight of whom are licensed. Six weeks almost solid listening pushed the A.1657 total from 42 to 72C, the latest being VP1XM, FF8AP, XW8AL, LX1HM and OD5AB. John also tunes the 38/40 Mc/s band and hears several unreadable Russians (RA1, RB5, RL7, etc.). Modulation is poor, so he's looking for some c.w.!

The Fifteen Metre Story.

Livelier than ten but still jammer-ridden, the band takes patience and fortitude if one is to dig up the good stuff 'neath all the noise. G3KAA (Luton) succeeded in working

9K2AN (11.30), MP4BBE and HZ1HZ (14.00) on c.w. ere moving elsewhere. G3LKZ emerged with KR6AK ('080, 12.00), VQ3CF, UA0KAR (Dickson Is.), CR6, CR7, etc., though he missed rarities such as VK9AD, VK9DB, BV1US, ZD1FG, VR2 and VP2DW, all on c.w. G3KGV (Sunderland) has also been chasing VK9AD to no avail but he did hook BV1US. G3MMP got IS1BCO for a new one, with the help of "some atrocious French"!

B.R.S. 20315 logged VKs, ZLs, VP2KH and a rare one—HL9KS (09.50)—on phone while A.1798 heard JA1ACB, ZL and VK on A3. B.R.S. 20317 used c.w. to unearth VP2DW, VP9EB, EA9AQ and VK6BE from the competing noises.

LA6VC says LA2JE/P is on 21 Mc/s (13.00-14.00) and also on 14 Mc/s ('025 and '080, 21.30), while Svalbard's LA4CG/P is also active on both bands.

A.1744 thought the band best of all for DX and he logged K4AWS/KH6, VR2DE and VR2AZ, all new ones, on A3. S.s.b. provided DX such as TF, KG1, SV0WE (Rhodes), SV0WT (Crete), XE1ZM, VQ3ERR and FS7RT (QSL received). A.1743 heard ZE4JH, ZD1FG, VQ2, ZL and ZD6RM, who closes down from his present QTH on March 7. B.R.S. 2292 logged ZS5RO and FM7WX (A3) and pulled in W7DXM and W7TPE (both Montana) on the key. A.1657 heard ZP5MN (YL), OQ5FH (YL), VP9EB and FE8AP.

Tom Knight, G2FUU (near Waltham Abbey, Essex) worked a few new ones including 9G1AA, PY0NA, VS9AW and JA1BF on 21 Mc/s and ZE1GT, ZD6RM, TI2OE and VE7ZM on 28 Mc/s during the R.S.G.B. Telephony Contest. He was impressed by the good spirit of the contest.

Twenty Metres

Things are improving on twenty again and as usual the rarities tend to favour the band. G3LKZ made c.w. two-ways with HC4IM ('033, 10.50), OA4FA, KH6IJ, VK7UW, VK7KS and HZ1HZ ('080, 17.00). G3LKZ, incidentally, also QSOed YK1AT ('080, 1957) and heard

Frequency Predictions for March 1959

PREPARED BY J. DOUGLAS KAY (G3AAE)

BAND	NORTH AMERICA East Coast	NORTH AMERICA West Coast	CENTRAL AMERICA	SOUTH AMERICA	SOUTH AFRICA	NEAR EAST	MIDDLE EAST	FAR EAST	AUSTRALIA
M.U.F.	31.5 Mc/s 1800	24 Mc/s 1915	39 Mc/s 1300	41 Mc/s 1200	42.5 Mc/s 1130	40 Mc/s 1000	40.5 Mc/s 1030	41 Mc/s 1145	34 Mc/s 0930 SP
28 Mc/s	1200/2115	1915	1015/2100	0930/2100	0730/2000	0730/1745	0700/1730	0730/1500	0730/1400 SP
21 Mc/s	1030/2145	1700/2045	0900/2330	0815/1130 1800/0300	0530/0830 1300/0200	0615/2030	0930/1945	1130/1315	0900/1800 SP 0730/1100 LP 2200/0100 LP
14 Mc/s	0900/1200 2100/0200	0100/0900	2130/0900	2200/0830	1730/0500	1400/0900	1530/0300	1630/2200	1430/2200 SP
7 Mc/s	0000/0700	0600	0200	0400	0000	2030/0500	2200	2000	1600 SP
3.5 Mc/s	0400	0600	0200	0400	0000	2330/0130	2200	2000	1600 SP

DX TELEVISION PREDICTIONS: ADEN 0800/1300, ACCRA 0900/1400, CAPE TOWN 1100/1400, JOHANNESBURG 1000/1300, DAKAR 1100/1300, NAIROBI 0800/1300, SALISBURY 0900/1330. Based on B.B.C. Channel 1 sound frequency of 41.5 Mc/s. (Vision frequency is 45 Mc/s). These predictions are based on information provided by the Engineer-in-Chief of the Post Office. All times are G.M.T.

VP2MO (Montserrat) on s.s.b. up on '300 kc/s. G3ATU worked his first new one for months when VS9MI (Maldives, '050, 19.00), came back. He was about to go to bed, but couldn't resist answering a G. Good show!

G3KAA caught FS7RT on c.w. for a change (00.20) and also worked ZD2GUP and LX1RA, but Danny Weil on '075 from VP2DW, VP2LW, VP2SW hears only the nearby W legions.

QTHs from G3KAA are: ZD1GM—P.O. Box 67, Freetown; MP4DAA—Box 330, Bahrain Is.; FQ8AJ—P.O. Box 2023, Brazzaville.

A.1580 (Bristol) opens his reporting with FO8AG (c.w.) and UC2KAB (phone). B.R.S. 21918 logged XZ1T1 (XZ2T1?) on c.w. B.R.S. 20135 stresses the evening DX openings, which meant phone for him from VU2NR (19.20), VK5LT, VK5OB (20.30), ZETJR, HZ1SN, 9G1CT, SV0WT and KG4AA, with 9K2AM and ET2US on s.s.b. B.R.S. 20317 extracted yet more new ones from the c.w. end of the band, his catches being CR5AR (St. Tome Is. '030, 22.00), PY7AFN (Fernando da Noronha, '058/'068, 19.30 to 02.00), ZD1GM ('032, 00.00) and VP2DW, with VP2LW, VP8BK, LA2JE/P, PJ2ME ('050, 00.30), ZL5AC (Antarctic), ZK2AD ('050, 18.00), ZD7SA and ZD7SE ('070, 20.50) for good measure. DX news from B.R.S. 20317 is of KJ6BV (ex-W2EPS/KJ6) on s.s.b., '235/'268, 10.00; CR9AH on '305 kc/s s.s.b. and MP4DAA on '046 on Saturdays from 12.00 to 16.00. MP4TAC may be on '150 daily from 15.00 to 17.30.

A.1744 heard HV1CN and IS1 (new ones), VP3MC and FO8RG on A3, while A.1583 logged VP2DX, EL3A, KH6BX and ZD1FG (07.45) on voice. B.R.S. 2292 pulled in Crete (SV0WT) on A3 and he heard CE8AA, CX1NE, HH2LR, HZ1HZ, K7AHO (Wyo.), PZ1AP and VK7AB on A1.

Forty Metres DX

Forty seems to be coming back into the DX picture to a certain extent these days. B.R.S. 2292 finds a definite trend towards the band and he heard Gs calling W phone up to 11.00 recently. He found the periods 06.30 to 07.00 and 20.30 to 22.00 best and at those times he came upon all W districts, with K6FEG and W7FB the best, EA8, CN8, PY, UF, UN, UA9, ZD2GUP (21.00), 5A3TQ and 9G1CX (06.45).

G3MMP worked UO5II (Ivan, 20.10) on c.w. and A.1580 heard a host of Ws on phone, W0ERB, W5DBN and W5ZHR among them. G2PU was calling ZL2BE on the band, but apparently in vain! B.R.S. 20317 has always been keen on forty and this time he picked up HZ1HZ, KL7FBO (00.50), OD5LX (23.30), PJ2MF (00.30, 02.30), U18AK (16.40), UL7, UA0KAD, VP4LP (00.20), W6YMD (03.30), CT2BO and KS4AZ (Swan Is., '010, 00.50), plus a single A3 station in VP3VN ('010, 00.30).

Eighty Metres and Above

International contests seem to have stirred even eighty from its local stupor and B.R.S. 20317 heard FA9VN, UA9CM, '9KAG, '9SB (21.00, 00.00), VE1ZZ, W9LNM, plus YK1AT (02.30, 3505) and HZ1HZ (02.25, 3505). HZ1HZ surely has been active. That makes five bands he's been on this month.

On January 11, one-sixty opened to the U.S.A. and B.R.S. 20317 heard W1BB, W1PPN, W2GGL and W9PNE (07.15). A.1743 used a simple 0-V-1 to log DL1FF (00.00).

* * *

So ends the first M.O.T.A. of a new year, one that holds great promise of DX on just about all our bands. May it live up to expectations! Meanwhile, many thanks for all the reports and items of news. Keep the ball rolling and send your next contributions to arrive, please, by February 19 if possible. Good hunting again and 73.

R.A.E.N. Rally 1958

THE R.A.E.N. Rally, held on September 28, 1958, was once again well supported, and all entrants seem to have thoroughly enjoyed the event. The new series of test phrases proved to be excellent and put all operators on their metal in their efforts to pass them correctly. In the majority of cases this was accomplished, but on a few occasions the test phrases came to grief, although they did not reach the "Dancing on a wet plank" stage. Spelling errors seemed to be the greatest stumbling block but this was possibly due to the technical nature of the test phrases.

Outstation and Fixed station scores were mixed by some entrants and had to be separated by the judges. The logging of duplicate entries by a couple of stations caused their claimed scores to be considerably reduced.

Some parts of the country were well represented, but unfortunately no entries were submitted from other areas. It would greatly assist in future rallies if all active stations would submit logs if only for check purposes. Only about 50 per cent of those who took part in the transmitting sections submitted logs.

Special congratulations go to J. H. Sleight (A.1564) on achieving second place in the Receiving Section with 300 points, a very good effort for a youngster of 15. His entry was most noteworthy because he lives only 100 yards from a 40 kW transmitting station which is constantly on the air.

More operating took place on 160m. than on any other band, but 80m. seems to have been busier than in previous years. Activity on 2 and 10m was at a very low level, and seemed to serve only for local contacts.

Congratulations go to the leading entrants in each section, especially to Mrs. M. Jackson, who has now won the Receiving Section for the third year in succession.

Check logs from G3ELZ/M, G3FZW, G8ON and G8QX are acknowledged with thanks.

RESULTS—R.A.E.N. RALLY 1958

Fixed Stations					
Position	Call-sign	Points	Position	Call-sign	Points
1	G3BMY	94	24	G2AYQ	30
2	G3TN	87	25	G3MVF	28
3	G3GVM	68		G4IV	28
4	G3NLD	64	27	G3LXG	24
5	G3LDA	59	28	G3LWQ	23
6	G3GYV	54	29	G3GNS	21
7	G3LUG	50		G3MOE	20
8	G2ATS	50	30	G8DT	20
9	G2AO	47		G3LNN	20
10	G3CGD	46	33	G3GGH	17
11	G3JFH	44		G3HRK	17
12	G3DWQ	43	35	G3MC	15
13	G3JXS	42	36	G3ICX	14
14	G3LVP	41		G3AET	12
15	G4XC	39	37	G2BCX	12
16	G3IHH	39		G2HKS	12
17	G3MZB	38	40	G3DCJ	11
18	G3EFA	35	41	G6NU	10
	G3HIU	35		G6KT	9
21	G3HTI	35	42	G3KFY	9
	G3ERB	32		G3FPV/A	9
22	G3HSG	31			
	G3AVE	31			

Outstations			Receiving Section		
Position	Call-sign	Points	Position	Name	Points
1	G3CSG/P	83	1	Mrs. M. Jackson	393
2	G3BTU/P	61	2	J. H. Sleight	300
3	G3LBU/P	52	3	V. W. Stewart	105
4	G3CUZ/M	44	4	K. J. Creamer	96
5	G3HRK/M	43	5	W. Locke	90
6	G3BCX/M	39	6	P. Dennison	72
7	G3ERB/M	37	7	J. R. Pledge	64
8	G3GXZ/M	35	8	A. R. Dexter	63
	G3MFL/P	35	9	D. A. Youngman	45
10	G3JFH/P	32		J. R. Toothill	36
	G3LNN/M	32	10	M. Rentell	36
12	G3HAN/M	25		D. Brooks	18
13	G6ZV/M	8			

FOUR METRES



AND DOWN

By F. G. LAMBETH (G2AIW) *

A Decade Ago

THERE has been some interesting comment on the early days of 2m from G3BLP (Selsdon), arising out of the recent remarks of G6LI. G3BLP says that from 1949 onward he was using a 16-element stack as also was G3ABA around that time, whilst pioneers like G2NH, G5MA and G2MR were already using 4-over-4s. From other QSLs many similar arrays are noted although there were quite a lot of 4 element wide spaced Yagis about.

The present converter at G3BLP (6AK5/EC91 cascode crystal controlled) was built early in 1949 and G3BLP doesn't really think it has been bettered, even today. Good receivers were also in use by G2NH, G5MA, G2MR, G6VX and G2AJ. Excellent versions of the G2IQ converter were to be found at many stations.

Portables and Mobiles

If you want good coverage for your holiday expeditions, don't forget to let G2AIW have an early note of inclusive dates, locations and frequencies for publication in *Four Metres and Down*.

In spite of a poor position for the Continent (G2NH was often heard working ONs, PAs etc. inaudible at Selsdon) the first F was worked in 1949, PA, ON and DL in 1950, with the first OZ in 1951. The opening of March 1950 has never been equalled in G3BLP's opinion, with some 50 PAs and ONs logged in one night. As it was the impression then that PAs mostly had 4 element Yagis and worked phone only, G3BLP then judged that better organization would lead to easier contacts (October 1958 still wants beating—G2AIW). Although East Coast stations like G6LI were regularly working PA, ON and F from early 1949, there was not much DL or Scandinavian activity until 1950. As a relic from 5m days, G6VX used a band-pass crystal filter, with a bandwidth of 1200 c/s. This was perhaps exceptional, but G2NH, G5MA and G2MR were using HROs as i.f. channels while G3BLP himself had a BC453 after the BC348; if necessary an FL8 filter was used as well. Although the gear quoted was used by a known group of stations, G3BLP is sure that leading stations elsewhere were also largely using comparable equipment. G3BLP has been intermittently active in the last two years and can still hear the DX as well as ever, but says it is now very difficult to get a reply to a c.w. CQ call; he fears many people overmodulate to get "RS2/2" QSOs when on c.w. they would be R5 and quite comfortable.

Two Metres

The period under review was probably the worst anti-climax as regards 2m and 70cm conditions that one could imagine. Almost all the reports speak of the same thing—little or nothing to hear or work—and at the end of the period, when pressure was higher, the weather was far too cold for most of the shacks. Oh well, it can't last for ever!

England

G2JF (Ashford, Kent) registers a protest against the decision to withdraw listeners reports on 2m. This is a

* 21 Bridge Way, Whitton, Twickenham, Middlesex.

retrograde step, he says—reports on 2m are in a very different category from those on other bands. However, for this month at any rate conditions seem to have taken care of things. G3EMU (Canterbury) should be returning to the band shortly.

G5DW (Ashcott) has been busy with converter modifications, modifying the original v.f.o. type to crystal control; he is now trying to cure break-through on the main receiver! One useful gadget on the new converter is variable amplitude on the injection voltage. G2XV (and many others) cannot understand why the c.w. contest had to be organized for a Saturday morning when surely many potential contestants would be at work.

B.R.S. 19162 (Dewsbury) will change air spaced coils for the slug tuned variety in the converter, instead of building a new one.

B.R.S. 20133 (Melton Mowbray) has no log for 2m stations (for about the first time) and this gives an idea of conditions; only G3JWQ and G6XM have been heard. Richard has been reading a new Penguin book entitled *The Face of the Sun* which he recommends to anyone interested in the Sun and sunspots and their effects on radio conditions.

Scotland

GM2FHH (Aberdeen) says there was strong visible aurora on January 9, but the beam was frozen solid in the southerly position. After very much effort it was moved, but it was then 11 p.m. approximately and no auroral signals were heard. The sked with G3BA (23.15) is temporarily suspended for a rebuild at both ends, but will re-commence during March. GM6IZ (Aberdeen) has appeared on the band and will be more active in future.

GM6WL says Glasgow has been quiet lately despite the fine visual aurora on January 9, followed by a faint recurrence for a short time on the Saturday morning. Nothing has been heard of any local auroral contacts, and G15AJ says that G2NY (Preston) was also disappointed.

GM3DIQ now has his big transmitter on the air, but only on phone yet, as there are some adjustments to be made in the keying circuit to prevent surges etc. It is hoped to be ready for the next aurora. GM3EGW has been heard working G3FZL and G3HBW on the most unlikely nights as far as weather is concerned. GM6WL's sked with G15AJ has continued successfully in spite of generally poor conditions. Seven contacts were made in the period.

Norway

LA9T (Moss) says Norwegian amateurs have now learned the procedure for working by aurora. If they hear a trace of the well known aurora signal from Dresden TV (145.26 Mc/s) they then call "CQ A" and immediately start working the Swedish stations, followed shortly after by GM3BDA, who appears to have a private channel on aurora for Norway and Sweden. The most recent openings were on December 17 and January 9/10 when many SM5, 6, and 7 stations were heard. SM7AED was worked on December 17 and on January 9 when SM7PQ and GM3BDA were also raised. On January 10 SM7BCX and DJ1EY were heard and worked.

Wales

GW3MFY (Bridgend) has had no DX, finding conditions and activity about as low as could be. Most of the time has been spent building a new c.c. converter to the design described by VQ4EV in November R.S.G.B. BULLETIN. The 47 K ohms resistor in the anode circuit of the 12AT7 Squier oscillator had to be reduced to about 1.8 K ohms before enough injection could be obtained, otherwise everything was fairly straightforward. GW3MFY asks if anyone can keep amateurs informed of the latest v.h.f. valves (especially receiving valves) including the price. Most of those specified in converter designs are obsolete, and it is a long time before people "not in the know" learn about the latest ones.

Seventy Centimetres

GM6WL reports that GM3DDE has been ill, and although better cannot join in the GM5VG skeds as his aerial was damaged by gales and had to be taken down. Meantime there is a Sunday morning activity period with GM6KH, GM3GUO and GM5VG. Sometimes GM6ZV and GM6WL join in as well. GM3NG ran a sked with GM6WL for 30 days continuously during the worst of conditions with only about 8 per cent variations on "S" meter readings over all.

SCOTTISH V.H.F. CONVENTION

Brablock Hotel, Renfrew Road, Paisley
(5 minutes from Renfrew Airport)

MARCH 14, 1959

2 p.m. to 11 p.m.

Lectures — Exhibition — Tea — Dinner
Visits to Local Amateurs

Tickets, including tea and six-course dinner, may be obtained, price 2/- each, from W. C. Bradford, GM3DIQ, 6 Langside Park, Kilbarchan, Renfrewshire. Members requiring hotel accommodation should inform Mr. Bradford immediately.

Six Metres

From the official Newsletter of the Radio Society of East Africa we glean the news that VQ5GF worked W1FOS, W2UTH, W3VIR, W8CMS and K2KLP on October 15. W1FOS, who uses 1 kW to a "long" long Yagi (the boom is 36 ft. long), was the strongest. East African stations are to keep 50/54 Mc/s although the I.G.Y. has ended. The band is retained on a non-interference basis.

K4ZY0 (Miami) heard VQ4EV on October 11 but as the band was only open for a few minutes no QSO resulted.

From the same source it is learnt that ZE1JZ contacted W0EDM and K0LHZ on phone, with W0DNW the strongest of the lot (November 4). W0DNW was again worked on November 6. ZE1JN heard W9ENW on the same day.

For LA9T (Moss) conditions were not so good in December-January as in the same period last year. On December 17 W1LGE was heard, while December 26 brought VE1ZR and the 27th W3SCE and K2ITQ, none of whom were worked. VE1ZR was worked, however, on January 3. On January 4 many W1s and VE1s were heard, while there were signs of auroral reflections on January 10 but no stations were heard.

G4LX (Newcastle-on-Tyne 3) is in his new QTH and hopes to be on again soon.

B.R.S. 21476 (Penarth) heard many Ws and VEs during December/January, including W/K 1, 2, 3 and 8 call areas and VE1. During the period fewer signals were heard than in the corresponding period last year. There have only been

intermittent short periods during the afternoons when signals have been audible, and for the majority of the time the band appeared to be dead. The m.u.f. has only just reached 50 Mc/s on peaks. XE1PFE states (on a QSL received by B.R.S. 21476) that on November 16 he worked W1, VE1, VE6, W7 and EI2W. He also heard SM6BTT but could not raise him.

Four Metres

G2JF, G5MR and G5MP are still trying hard on 4m in south-east Kent. They would welcome anyone to join in their schedules.

G5MR (Hythe) found conditions variable with local activity well maintained (and in this is included F8GH, although he is 112 miles away). The increased entry for the November contest seems to show that more Gs are coming on the band which makes G5MR particularly glad. On Sunday mornings between 1100/1200 clock time G5MR beams west and north to look for new stations either on c.w. or phone. His frequency is 70-232 Mc/s.

V.H.F. Skeds Required

Members of the Graz (Austria) V.H.F. Group wish to make 2m skeds with stations in all the G prefix areas. Those interested in making such arrangements should write to A. E. Pendl (OE6AP), Pluddemanngasse 49, Graz-Waltendorf, Austria.

London U.H.F. Group Dinner

Dr. R. L. Smith-Rose, President of the Society, was the Guest of Honour at the London U.H.F. Group's Annual Dinner on January 31. Others present included Dr. Karl Lickfeld (DL3FM), Chairman of the I.A.R.U. Region I V.H.F. Committee who flew from Germany specially for the Dinner, and Dr. J. A. Saxton of D.S.I.R. Altogether there was an attendance of about 40, v.h.f. enthusiasts travelling from as far afield as Bristol, Locking, Nottingham and Cambridge to be present.

LONDON U.H.F. GROUP

will meet at the Bedford Corner Hotel, Bayley Street,
Tottenham Court Road,
at 7.30 p.m. on Thursday, March 5, 1959
All v.h.f. and u.h.f. enthusiasts welcome.

Late News

During the Quadrantid meteor shower at the beginning of January, G3HBW heard HB9RG on each of the four days. On January 4, by meteor scatter, SM6BTT and OE1WJ made the first SM/OE contact. The contact period ranged over about three hours, part of which was, of course, "hearing" only. This was the third reported European meteor scatter contact, the second being another one between SM6BTT and HB9RG.

On January 26 there was an auroral opening, during which G5YV believes he heard an OH, but this is not so far confirmed. The night of January 27 was marked by a tropospheric opening, the first for some time, during which many PAOs and DLs were in evidence.

The C.W. Contest on January 24 was well supported, although conditions were not as good as they might have been. Several QSOs of 100 miles and over were achieved, but apparently nothing spectacular occurred.

Let's hope for better things next time. The February deadline is the 18th.

Russian Rocket Frequencies

MR. C. T. FAIRCHILD (G3YY) of Brighton has drawn attention to the fact that the frequencies referred to at the end of the I.G.C. article in the January 1959 BULLETIN applied to the Russian Cosmic Rocket and not to *Sputnik 3*.

FEBRUARY is not the most likely month for mobile operation but it is a time when the ardent mobileer really gets down to the work of preparing for the season ahead. Time spent now on putting gear into first class order will be well repaid in operating pleasure later on. Meanwhile, the organizers of mobile rallies and meetings are laying their plans and, as a glance at *Dates for Your Diary* elsewhere in this issue will show, events have already been arranged for April 26 (North Midlands), May 3 (Penryn, Cornwall), May 10 (Cheltenham) and June 14 (Longleat). All being well, another rally will be held at Woburn in September but before final arrangements are made we should like to receive comments from readers on views that have been expressed in some quarters that a rally should not be held at the same venue more than two years running and that there are too many rallies, anyhow. There is, of course, always a danger in slavishly following a formula which has been found to work on a previous occasion but whether the average mobileer and his family are beginning to feel that way about mobile rallies we just don't know. Comments will be greatly appreciated.

Shacks-on-wheels

One of the great attractions of a rally is that it provides an unparalleled opportunity to inspect the other man's shack-on-wheels. The newcomer to mobile is probably particularly interested to get some idea of how other people have tackled the problem and it is hoped therefore that the following brief descriptions of some of the installations seen at the Woburn Abbey rally last year will be of interest. The registration number of the car in use at the time is shown in brackets below the call-sign.

- G2CAJ** (TYX252) Transmitter—100 watts input to modified Command equipment with 24/12 volt series/parallel charging system; aerial—continuously loaded step-switch fibre-glass whip.
- G2DQ** (2259HK) Transmitter—12AU7 v.f.o.—cathode follower, EF91 buffer-doubler, 6V6 p.a. modulated by 12AX7, 6C4 and p.p. 6AQ5 (for 1.8 and 3.5 Mc/s); ancillary gear—internal monitor and artificial aerial, remotely tuned aerial.
- G2SR** (PMM129) Transmitter—6SJ7 oscillator, 6AG7 buffer-amp., 1613 p.a. modulated by 6SJ7 and 12A6; receiver—Bendix.
- G3AKU** (LEW377) Transmitter—12AH7 oscillator, 12A6 p.a. modulated by 12AX7, 6C4 and 12AX7.
- G3APY** (WRR519) Transmitter (144 Mc/s)—6BJ6 crystal osc./tripler, 6AK6 tripler, EL85 doubler, QQV03/10 (22 watts input on c.w.) modulated by 6BJ6 microphone amp. and ECC81 gating modulator; receiver—quadruple superhet with crystal controlled first oscillator and ECC88 cascode r.f.; aerial—halo.
- G3ATL** (PUT800) Transmitter (1.8 to 28 Mc/s)—6AU6, 6L6, 807 p.a. modulated by 12AY7 and 6L6s in AB1, mounted in boot; receiver—modified P58CR; aerials—loaded whips mounted on rear of car.
- G3BG** (938ATO) Transmitter (1.8 Mc/s)—12SK7 v.f.o., 12AC7 b.a., TT11 p.a., modulated by EF37A, 6SN7 and 6N7; receiver—12SK7, 12K8, 12SR7 and 12A6; aerial—centre-loaded 8 ft. whip with remote controlled base coil for QSY.
- G3BJF** (KOE685) Transmitter—6AG7 v.f.o., TT11 p.a. (4.5 watts), 6V6 modulator; receiver—homebuilt.
- G3BMD** (BNH513) Transmitter—EF50 v.f.o., TT11 p.a. choke modulated by 6J7 and EL32; receiver—R.1124 with modified front end and one stage converter for 1.8 Mc/s.
- G3CBE** (LHV228) Transmitter—EF91 v.f.o., EF91 b.a., QV04/7 p.a. modulated by 12AX7 and EL84; receiver—Command; aerial—12 ft. 6 in. base-loaded whip.

- G3CJM** (2716NO) Transmitter—EF91 v.f.o., EF91 w.b.a., QV04/7 p.a. (6.9 watts input), 12AX7 and 12AU7 speech amplifier, 12AX7 in zero bias class B modulator; receiver—12SK7 r.f., 12K8 frequency changer, two 12SK7 i.f., 12C8 a.v.c./det., 12H6 n.l., 12A6 output; aerial—centre-loaded and tuned by roller inductance from driver/operator seat by flexible drive.
- G3EVV** (917MML) Transmitter (144 Mc/s)—EL91, EL91, 6C4 and QQV03-10; aerial—halfwave dipole.
- G3FIY** (ULF214) Transmitter comprises v.f.o., buffer and p.a., series clamp modulator; receiver—much modified Command set; aerial—ferrite centre-loaded.
- G3FXA** (FDY525) Transmitter—6SN7GT v.f.o. and buffer, 807 p.a. modulated by 6C4, 6J6 and p.p. EL91; receiver—EF80 and X78 to modified R23/ARC5; aerial—base loaded. Complete station works from 6 volt vibrator giving 200 volts at 100 mA.
- G3FZB** (GVE621) Transmitter—built into BC610 tuning drawer for 1.8 and 3.5 Mc/s: 6C4 Clapp v.f.o., 6C4 b.a./doubler, 6BW6 p.a. modulated by 12AU7 and 12AX7 in class B; receiver—CG46116; aerial—centre-loaded whip.
- G3GMN** (MHY368) All bands 1.8 to 30 Mc/s.
- G3GVN** (JA9474) Transmitter—12A6 v.f.o., 9003 b.a. and 12A6 p.a. modulated by 6SJ7, 6C4 and EL41.
- G3GXZ** (PNB554) Transmitter (144 Mc/s)—ECC81 Squier osc. to 72 Mc/s, EL91 doubler, QV03-12 p.a. (10-12 watts input); receiver—ECC81-ECC81 converter into EF91-EF92-EF91-EB91-ECC83-EC91 and EL90; both remote controlled.
- G3HLI** (OAC594) Transmitter—Z77 c.c.o., Z77 b.a., 5763 p.a. modulated by 12AU7 and p.p. 6AQ5; receiver—Command receiver for 1.8 Mc/s; aerial—centre-loaded 11 ft. 9 in. whip.
- G3JEQ** (SPK876) Transmitter—EF91 v.f.o., EF91 buffer-doubler, QV04/7 p.a. modulated by 12AX7, 12AU7 and 12AX7 in class B; receiver—R109.
- G3JPN** (TVP321) Transmitter—6SH7, 6AU6 and two TT11s (9 watts input) modulated by 12AT7, 12AU7 and p.p. 12A6; receiver—Command set for 1.8 Mc/s with twin noise squelcher; aerial—centre-loaded 9 ft. 3 in. whip fed by open wire feeder from pi output circuit.
- G3JQP** (6004F) Transmitter—EF91 v.f.o., 6F14 b.a., miniature 807 p.a. modulated by 12AX7 (speech amp.) and 6V6; receiver—modified Command receiver for 1.8 Mc/s; aerial—12 ft. centre loaded with variable resonance.
- G3JXA** (VPH603) Transmitter—6AM6 switched fundamental oscillator on 1.8, 3.5 and 7 Mc/s, two 6AM6 b.a.-multipliers, QV04/7 p.a. (5 to 6 watts input) for all bands 1.8 to 28 Mc/s; receiver—6BJ6 r.f., X78 mixer-oscillator, two 6BJ6 i.f., crystal diodes for detector and n.l., 12AU7 b.f.o. and first audio, 6V6 output (same valve is driven by 6AM6 and 12AU7 for modulation).
- G3JZW** (NNM184) Transmitter—EF91 Clapp v.f.o., EF91 w.b.c., 5763 p.a. (6 watts input) modulated by 12AX7 and 6BW6; receiver—12AH8, two 6BA6 i.f., DH77 det. and 12AT7 output and v.f.o. (complete unit measures 4½ in. by 10 in. by 8 in.).
- G3KEU** (FEL416) S.s.b. transmitter—EF91, 12AT7 audio, 12AU7 balanced mod., 12AU7 carrier oscillator and v.f.o., half-section lattice filter (461 kc/s), EF91 class A amp., two 6AQ5 linear p.a.
- G3KVF** (RJJ820) Transmitter—Gelosio v.f.o., 5B/254M p.a. modulated by 12AX7 and two 6BW6s in class AB1; receiver—Minimixer converter into modified car radio fitted with S meter, n.l. and squelch.
- G3LLK** (XMV457) Transmitter—6AM6 v.f.o. or c.o., TT11 p.a., Heising mod. by 7F7 driving 6L6; receiver—modified Motorola broadcast.
- G3MED** (BRE246) Top Band—6V6 p.a. modulated by 6L6 feeding 12 ft. whip and R.1155 receiver.
- 420 Mc/s—modified APS13 with two 6J6 in push-pull, 5 element aerial.

* Assistant Editor

- G3MNM (GTD740)** Top Band—6G6 c.o., 12A6 p.a. modulated by 12AT7 and 6V6 (8 watts input).
144 Mc/s—four EF91s (2.5 watts), p.a. modulated by 12AU7 and 12AX7.
420 Mc/s—two 6J6 in self-excited p.a. modulated by 6AG5 and 6AQ5.
Aerials—6 ft. loaded whip for Top Band, dipole for 144 Mc/s and 5 element bi-directional beam for 420 Mc/s.
- G3MQT (BWR195)** Transmitter—12A6 c.o., 1625 p.a., modulated by 12AX7, 12AU7 and two 6AQ5s in class AB1 (covers 1.8, 3.5 and 7 Mc/s); aerial—4 ft. base-loaded whip.
- G3MWG (OVE907)** Minimixer converter into modified Command receiver at 1.5 Mc/s.
- G3WW (RFG555)** Transmitter—EL91, 6C4 b.a.-doubler, 5763 p.a. for 1.8 and 3.5 Mc/s with voice controlled send-receive switching; receiver—Command type; aerials—centre-loaded whips.
- G3XC (TPP198)** Transmitter (1.8 Mc/s)—12AT7 c.o., 5763 p.a. modulated by 12BA6, 12BA6 and 12BH7.
- G4IB (WKJ968)** Transmitter (144 Mc/s)—1.2 watts input to 12AT7 p.a.; receiver—6BQ7A cascode, 12AT7 mixer-oscillator followed by 10.7 Mc/s i.f. and 465 kc/s second i.f.
- G5PP (RWK967)** Transmitter—Z77 c.o., Z77 b.a. 6L6 p.a. modulated by 12AX7 into 6L6; receiver—modified Command set for 1.8 Mc/s; aerial—whip with matching box at base.
- G6NW (261MMG)** Transmitter—12AT7 Tesla v.f.o. and cathode follower, EF91 b.a. and two 5763s in parallel in p.a. modulated by EF91, 12AT7 and p.p. 6V6s (covers 1.8, 3.5 and 7 Mc/s); aerial—continuously loaded whip.
- G6SN (GVW708)** Transmitter (144 Mc/s)—12AT7, Z77 to QV04/7 p.a. (12 watts input); receiver—cascode comprising 6AK5, EC91, 12AT7, two 12SG7, 6SQ7 and 6C5.
- G8ML (SDD720)** Transmitter—6SJ7 oscillator, 6SJ7 b.a. and 5763 p.a., modulated by Z77, 6C4 and 12AX7.
- G8TL (OJN717)** Transmitter—6CH6 v.f.o., 5763 b.a.-doubler, 5B/254M p.a. for 1.8 to 28 Mc/s; receiver—6BJ6, 20D4, 6BJ6, 12AT6 and 6BW6 with converter (6BJ6 and 6U8) for higher frequency bands.

Corrections and additions to this list will be welcome and should be addressed to *Mobile Column*, R.S.G.B. BULLETIN, New Ruskin House, Little Russell Street, London, W.C.1.

Top Band Most Popular

Unfortunately, the newcomer to mobile cannot tell readily from this list which is the most popular band for mobile operation. However, checks show that about 70 per cent of all mobiles operate on Top Band, and about 25 per cent on 144 Mc/s. A high proportion of those on Top Band can also operate on 3.5 Mc/s. Mobile operation on all the other bands up to 420 Mc/s has been reported; but the proportion is very small. Equipment for Top Band work is comparatively easy to get going but in the past the outside aerials have appeared to be rather a disadvantage. However, good results are now being obtained by many stations, using whips of reasonable length, and at least one manufacturer has made such aerials available commercially. Aerials for 144 Mc/s present no problem, the halo and half-wave dipole, mounted as high on the car as possible, being the most popular. Results on the DX bands are encouraging and several mobile operators are well on the way to a DXCC/M.

Mobile operation is not limited to transmitting amateurs. A.1404 of Oldbury, Birmingham, for instance, uses a much modified 19 set for Top Band, 3.5 and 7 Mc/s with an RF24 unit ahead for 14, 21 and 28 Mc/s.

Points to be borne in mind in planning mobile gear are the current consumption—the car battery is not a limitless source of amps.—and safety. The very minimum requirements for the latter are that the equipment should be rigidly fixed in the car and arranged in such a way that it does not impede the normal operations of the driver. For the h.t. supply, the advent of reasonably priced power transistors make a transistorized unit the obvious choice.

Insurance

As mobile radio equipment is not generally covered by a motorist's normal comprehensive policy it is suggested that those who operate mobile should check with their insurance companies or brokers to ensure that they are covered in the event of theft, fire or accidental damage to their gear. At least one company is willing to issue a special policy covering the radio equipment in a car at 10/- % per annum for the risks mentioned.

* * *

Contributions to *Mobile Column* are always welcome and should be sent direct to Headquarters.

Mobile Meeting in London

SO much support has been promised for the meeting of mobile enthusiasts to be held at "The Rising Sun," 46 Tottenham Court Road, London, W.1. on February 22 that practically all the available seating has been booked. Those who have not yet replied to the organizer's circular letter and would like to attend should write to Rex Toby (G2CDN/M), 13 Wood Lane, Isleworth, Middlesex, immediately. It is hoped that the meeting will result in the formation of a self-supporting group or club devoted solely to the interests of mobile operators.

Voice of America Amateur Radio Programme

A SPECIAL 15 minute programme of news and propagation forecasts for radio amateurs and shortwave listeners is broadcast at five different times on Sundays by Voice of America transmitters. The programme forms part of the *Sunday Report from America* broadcast and transmission times are announced at frequent intervals.

Reports on the reception of the programme, which will be acknowledged by a special QSL card, should be sent to Amateur Radio, Box 922, Washington 4, D.C.

Nice Work G3MCN

THE November 1958 issue of "5 and 9," the News Sheet of the Liverpool and District Amateur Radio Society, reports that Harry James (G3MCN) received the final card for his DX CC certificate a year to the day after he was licensed. Is this a record?

Are You a Tabler?

THE Society's Region 8 Representative, Mr. E. R. Dolman (G2DCG), 20 Canterbury Road, Margate, Kent, who is a keen member of Round Table, would like to hear from other R.S.G.B. members who are Tablers.

Modifying the Army W.S. 19 for Amateur Bands Operation

Contd. from page 383

Further Modifications

Two further modifications are worth considering. One is the provision of an r.f. gain control which can be provided by a 10 K ohms wire wound variable resistor introduced between the end of the cathode resistor of V1A (220 ohms) and the chassis. The other is an a.v.c. on/off switch to improve the reception of c.w. signals. The main trouble in the alterations is finding room on the panel for the controls! Possibly a potentiometer and switch combined might be a way out, so that, with full r.f. gain, the a.v.c. is on and when the r.f. control is brought into operation the a.v.c. is automatically switched off.

It is hoped that these notes will enable many more No. 19 Sets to be suitably modified for amateur use.

The writer thanks G3HTP, G3IPB and G3IHF for their helpful suggestions and criticism during the modification of his own 19 set.

Society News

Dr. R. L. Smith-Rose Installed as President

AT the meeting held on Friday, January 23, 1959, at the Institution of Electrical Engineers, London, W.C.2, Dr. R. L. Smith-Rose, C.B.E., was installed as twenty-fifth President of the Society.

Prior to the installation ceremony (performed by the outgoing President Mr. L. E. Newnham, B.Sc., G6NZ), Dr. Smith-Rose delivered an Address which is reproduced elsewhere in this issue. Among those present at the meeting were Past Presidents A. D. Gay (G6NF), S. K. Lewer, B.Sc. (G6LJ), W. A. Scarr, M.A. (G2WS), L. Cooper (G5LC) and A. O. Milne (G2MI); Vice-Presidents W. H. Allen, M.B.E. (G2UJ), J. W. Mathews (G6LL) and H. V. Wilkins (G6WN). Members of Council present included Messrs. N. Caws (G3BVG, Honorary Treasurer), J. D. Kay (G3AAE), E. W. Yeomanson (G3IIR) and W. J. Green (G3FBA). Dr. J. A. Saxton and Miss B. Chaplin, M.B.E., both from the Radio Research Station, Slough, were also in the audience, as was Mr. Maurice Child, an early member of the Wireless Society of London and one time member of the Council.

Immediately after his installation, the President announced that the Council had, at its meeting the previous evening, elected Mr. W. H. Allen, M.B.E. (G2UJ), a Vice-President in recognition of his outstanding service to the Society over a period of many years. Dr. Smith-Rose then presented the Wortley Talbot Trophy to Arnold Mynett (G3HBW) and the Calcutta Key to George Partridge (G3CED).

Mr. F. Lawrence (G2LW), who is Curator of the Society's Library of Recorded Lectures, recorded the Presidential Address which will be placed in the archives of the Society.

Nominations Invited for vacant office of Zone A Representative

TO fill the vacancy at present existing in the office of Zone A Representative, any ten Corporate Members resident in the Zone (Regions 1 and 2) may nominate any other duly qualified person resident in that Zone by delivering their nomination in writing in a single document to the Secretary, together with the written consent of such person to accept office if elected, but each such nominator shall be debarred from nominating any other person for this election.

The nomination paper must reach the Secretary by not later than 12 noon on March 2, 1959.

In the event of more than one duly qualified person being nominated for the vacancy a ballot will be conducted, details of which will be published in the March 1959 issue of the Society's Journal.

R.S.G.B. QSL and V.H.F. Managers Reappointed

THE Council has been pleased to reappoint Mr. A. O. Milne (G2MI) and Mr. F. G. Lambeth (G2AIW), to the offices of QSL and V.H.F. Manager respectively. Mr. Milne has been the R.S.G.B. QSL Manager since 1939, and Mr. Lambeth the R.S.G.B. V.H.F. Manager since 1954. Mr. Lambeth is also Honorary Secretary, I.A.R.U. Region I Division V.H.F. Committee.

New Malayan Call-signs

AS from January 1, 1959, the call-sign prefix used by amateurs resident in Malaya was changed from VS2 to 9M2. It is not anticipated that the change will affect certificates and awards issued by the R.S.G.B.

Committees of the Council 1959

THE following members have been appointed to serve on the Committees of the Council for 1959:

Contests. *Council Members:* K. E. S. Ellis (G5KW), D. A. Findlay (G3BZG). *Non-Council Members:* R. S. Biggs (G2FLG), M. Harrington (B.R.S. 20249), R. C. Hills (G3HRH), W. H. Matthews (G2CD), F. E. Woodhouse (G3DC).

Exhibition. *Council Members:* C. H. L. Edwards (G8TL), E. W. Yeomanson (G3IIR). *Non-Council Members:* G. G. Gibbs (G3AAZ), G. W. Norris (G3ICI), F. F. Ruth (G2BRH), G. M. C. Stone (G3FZL), A. J. Worrall (G3IWA).

Finance and Staff. *Council Members:* H. A. Bartlett (G5QA), N. Caws (G3BVG), C. H. L. Edwards (G8TL), K. E. S. Ellis (G5KW), J. H. Hum (G5UM), L. E. Newnham (G6NZ), W. A. Scarr (G2WS).

G.P.O. Liaison. *Council Members:* J. D. Kay (G3AAE), A. O. Milne (G2MI), L. E. Newnham (G6NZ). *Non-Council Members:* H. A. M. Clark (G6OT) and the Chairman of the TVI/BCI Committee.

Handbooks. *Non-Council Members:* W. H. Allen (G2UJ), H. A. M. Clark (G6OT), D. N. Corfield (G5CD), S. K. Lewer, (G6LJ), J. W. Mathews, (G6LL).

Membership and Representation. *Council Members:* H. A. Bartlett (G5QA), W. J. Green (G3FBA), E. G. Ingram (G6MIZ), J. D. Kay (G3AAE), W. R. Metcalfe (G3DQ), H. W. Mitchell (G2AMG), A. C. Williams (GW5VX).

Publications. *Council Members:* D. A. Findlay (G3BZG), J. H. Hum (G5UM). *Non-Council Members:* W. H. Allen (G2UJ), J. P. Hawker (G3VA).

R.A.E.N. Council Members: H. A. Bartlett (G5QA), C. H. L. Edwards (G8TL), L. E. Newnham (G6NZ), E. W. Yeomanson (G3IIR). *Non-Council Members:* C. L. Fenton (G3ABB), A. C. Gee (G2UK), E. A. Matthews (G3FZW), F. R. Peterson (G3ELZ).

Technical. *Council Members:* C. H. L. Edwards (G8TL), L. E. Newnham (G6NZ). *Non-Council Members:* W. H. Allen (G2UJ), H. A. M. Clark (G6OT), D. N. Corfield (G5CD), D. Deacon (G3BCM), G. C. Fox (G3AEX), A. H. Koster (G3ECA), J. W. Mathews (G6LL), R. F. Stevens (G2BVN), G. M. C. Stone (G3FZL).

TVI/BCI. *Council Members:* D. A. Findlay (G3BZG), L. E. Newnham (G6NZ), W. A. Scarr (G2WS), E. W. Yeomanson (G3IIR). *Non-Council Members:* D. Deacon (G3BCM), J. W. Mathews (G6LL).

V.H.F. Council Members: N. Caws (G3BVG), K. E. S. Ellis (G5KW), J. H. Hum (G5UM). *Non-Council Members:* W. H. Allen (G2UJ), N. G. Hyde (G2AIH), F. G. Lambeth (G2AIW), A. L. Mynett (G3HBW), C. E. Newton (G2FKZ), G. M. C. Stone (G3FZL).

The President, Dr. R. L. Smith-Rose, is an *ex-officio* member of all committees.

Overseas Subscription Rate

The Council give notice that as from April 1, 1959, the Overseas Corporate Subscription rate will be increased to £1.8.0 (\$4.00 U.S.) per annum.

Council Proceedings

Résumé of the Minutes of the Proceedings at a Meeting of the Council of the Radio Society of Great Britain, held at New Ruskin House, Little Russell Street, London, W.C.1, on Thursday, December 11, 1958, at 6 p.m.

Present: The President (Mr. L. E. Newnham in the Chair), Messrs. W. H. Allen, H. A. Bartlett, N. Caws, C. H. L. Edwards, D. A. Findlay, W. J. Green, E. G. Ingram, W. R. Metcalfe, A. O. Milne, W. A. Scarr, E. W. Yeomanson (Members of the Council), John Clarricoats (General Secretary) and John A. Rouse (Deputy General Secretary).

Apologies: Apologies for absence from the meeting were submitted on behalf of Messrs. F. Hicks-Arnold and J. H. Hum.

Absent: Messrs. R. H. Hammons, H. W. Mitchell and A. C. Williams.

South Atlantic Balloon Crossing

The Secretary reported that Mr. J. D. Kay (G3AAE) had flown to Tenerife at the invitation of the *Daily Mail* in a professional capacity to supervise the installation and testing of the radio equipment to be used in the balloon which is to attempt a South Atlantic crossing. A brief account of the work done by Society members in connection with the project would appear in the December 1958 BULLETIN.

R.S.G.B. Radio Hobbies Exhibition

It was reported that the estimated profit on the sale of publications on the Society's stand at the R.S.G.B. Radio Hobbies Exhibition was £200, and that subscriptions had been received from 61 new members enrolled at the exhibition.

Reports of Committees

The Minutes of meetings of the Contests, Exhibition and V.h.f. Committees were submitted as Reports.

Resolved to receive the Reports and to accept the recommendations contained therein.

The recommendations dealt with (a) the judging of various contests (b) the rules for 1959 events, (c) the R.S.G.B. Radio Hobbies Exhibition, (d) a suggestion that the Society should seek permission to erect a 2m beacon station on the site of the B.B.C. Monitoring Station at Tatsfield, Surrey, (e) the appointment of an additional operator for the South of England News Bulletin Service on 2m, (f) the holding of a V.h.f./U.h.f. Convention in London during May 1959.

Membership

Resolved (i) to elect 146 Corporate Members and 36 Associates. (ii) to grant Corporate Membership to six Associates who had applied for transfers.

Application for Affiliation

Resolved to grant affiliation to the Faculty of Technology Union Amateur Radio Society (Manchester University).

Scottish Trophies

Resolved to request the Scottish Zonal Representative to discuss with the Scottish Regional Representatives a suggestion that the Wyllie and Scottish N.F.D. Trophies should become R.S.G.B. Trophies.

Overseas Subscription Rate

Resolved to give notice that as from April 1, 1959, the subscription to be paid by Overseas Corporate Members shall be £1 8s. 0d. (\$4.00 U.S.) per annum.

Finance Act 1958 Section 16

An equality of votes having been recorded for and against a motion that application should be made to the Commissioners of Inland Revenue for the Society to be approved in accordance with the provisions of Section 16 of the Finance Act 1958, it was **Resolved** to discuss the matter further at the January 1959 meeting of the Council. (It has now been decided to apply for the Society to be approved—Ed.)

The Amateur Radio Handbook

The President reported upon a meeting he had had with Mr. Lewer to discuss matters relating to the *Amateur Radio Handbook*. During the discussion Mr. Lewer had spoken optimistically of the progress to date and he appeared to be confident that the *Handbook* would be published in time for it to be placed on sale at the R.S.G.B. 1959 Radio Hobbies Exhibition.

QSL Bureau

Resolved to award honoraria to a total of £78 15s. 0d. to ten QSL Sub-Managers.

Staff Christmas Boxes

Resolved as a token of goodwill to award Christmas Boxes in the form of gifts in kind, to a total value of £17 17s. 0d. to the seven members of Headquarters staff.

Guide to Amateur Radio

Resolved to award a suitable honorarium to Mr. J. P. Hawker (G3VA) in appreciation of his services to the Society in connection with the 7th edition of *A Guide to Amateur Radio*.

Technical Library

Resolved to accept a quotation in the sum of £82 15s. 0d. for the construction of a bookcase to house technical books and publications.

Bulletin Deliveries

Attention was drawn to the fact that certain copies of the November 1958 issue of the R.S.G.B. BULLETIN did not reach members until the 22nd of that month. The Secretary explained the reasons which had contributed to the delay.

Council Elections

A member stated that he would like the Council to consider at a later date the question of the earlier circulation of Council Ballot Papers. The Secretary explained that the Society is only required to ensure that the Ballot Papers are issued three days before the date fixed for their return. In point of fact the Ballot Papers are issued at least 14 days before the date fixed for their return.

Retiring Members of Council

The President referred to the fact that Messrs. Hicks-Arnold and Allen would be retiring from the Council at the end of December 1958.

The Immediate Past President on behalf of his colleagues congratulated the President on the able manner in which he had conducted the affairs of the Society during the year. Mr. Newnham thanked Mr. Findlay for his kind remarks.

The meeting terminated at 10 p.m.

London Meetings

Friday, February 27, 1959

"Recent Developments in the Microwave Field"
by K. W. Drummond (Mullard Ltd.)

Friday, March 20, 1959

"Single Sideband Techniques"
by B. J. Rogers, G3ILI (Bush Radio Ltd.)

at the
Institution of Electrical Engineers
Savoy Place, Victoria Embankment

Buffet Tea 6 p.m.

Lecture 6.30 p.m.

New Belling & Lee Wall Chart

A NEW version of the Belling & Lee Unit Plan Wall Chart, which gives full details of the various outdoor and indoor aerials manufactured by that company, together with information on brackets, masts and clamps has just been produced. Copies are available on request to Belling & Lee Ltd., Great Cambridge Road, Enfield, Middlesex.

GB2RS SCHEDULE

R.S.G.B. News Bulletins are transmitted on Sundays in accordance with the following schedule:

Frequency	G.M.T.	Location of Station
3600 kc/s	10.00	London
	12.00	Yorkshire
145-55 Mc/s	11.15	Beaming south-east from Leeds
	11.30	Beaming south-west from Leeds
	11.45	Beaming north from Leeds
145-3—	12.00	Beaming north from London area
145-4 Mc/s	12.15	Beaming west from London area

GB3IGY SCHEDULE

The Society's beacon station is in operation daily in accordance with the following schedule:

145-5 Mc/s	18.00—	Well Hill, Kent
	23.00	

The International Ham Hop Club

IN June 1956, George Partridge (G3CED) set out on a novel one-man expedition across Germany visiting amateur stations on the way. With true amateur spirit and continental hospitality he was made most welcome and passed on from one home to another thus enjoying a memorable holiday.

From this experience arose the idea of forming the International Ham Hop Club the object of which is to provide various kinds of hospitality ranging from international links between Amateur Radio clubs to exchange holidays between members and their families, an overnight stop, or just a "rag-chew" and a cup of tea in the shack. Many a time amateurs have invited the other fellow to call on them but circumstances rarely make it possible; the unexpected visit is not always convenient. The Ham Hop Club provides that little bit of organization which is needed to smooth the way for such personal meetings which do so much to cement national and international friendships.

The Club, run entirely on a voluntary basis, is growing rapidly both in Europe and in the U.S.A. In the last two years members of many nations, often accompanied by their wives, have enjoyed "ham-hops" and made good personal friends, for by this method one enters the family circle of one's host and so obtains an intimate impression of the lives of many folks of all ranks and of all nations which is denied to those who travel in more conventional ways.

"Ham-hopping" also appeals to the younger amateur for it is light on the pocket and provides an excellent chance to see and discuss the varied interests and developments within Amateur Radio. No two shacks are alike and one can learn much from every one of them. Experience has shown that far more hospitality is offered than is accepted. Younger members, still living at home, at a University or in the Forces, even if unable to offer full hospitality themselves at present, are most welcome to visit the more static members of the Club.

Through the good will of its varied international membership the Club is able to help its members in many ways. Members can be supplied with advice on travel, the best routes and details of fare concessions available. At Dover visiting members are met and escorted through Customs and other formalities. Help with translations from all languages can be obtained and with the increasing membership still more assistance should be forthcoming in furthering hospitality and understanding between radio amateurs of all nations.

Licensed amateurs and B.R.S. members are invited to write (enclosing an s.a.e. please) for further details to: G. A. Partridge (G3CED), Hon. General Secretary, I.H.H.C., 17 Ethel Road, Broadstairs, Kent; R. W. Sawyer (G3DTB), Hon. Secretary, British and Irish Division I.H.H.C., Honeywood, The Beacon, Ilminster, Somerset, or to J. W. Maddison (G3KAW), Hon. Publicity Officer, I.H.H.C., 23 Mayfield Avenue, Dover, Kent. G3DTB.

Thames Valley Celebrates its Twenty-fifth Anniversary

DURING December 1958 the Thames Valley Amateur Radio Transmitters' Society celebrated its twenty-fifth anniversary with a Dinner-Dance and Cabaret at the Carnarvon Castle Hotel, Hampton Court. Among the company of 80 present were many old friends of the Society, including John Clarricoats, O.B.E., G6CL (General Secretary, R.S.G.B.), Stanley Vanstone, G2AYC (President, Sutton and Cheam Radio Society), Harry Faulkner (Kingston & District Radio Society), G. A. Bird, G4ZU, and John Gilbert, all with their ladies. Leslie Cooper, G5LC (President) presided.

In proposing a toast to Thames Valley, Mr. Clarricoats who is himself a Vice-President of that society, recalled the work done in the early days by founder members James Roe

(G2VV), Fred Crocker (G2NN), George Spencer (G2KI), Gerald Billson (G6GB) and Frank Wadman (G2GK). In his reply the President paid a warm tribute to all who had supported and helped the society during the 25 years of its existence. He also referred to the generosity of the radio trade who had, once again, contributed many excellent gifts for the raffle.

During the evening Mr. Cooper received, on behalf of T.V.A.R.T.S. a President's collar and badge donated by Vice-President Alan Mears (G8SM). The ceremony, which was of a rather unusual character, was performed by G2ANX, G3AIU, G3IKC, G3JIP, G3VK and G8SM.

Revised form of transmissions from GB3IGY

AS the issue of warning telegrams has been discontinued by the Meteorological Office, notices of alerts and Special World Intervals are no longer included in the transmissions from the Society's 2m beacon station GB3IGY. Transmissions now comprise "CQ DE GB3IGY" for 45 seconds followed by a silent carrier for 15 seconds.

From January 1, 1959, until the time of going to press, GB3IGY had been in continuous operation 24 hours a day without a break. Reports on reception should be sent to Council Member K. E. S. Ellis (G5KW), Hill Top, Well Hill, Chelsfield, Kent.

Cambridge University Wireless Society

THE Cambridge University Wireless Society is compiling a list of "Old Cantab" transmitting amateurs for display in the shack at G6UW. Former members of the University now holding transmitting licences are invited to send details to the Transmitting Secretary, I. S. Davies (G3KZR), c/o St. Catharine's College, Cambridge.

Hooligans not Hams

THE *Huddersfield Examiner* of November 3 carried a report that the Huddersfield Borough Police were on the look out for a gang of young radio "hams" who had been raiding telephone booths and stealing diaphragms from the ear-pieces of telephones. It is time the *Huddersfield Examiner* realized that "hams" are not hooligans.

New Transistors for the Amateur

TWO new transistors for the radio amateur and home constructor have been made available by Ediswan-Mazda. They are the XA103 (price 15/-), suitable for use as an i.f. amplifier, and the XA104 (price 18/-), a general purpose r.f. transistor for use up to 4 Mc/s. The prices of the XB102 and XB104 general purpose audio transistors have been reduced to 10/-.

News from VE2BAT (Ex-G3GDN)

IAN TURNER who, previously, operated from North London as G3DGN, now holds the call VE2BAT. His present address is Apt. 1, 845 Des Jesuites, Quebec 6, P.Q., Canada. Ian recently passed the Canadian "Advanced Amateur Examination" which permits him to operate on all amateur bands (phone and c.w.). The examination consisted of a written paper with questions of the City and Guilds type plus two questions on Canadian licence regulations (10 questions out of 20 in all). He also had to take a Morse test at 15 w.p.m.—three minutes plain language, one minute code and one minute numerals.

He wishes to be remembered to all old friends in Region 7.

G3HSE Honoured

IN the New Year Honours List, Mr. D. C. French (G3HSE) of New Cross, London, received the British Empire Medal.

R.A.E.N. Notes and News

By E. ARNOLD MATTHEWS (G3FZW)*

Use of Calling Frequencies

In some areas the R.A.E.N. calling frequencies are being used for routine nets and exercises, thereby defeating the purpose of these assignments. Controllers are reminded that the whole object of the calling frequencies is to give emergency calls as good a chance as possible of being heard. The correct procedure is to net on the calling frequency and then QSY, or to net on a predetermined operating frequency. It is good practice to leave one station or a listener manning a spare receiver on watch on the calling frequency for the band in use.

"Exercise Blizzard"

An excellent account received from North Cornwall A.C., G2AYQ, reveals that in a recent exercise action centred round a story of "the worst snowstorm in living memory" and possible events resulting therefrom—telephone lines down, groups of people cut off, a railway accident due to a falling viaduct, urgent demands for medical supplies wanted in remote areas and so on. Allowance was made for some members having to perform their normal work, another was put out of action for a period with a "blown-down aerial." As the story developed it became clear that "help was required from farther afield" and contact was made with R.A.E.N. stations in South Devon. After some hours it was assumed that telephone lines had been repaired and the exercise was closed down with a message of thanks to all stations from the C.C., G3AET. Stations participating were G2AYQ, G3AET, G3CZZ, G3DCJ, G3EHT, G3HFS, G4IV, and, from South Devon, G3GRA and G6JF. Much of the success of this exercise must have derived from the care taken in the planning. The story was not too improbable, and it was made to fit the object of the exercise—to test communications within the North Cornish Group and with South Cornwall and South Devon Groups.

Around the Groups

Considerable interest is being shown in the value of listener members and Cornwall are appointing a Controller of Listeners. This plan has R.A.E.N. Committee approval, and it may be followed in other areas soon.

After a deliberate rest period the Northern Ireland Controller, G13BHX, plans to restart group activities again. This form of operation has much to commend it. It is rarely possible to maintain a high state of activity for any length of time and it is unwise to try to do so as the psychological let-down is damaging to group morale. Most groups find that short periods of activity at reasonably frequent intervals are sufficient to maintain efficiency without creating "staleness."

A letter on some nicely printed notepaper gave the information that this was part of a surprise Christmas present from a listener member to the Norfolk C.C., G3HRK. The member evidently realized that most officers find group postage expenses from their own pockets and took this very thoughtful way of lightening the burden. Where no group funds have been raised Controllers are bearing all such expenses. Perhaps members might follow the Norfolk member's lead by supplying their Controllers with a small supply of stamped addressed envelopes (QSL bureau fashion) for the issue of routine correspondence and exercise details, etc. The Norfolk group is preparing for another lecture

and demonstration to St.J.A.B. Good liaison has been established with the local Coastguard service, which is showing a keen interest in R.A.E.N. despite having their own radio.

Sussex group is again meeting the county B.R.C.S. Activity is somewhat hampered by the lack of a Controller for the north-west of the county and the C.C. G3FEX asks anyone interested in undertaking the duties to contact him.

Birmingham. The M.A.R.S. exhibit at the Birmingham and Midland Institute's Annual Conversazione featured a stand devoted to R.A.E.N. Various equipments, posters and maps were displayed. From comments heard it was evident that many members of the public went away more enlightened by this apparently little-known facet of Amateur Radio. At the same time the general trend of comment was one of unqualified approval of such activity. Members who undertook stand duty were G3BA, G3CNV, G3JPN, G3LNN, G3LAI, G3AVE and G3GLQ.

Officers of Essex, London and Suffolk county groups met at Boreham on January 11, despite the bad weather. The main item on the agenda was inter-county co-operation. A test exercise was arranged for February 7, and another meeting is to be held in March.

Net Schedules

The Honorary Secretary, R.A.E.N. Committee, now holds a fairly comprehensive list of group schedules and will be pleased to supply specific details to Controllers on request.

Norfolk net schedules have been amended to: weekdays, 21.30, 1975 kc/s; Sundays, 10.00; net on 1980 kc/s, then QSY to 1930 kc/s. (Times are clock time.)

Personnel

G. A. Allcock (G3ION), 29 Granby Grove, Highfield, Southampton, Hants. has been appointed a Country Controller and J. E. Bowden (G2AYQ), Albany House, Goon-town, St. Agnes, Cornwall, an Area Controller. Messrs. G. A. Partridge (G3CED) and F. R. Peterson (G3ELZ) have resigned their offices as County Controllers.

The address of the A.C. for Spilsby, Lincs., N. T. Hodgson (G2ABR) is now Raithby Road, Hundleby, Spilsby.



START 'EM RIGHT!

Thirty minutes after his wedding, G3JSV was found operating G3GWQ's mobile on Top Band. Here he is with his bride in QSO with G2DQ.

* 1 Shortbatts Lane, Lichfield, Staffs.

Tests and Contests

144 Mc/s Open Contest 1959

R.S.G.B. members throughout Europe are invited to take part in this popular v.h.f. contest. Both phone and c.w. may be used. Log forms and contest cover sheets are available from Headquarters on request (6d. in stamps to cover the cost of packing and postage should be enclosed).

The details are as follows:

When: 17.00 G.M.T. on Saturday, March 7, to 19.00 G.M.T. on Sunday, March 8, 1959.

Eligible Entrants: All fully paid-up members of the R.S.G.B. resident in Europe.

Contacts: May be made on A1, A2 or A3.

Scoring: For each completed contact within the United Kingdom 10 points may be claimed; in addition a bonus of 25 points may be claimed for the first contact in each county in accordance with the list on page 131 of the September 1958 issue of the R.S.G.B. Bulletin. The whole of the London Postal Districts will count as one county only. For contacts outside the United Kingdom, a flat rate of 25 points for each completed contact may be claimed.

Contest Exchanges: RST or RS reports followed by the band identification letter A, the contact number and the location (e.g. RST59A001 6SE Oxford).

Logs: (a) Must be tabulated in columns headed in this order "Date/Time G.M.T.", "Call-sign of station worked", "My report on his signals and serial number sent", "His report on my signals and serial number received", "County of station worked", "Bonus Points", "Points Claimed".

(b) The cover sheet must be made out in accordance with R.S.G.B. Contests Rule 5 and the declaration signed.

(c) Entries must be postmarked not later than March 23, 1959.

Awards: At the discretion of the Council, the Mitchell-Milling Trophy will be awarded to the winning entrant and a certificate of merit to the entrant placed second. A certificate of merit will also be awarded to the non-transmitting member submitting the best check log in the opinion of the Contests Committee.

The General Rules for R.S.G.B. Contests published on page 348 of the January 1959 issue of the R.S.G.B. Bulletin apply to this contest.

R.S.G.B. 1250 Mc/s Tests 1959

THE fourth 1250 Mc/s Tests organized by the R.S.G.B. will take place on March 21-22, 1959, and it is hoped that the tests will again attract the support and interest of all u.h.f. workers.

Rules

The event will have few fixed rules, other than the duration, which will be from 17.00 G.M.T. on Saturday, March 21, to 22.00 G.M.T. on Sunday, March 22, 1959, and the provision that all entries must be from fully paid-up Corporate members of the R.S.G.B. and accompanied by the declaration set out below. Entries can be accepted only on behalf of an individual station, though no limitation is placed on the number of operators or assistants. Entries from receiving stations will be welcome and will be eligible for the award.

The entries will be required to include details of stations heard or worked (with distances) and general observations on the band. A full description of all equipment used should be included and this information and any other evidence submitted of work carried out on the band will be taken into consideration when judging the event. The Contests Committee reserves the right to abstract information for the purpose of preparing a report on the Tests. The entrant submitting the best entry in the opinion of the judges will be recommended to the Council for the award of the Arthur Watts Trophy.

Entries must be addressed to the Contests Committee, Radio Society of Great Britain, New Ruskin House, Little Russell Street, London, W.C.1, and be postmarked not later than April 6, 1959. Entries must contain the following declaration:

I declare that my station was operated strictly in accordance with the rules and spirit of the Tests and I agree that the decision of the Council of the Radio Society of Great Britain shall be final in all cases of dispute.

Date.....

Signed

Helvetia 22 Contest

THE annual contest organized by the Swiss Union of Shortwave Amateurs (U.S.K.A.) will take place this year between 15.00 G.M.T. on April 4 and 17.00 G.M.T. on April 5. Full details may be obtained from Acklin Frank (HB9NL), U.S.K.A. QSL Manager, Knutwil, Lucerne, Switzerland, to whom entries should be posted not later than April 20, 1959.

New Scandinavian DX Contest Planned

A NEW annual International DX Contest between the Scandinavian countries and the rest of the world will take place for the first time next September. The event will probably be known as the "Scandinavian Activity Contest."

The c.w. section will commence at 15.00 G.M.T. on Saturday, September 19, and end at 18.00 G.M.T. on Sunday, September 20. The telephony section will take place between the same hours during the following weekend.

The contest will be organized by the Scandinavian Member Societies of I.A.R.U. in turn as follows: Finland (S.R.A.L.) 1959, Sweden (S.S.A.) 1960, Norway (N.R.R.L.) 1961, Denmark (E.D.R.) 1962. Further details of the 1959 event may be obtained from the S.R.A.L. Contest Manager (OH2XK), P.O. Box 306, Helsinki, Finland.

New Great Circle Map

A NEW edition of the *Short Wave Magazine* DX Zone Map is now available. The map, which measures approximately 25 in. by 34 in., is printed in five colours. The projection is centred on London.

In addition to showing amateur prefixes corrected according to information available up to the end of October 1958, the map indicates the boundaries of the 40 Amateur Radio "zones" laid down by CQ Magazine in connection with the W.A.Z. Certificate.

The map makes a handsome addition to any shack and is obtainable, price 9/3d. post free (paper) or 11/9d. (linen) from the Publications Dept., Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

Contests Diary

1959

February 21-22	- A.R.R.L. DX Contest (C.W. Section)
February 21-22	- First (Short) 1.8 Mc/s Contest ¹
March 7-8	- A.R.R.L. DX Contest (Phone Section)
March 7-8	- R.S.G.B. 144 Mc/s Open Contest ^{2,3}
March 21-22	- A.R.R.L. DX Contest (C.W. Section)
March 21-22	- R.S.G.B. 1250 Mc/s Tests ²
April 4-5	- Helvetia 22 Contest
April 11-12	- R.S.G.B. Low Power Contest
April 26	- D/F Qualifying Event
May 3	- First 144 Mc/s Field Day (c.w. only) ³
May 10	- D/F Qualifying Event
May 24	- 420 Mc/s Contest
June 6-7	- National Field Day ⁴
June 20-21	- First 70 Mc/s Contest
June 28	- D/F Qualifying Event
July 5	- Second 144 Mc/s Field Day ²
July 12	- D/F Qualifying Event
September 5-6	- National V.H.F. Contest and European V.H.F. Contest ³
September 20	- Low Power Field Day
September 27	- R.A.E.N.
November 7-8	- Second 1.8 Mc/s Contest
November 21-22	- R.S.G.B. Telephony Contest

¹ For details, see page 347, R.S.G.B. Bulletin, January, 1959.

² For details, see this page.

³ These contests are arranged to take place during the periods suggested by the Region I V.H.F. Committee.

⁴ For rules, see page 294, R.S.G.B. Bulletin, December, 1958.

G.P.O. Radio Amateurs' Examination

CANDIDATES who sat for the G.P.O. Radio Amateurs' Examination on October 4, 1958, were required to answer both questions in Part I of the paper and six out of the eight questions in Part II. A copy of the paper is set out below. The maximum number of marks possible is shown against each question. Of the 169 candidates who sat for the Examination 107 (63.5 per cent) passed. The examination was held simultaneously in London (126 entered, 84 passed), Leith (21 entered, 11 passed) and Cardiff (22 entered, 12 passed).

Part I

1. (a) What are the main purposes for which an amateur station may be used?
(b) In what localities or places may an amateur station not be established?
(c) What classes of emission may be used in the 70 Mc/s band and what prohibitions are applicable to this band?
(d) Who may operate an amateur station?
(e) What log records should be kept? (20 marks)
2. With the aid of sketches and/or diagrams, explain:
(a) The effects of and the precautions against over modulation;
(b) The arrangement and use of circuits to reduce "key clicks," "harmonics" and "spurious emissions." (20 marks)

Part II

3. With the aid of sketches, describe a method of making an electro-magnet. What factors would determine the efficiency of such a magnet? Briefly describe two practical uses of electro-magnetic principles. (10 marks)
4. What do you understand by the terms " ωL " and " $1/\omega C$ "? Why are these terms important in dealing with alternating current problems and under what condition may they be disregarded? (10 marks)
5. With the aid of characteristic curves and waveforms, describe the action of a cumulative grid detector valve. (10 marks)
6. A superheterodyne receiver when tuned to 960 kc/s is found to be causing interference on 1425 kc/s. How would you account for this and what steps might be taken to reduce the interference? (10 marks)
7. Draw a circuit diagram of a crystal controlled oscillator. Describe its action in commencing and maintaining oscillations and say what refinements may be added to improve frequency stability. (10 marks)
8. Describe why changes in frequency may be necessary to maintain h.f. communication throughout a period of 24 hours. (10 marks)
9. What is meant by the "radiation characteristics" of a half-wave dipole? What practical steps could be taken to improve the radiation pattern or concentrate the beam in a specific direction? (10 marks)
10. Describe the construction of a moving coil ammeter. Say how you would adapt such an instrument to measure the anode current and anode voltage of a transmitter output stage? (10 marks)

City and Guilds Radio Amateurs' Examination

MEMBERS who wish to sit for the Radio Amateurs' Examination, to be held on Friday, May 8, 1959, should apply without delay to their local technical colleges who will make the necessary arrangements with the City and Guilds of London Institute. The closing date for making such arrangements is February 24 but in exceptional circumstances entries may be accepted, subject to a late fee of £1, up to March 22, 1959. In cases of difficulty candidates should apply to the Director of Education for the county concerned.

The fee for the examination is £1, plus, in some cases, a small local accommodation fee.

The Radio Amateurs' Examination is a pass examination consisting of a single question paper of three hours' duration. The paper is divided into two parts. Part I contains only two questions each of which must be answered. Part II consists of eight questions, six of which must be attempted. Candidates will be required to achieve a pass in each Part separately; failure in either Part will entail failure in the examination as a whole. Part I of the Syllabus deals with licensing conditions and transmitter interference and Part II with the theory of electricity and magnetism, radio principles, valves and circuitry, receivers, low power transmitters, propagation, aerials and measurements.

The examination is open to all candidates, whether they have attended a course of tuition or not and a certificate is issued to those who are successful.

Revision Notes Available

COMPREHENSIVE revision notes for the use of members who are preparing for the City and Guilds of London Institute examination on Friday, May 8, are available from Headquarters price 1s. per set, post paid.

Amateur Radio Station at the Ninth C.C.I.R. Plenary Assembly

RADIO amateurs of Southern California and Arizona under the direction of Ray Meyers (W6NLZ), a director of the A.R.R.L., will install and operate an Amateur Radio station at the Biltmore Hotel, Los Angeles, during the period of the Ninth Plenary Assembly of the C.C.I.R. The Conference will commence in April 1959 and is expected to last for about six weeks.

Amateurs from industrial and government agencies are combining forces to assure a successful demonstration of Amateur Radio capabilities during the Conference. As radio facilities will be available to foreign delegates who comply with U.S. regulations, it is expected that thousands of messages will be exchanged with many of the 97 participating countries.

The special call-sign K6USA has been assigned to the station and QSL cards will be exchanged to verify radio contacts conducted via a.m., s.s.b., c.w. and r.t.t.y.

Dr. Smith-Rose expects to attend the Assembly as a member of the United Kingdom Delegation.

New Post Office Radio Station at Ilfracombe

ILFRACOMBE Radio, the new Post Office Coast Radio Station at Mulacott Cross, North Devon, was opened on January 29 by Mr. T. A. Davies, O.B.E., Inspector of Wireless Telegraphy.

The new station, one of the most up to date of its kind in the world, is designed to improve the service and extend the range of ship-shore communications in the Bristol Channel area.

There are 12 radio stations in the Post Office maritime radio communication service. The largest, Burnham Radio, serves ships at sea in any part of the world. The remaining 11 provide communication up to about 300 miles of the coast of Britain.

This year is the Golden Jubilee of the Post Office ship-shore radio, for on September 29, 1909, the Post Office took over services which had previously been operated by the Marconi Company and Lloyds. A little earlier the Post Office had opened an experimental station at Bolt Head, Devon. It was over the Bristol Channel in 1897 that Marconi sent the first over-water wireless message and paved the way for the era of wireless communication.

Regional and Club News

Acton, Brentford and Chiswick Radio Club.—Recent events have included a talk by G6RC on "Operating Procedure for Beginners." On February 17 there will be a lecture by Miss R. Anderson, illustrated with lantern slides, of a tour of SV and YU. Morse practice for beginners is held every Tuesday at the Club Room, 66 High Road, Chiswick, W.4. *Hon. Secretary:* W. G. Dyer (G3GEH), 188 Gunnersbury Avenue, Acton, London, W.3.

Bradford Amateur Radio Society.—A very successful Social Evening was held during December. Meetings at Cambridge House, 66 Little Horton Lane, have been arranged for 7.30 p.m. on February 24 ("Transmitter Design and Construction," D. M. Pratt (G3KEP), March 10 (Junk Sale) and March 24 (A.G.M.). Visitors and prospective members are always welcome. *Hon. Secretary:* David M. Pratt (G3KEP), "Glenluce," Lyndale Road, Eldwick, Bingley, Yorks.

Bristol.—About 40 members were present, despite very bad weather conditions, at the January meeting when a talk on the "Principles and Practice of Frequency Measurement" was given by D. V. Newport (G3CHW) who demonstrated typical equipment ranging from an absorption wavemeter to the latest counter techniques. The chairman was the new C.R., Eric Chambers (G2FYT). On February 20, H. J. Gratton (G6GN) will give a lecture entitled "Some Thoughts on the Applications and Adjustment of Relays." Another skittles match has been arranged for February 23—on this occasion the challengers are the Bristol Branch of the R.T.R.A. *Hon. Secretary:* D. F. Davies (G3RQ), 51 Theresa Avenue, Bishopston, Bristol 7.

Bromley and District Amateur Radio Society.—Meetings of this newly formed society are held on the second Tuesday in each month at the "Farwig Arms," College Road, Bromley. A weekly net on 29 Mc/s takes place on Mondays at 9.30 p.m. The *Chairman* is G. C. Fox (G3AEX), the *Hon. Treasurer* is A. W. Gover (G4AU) and the *Hon. Secretary* is J. R. Acworth (G3JRA), 64 College Road, Bromley.

Bury Radio Society.—At the A.G.M. the following were elected: *Chairman*—J. E. Hodgkins (G3EJF); *Hon. Secretary*—Mrs. Jean Hodgkins (G3JZP), 24 Beryl Avenue, Tottington, near Bury; *Hon. Treasurer*—C. L. Robinson; *Committee Members*—T. C. Platt (G2GA), D. Winterburn (G3DQQ), F. Stocks (G3IVG) and J. Crowther (G3KMM). Since the society was re-formed three years ago, membership has almost doubled. Prospective members and visitors are always welcome at the meetings held at the George Hotel, Kay Gardens, on the second Tuesday in each month. Copies of the programme for 1959 may be obtained from the *Hon. Secretary* on request.

Cambridge and District Amateur Radio Club.—A film show was held on December 19 and proved highly successful. The next meeting is on February 20 at 7.45 p.m. at the "Jolly Waterman," Chesterton Road, Cambridge, and members should bring with them any motions they may wish to propose at the A.G.M. on March 2. *Hon. Secretary:* A. H. G. Waton, New Road, Barton, Cambridge.

Cornish Radio and Television Club.—More than 40 members attended the January meeting held at the Cornwall Technical College, Trevenon, near Camborne. The programme included a film show and a report on a recent R.A.E.N. exercise by G3AET. *Hon. Secretary:* J. Brown (G3LPB/T), Marlborough Farm, Falmouth.

Halifax and District Amateur Radio Society.—At the January meeting there was a good attendance to hear a lecture by Duncan Enoch (G3KLZ) on "Fault finding made easy." At the March meeting there will be a talk on high fidelity techniques. *Hon. Secretary:* A. Robinson (G3MDW), Candy Cabin, Ogden, Halifax.

Lothians Radio Society.—On February 19 GM3EDL will give another talk on single sideband while F. Shepherd (GM3EGW) will lecture on v.h.f. propagation on March 5. Both meetings will be held at 25 Charlotte Square, Edinburgh, and will commence at 7.30 p.m. All interested in Amateur Radio are invited to attend. Membership now exceeds 30 and prospective members are assured of a hearty welcome. *Hon. Secretary:* L. Lumsden, 33 Hillview Drive, Edinburgh 12.

North Kent Radio Society.—On February 26, R. Mallinson (G3GOG) will lecture on "Tape Recorders for the Amateur." C. J. Leal (G3ISX) will give a talk on "The Construction and

Testing of Domestic Watt-Hour Meters" on March 12. Meetings are held on the second and fourth Thursdays in each month at the Congregational Hall opposite Bexleyheath Clock Tower. Meetings commence at 8 p.m. but members usually gather from 7.30 p.m. for informal chats. *Hon. Secretary:* D. W. Wooderson (G3HKX), 39 Woolwich Road, Bexleyheath.

Newbury and District Amateur Radio Society.—At the January meeting, H. F. Knott (G3CU) demonstrated single sideband equipment. On February 27 there will be a talk entitled "This DX Season—Band Conditions" and a progress report on preparations for N.F.D. A technical forum has been arranged for March 27. Meetings are held at Elliotts of Newbury Canteen, West Street, and further details may be obtained from the *Hon. Secretary:* J. A. Gale (G3LLK), "Wild Hedges," Crookham Common, near Newbury.

Norwich and District Radio Club.—The club's annual dinner will be held at the Grosvenor Rooms on February 28 and tickets may be obtained from the *Hon. Secretary:* C. R. Reynolds (G3JPT), Post Office, Barnham Broom, Norwich.

Swansea.—L. D. Watts (GW3MOP), 110 Duvant Road, Killay, Swansea, will be glad to hear from members in and around the town who are interested in forming an R.S.G.B. Group.

Tees-side Amateur Radio Club.—There was an attendance of 45 at the club's Christmas Party at Settlement House, Newport Road, Middlesbrough, in December. *Hon. Secretary:* A. L. Taylor (G3JMO), 12 Endsleigh Drive, Middlesbrough.

Torbay Amateur Radio Society.—The new headquarters is nearing completion and it is expected that a club licence will be obtained shortly. The Annual Dinner is to be held at the Abbey Lawn Hotel on March 7 and tickets, price 11/6 each, may be obtained from the *Hon. Secretary:* G. A. Western (G3LFL), 118 Salisbury Avenue, Barton, Torquay. Membership is approaching 50, many of the newer members being local technical and grammar school pupils.

Wells.—An informal meeting and film show for those interested in Amateur Radio in the Wells area of Somerset was held at the Globe Hotel, Wells, on January 27. Those present included W. J. Green (G3FBA), Zone D Council Member, and G. Embleton (G3BNF), both from Bath. Those present agreed to form a radio club and to combine with the Bath Group in entering a station for N.F.D. All interested are asked to contact C. Read (G3MQQ), 12 Knowle Lane, Wookey, Somerset.

West Lancashire Radio Society.—Meetings are held each week on Tuesdays at 8.30 p.m. at "Colonsy," Crosby Road South, Waterloo, Liverpool 22, with theory and Morse classes on alternate weeks. On February 17, G3FZG will give a talk entitled "Practical Alignment." "Morse Procedure" will be the subject of G3GST's talk on February 24. *Hon. Secretary:* A. Crighton, 77 Myers Road West, Great Crosby.

Silent Keys

P. B. CARTER (G3IWQ)

We record with regret the death on December 26, 1958, at the early age of 29, of Mr. P. B. Carter (G3IWQ) of Shepherds Bush, London. Mr. Carter had been a member since 1952.

Deepest sympathies are extended to his widow and family in their great loss.—G3IJL.

E. E. HEWITT (G4MY)

The death occurred on December 29, 1958, of Mr. E. E. Hewitt (G4MY) of Bournemouth, Hants. Mr. Hewitt held an A.A. licence (2DTR) for some years but this was exchanged for a full licence just before the last war. He had been a member since 1936.

Sympathies are extended to Mrs. Hewitt and her family in their bereavement.

A. N. JACKSON LEY (G5DM)

It is our sad duty to record the death on January 12, 1959, of Noel Jackson Ley (G5DM) of Beeston, Notts. A member of the Society since 1924 Mr. Ley was one of the pioneers of Amateur Radio in the Midlands. Don Emma, as he was invariably called by his contemporaries, was present at the first Old Timers' dinner in 1938 but ill health prevented him from attending the dinner last October.

Sympathies are extended to Mrs. Ley and her family at this time of great loss.

Representation

THE following are additions to the list of County Representatives published in the December 1958 issue:

REGION 1

LANCASHIRE WEST

F. H. P. CAWSON (G2ART), 113 Waterloo Road, Southport.

WESTMORLAND

G. MOSER (G3HMR), 31 Castle Road, Kendal.

REGION 8

KENT

R. C. FAGG (G3FVV), 14 Westover Road, Broadstairs.

REGION 9

CORNWALL

J. N. WATSON (G3AET), 24 St. John's Terrace, Devoran, near Truro.

DORSET

A. A. BARRETT (G5UF), "Glenelg," Radio Station Houses, Dorchester.

* * *

The following are additions or amendments to the list of Town Representatives published in the December 1957 issue:

REGION 1

CHESHIRE—WIRRAL AREA

H. V. YOUNG (G3LCI), 9 Eastcroft Road, Wallasey.

REGION 9

BRISTOL

C. N. CHAPMAN (G2HDR), "Yeovil," Stoke Hill, Bristol 9.

REGION 10

GLAMORGANSHIRE—CARDIFF

T. J. BROOKE (GW3GHC), 32 Elgar Crescent, Llanrumney.

PORT TALBOT AND DISTRICT

G. E. EVANS (GW2AVV), 121a Penycae Road, Port Talbot.

Vacancies

Messrs. J. D. Kay (G3AAE), E. P. Essery (G3KFE) and E. M. Hale (G3GFS) have resigned as Town Representatives for Barnet Area, Southgate & District and Chingford, respectively. Nominations for their successors should be made in the prescribed form and sent to reach Headquarters by not later than March 31, 1959.

Affiliated Society Representatives

THE following have been appointed Affiliated Societies' Representatives for 1959:

CLIFTON AMATEUR RADIO SOCIETY (G3GHN): C. H. Bullivant (G3DIC), 25 St. Fillans Road, Catford, London, S.E.6.

NORTH KENT RADIO SOCIETY (G3ENT): C. J. Leal (G3ISX), 1 Deepdene Road, Welling, Kent.

Can You Help?

● A. S. Bragg (B.R.S. 11262), 118 Wallace Road, Ipswich, Suffolk, who requires information on the R208 receiver (20 to 145 Mc/s, a.m. and f.m.) and the B.T.H. P58 receiver (280 to 680 Mc/s.)?

Radio Tube Vade Mecum

THE 14th Edition of *Brans' Radio Tube Vade-Mecum* is now available from Bailey Bros. & Swinfen Ltd., Hyde House, West Central Street, London, W.C.1, price 32/-, Published by P. H. Brans Ltd. of Antwerp the 1958 edition runs to 464 pages.

IF YOU ARE A HOME CORPORATE MEMBER HAVE YOU AMENDED YOUR BANKER'S ORDER TO THE CURRENT SUBSCRIPTION RATE OF 30/-? IF NOT WILL YOU PLEASE DO SO WITHOUT DELAY? THANKS

Slow Morse Practice Transmissions

G.M.T.	Call-sign	kc/s	Town
Sundays			
09.00 ...	G3BHS	1810	Southampton
09.30 ...	G3BKE	1900	Newcastle-on-Tyne
10.30 ...	G3FFA	1935	Barnet
11.00 ...	G3GZE	1840	Blackburn
11.00 ...	G2FXA	1900	Stockton-on-Tees
11.30 ...	G3JDO	1900	Hebburn-on-Tyne
12.00 ...	G3LP	1850	Cheltenham
12.00 ...	G1SUR	1860	Belfast
15.00 ...	G3LEQ	1990	Tunbridge Wells
20.00 ...	G3MRA	1810	Southampton
20.30 ...	G3HTA	1850	Exeter
21.00 ...	G2FIX	1812	near Salisbury
Mondays			
18.00 ...	G3GZE	1840	Blackburn
18.30 ...	G3NC	1825	Swindon
19.00 ...	G3KTP	1850	Heanor, Derby
19.00 ...	G3LMT	1850	Exeter
20.00 ...	G3MDH	1860	Southampton
20.30 ...	G3AGN	1875	Felixstowe
20.30 ...	G3LSF	1900	Southport
20.30 ...	G3MXI	1910	Derby
21.00 ...	G3BHS	1810	Southampton
21.30† ...	G3LGK	1980	Derby
21.30† ...	G3MXI		
Tuesdays			
17.30 ...	G2AAM	1875	Swanwick, Derbys.
18.00 ...	G3GZE	1840	Blackburn
18.30 ...	G2FXA	1900	Stockton-on-Tees
20.00 ...	G3JLS	1810	Southampton
20.00 ...	G2FCI	1850	Exeter
21.00 ...	G3BHS	1810	Southampton
21.00 ...	G3EFA	1855	Southport
21.15 ...	G2CPL	1875	Felixstowe
21.45 ...	G2UK	1875	Lowestoft
Wednesdays			
18.00 ...	G3GZE	1840	Blackburn
19.00† ...	G3MCJ	1845	Exeter
19.00† ...	G3FLK		
19.00† ...	G2FCI		
19.00† ...	G3HTA		
19.00 ...	G3LZC	1830	Heanor, Derby
19.00 ...	G8RQ	1850	Chesterfield
19.30 ...	G3BIA	1900	Twickenham

G.M.T.	Call-sign	kc/s	Town
Wednesdays			
20.00 ...	G3IBI	1810	Southampton
20.30 ...	G3MXI	1910	Derby
21.00 ...	G3BHS	1810	Southampton
22.00 ...	G3JJC	1990	S.E. London
22.00† ...	G3LGK	1980	Derby
22.00† ...	G3MXI		
Thursdays			
17.30 ...	G2AAM	1981	Swanwick, Derbys.
18.30 ...	G3NC	1825	Swindon
19.00 ...	G3LXL	1850	Nottingham
20.00 ...	G3MCL	1810	Southampton
20.00† ...	G2ABR	1919	Hull, Yorks.
20.00† ...	G3FCY		
21.00 ...	G3GWT		
21.00 ...	G3KTO		
20.30 ...	G3GDZ	1910	Kingsbury, N.W.9
21.00 ...	G3BHS	1810	Southampton
21.30 ...	G3HMY	1850	Exeter
22.00 ...	G3JIT	1990	S.E. London
Fridays			
18.30 ...	G3DMN	1880	Ipswich
19.30 ...	G3FVP		
19.30 ...	G3FUA	1850	Kilburn, Derby
19.30 ...	G3MHR	1850	Swanwick, Derbys.
20.00 ...	G3IXN	1810	Southampton
20.30 ...	G3KSF		
20.30 ...	G3ICX	1915	Sutton Coldfield
20.30 ...	G3KGU	1915	Theydon Bois, Essex
21.00 ...	G3BHS	1810	Southampton
21.30† ...	G3KLZ	1900	Bradford
21.30† ...	G3KSS		
22.00 ...	G3KYU	1859	Bournemouth
22.00† ...	G3LGK	1980	Derby
22.00† ...	G3MXI		
Saturdays			
09.00 ...	G3BHS	1810	Southampton
13.00 ...	G2FXA	1900	Stockton-on-Tees
14.00 ...	G3BIA	1900	Twickenham
20.00 ...	G3MCL	1810	Southampton

† Alternately.
* Slow Morse QSO.

Forthcoming Events

Details for inclusion in this feature must reach the appropriate Regional Representatives *not later than the 18th of the month* preceding publication. T.R.s and club secretaries are reminded that the information submitted must include the date, time and venue of the meeting and, whenever possible, details of the lecture or other event being arranged. Regional Representatives are requested to set out copy in the style used below.

REGION 1

Blackpool (B. & F.A.R.S.).—Tuesdays, 7.30 p.m., Squires Gate Holiday Camp.
Bury (B.R.S.).—March 10 (Lecture on Jodrell Bank Observatory by a member of the staff), George Hotel, Kay Gardens.
Liverpool (L. & D.A.R.S.).—Tuesdays, Gladstone Mission Hall, Queens Drive, Stoneycroft.
Macclesfield.—February 24, March 10, 24, "The Bruce Arms," Crompond Road.
Manchester (M. & D.R.S.).—March 2 (Junk Sale), 7.30 p.m., Brunswick Hotel, Piccadilly.
Manchester (S.M.R.C.).—March 6, Ladybarn House, 17 Mauldeth Road, Fallowfield, Manchester 20.
Wirral (W.A.R.S.).—February 20, March 6, 20, 7.45 p.m., No. 4 Hamilton Square, Birkenhead.

REGION 2

Bradford (B.A.R.S.).—February 24 ("Transmitter Design and Construction," D. M. Pratt, G3KEP); March 10 (Junk Sale); March 24 (A.G.M.), 7.30 p.m., Cambridge House, 66 Little Horton Lane.

REGION 3

Birmingham (M.A.R.S.).—February 17 (Film Show); March 5 (TV Lecture/Demonstration), 7.30 p.m., Midland Institute, Paradise Street. (Slade).—February 27 ("Round the Local Hams—G2AK"), 7.45 p.m., Church House, High Street, Erdington; March 6 (Mullard Film Show), 7.45 p.m., Y.M.C.A., Snow Hill; March 13 ("Pye V.H.F. Business Radio"), 7.45 p.m., Church House, High Street, Erdington. (South).—February 27, 7.30 p.m., Starchley Institute (Lecture).
Coventry.—February 20, 7.30 p.m., Vine Street Schools. (C.A.R.S.).—February 16 (Special General Meeting); February 23 ("Licence Conditions" by G3RF); March 9 ("Contest Operating" by G2LU); March 16 (Quiz), 7.45 p.m., 9 Queens Road.
Stourbridge & District.—February 20, 8 p.m., White Horse, Amblecote; March 3, 8 p.m., Brotherhood Hall, Scotts Road, Stourbridge (A.G.M.).

REGION 4

Derby (D. & D.A.R.S.).—February 18 (Open Evening); February 25 (Beginners' Demonstration); March 4 (Auction Sale, Surplus

Items); March 6 (Annual Dinner); March 11 (N.F.D. Discussion), 7.30 p.m., Room 4, 119 Green Lane, Derby.
Derby (S.W. EXP.S.).—Sundays, 10.30 a.m., February 19, 26, March 5, 12, 7.30 p.m., Club Room, Nunsfield House, Boulton Street, Alvaston.
Leicester (L.R.S.).—February 16, 23, March 2, 9, 16, 7.30 p.m., Old Hall Farm, Braunstone Lane, Leicester.
Lincoln (L.S.W.C.).—February 25, March 11, 25, (R.A.E. Classes) 7.30 p.m., Technical College, Cathedral Street.

REGION 6

Cheltenham.—First Thursday in each month, 8 p.m., Great Western Hotel, Clarence Street.
Oxford (O. & D.A.R.S.).—February 25 ("Transistor Application"); March 11 ("Further Applications of Transistors"); March 25, 7.30 p.m., Cherwell Hotel, Water Eaton Road.

LONDON MEMBERS' LUNCHEON CLUB

will meet at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road, at 12.30 p.m. on Friday, February 20 and Friday, March 20, 1959. Telephone table reservations to HOL 7373 prior to day of luncheon. Visiting amateurs especially welcome.

REGION 7

Acton, Brentford & Chiswick.—March 17 (Field Day Discussion); March 24 ("S.S.B." by G2QY), 7.30 p.m., A.E.U. Rooms, 66 High Road, Chiswick.
Barnet (B. & D.R.C.).—February 24 ("Transmitter Construction" by G. G. Gibbs, G3AAZ), 7.30 p.m., Red Lion Hotel, High Barnet.
Bexleyheath (N.K.R.S.).—February 26 ("Tape Recorders for the Amateur," R. Mallinson, G3GOG); March 12 (Junk Sale); Congregational Hall, Clock Tower, Bexleyheath.
Ealing.—Sundays, 11 a.m., ABC Restaurant, Ealing Broadway, W.5.
East Molesey (T.V.A.R.T.S.).—March 4, Carnarvon Castle Hotel, Hampton Court.
Harlow & District.—Tuesdays, 7.30 p.m., rear of G3ERN (G. E. Read).
Holloway (G.R.S.).—Mondays and Wednesdays (R.A.E. and Morse); Fridays (Morse and Club), 7 p.m., Montem School, Hornsey Road, N.7.
Ilford.—Thursdays, 8 p.m., G2BRH, 579 High Road, Ilford.
Kingston.—Lecture alternate Thursdays, 7.45 p.m., Theory and Morse Classes weekly, 5 Penrhyn Road, Kingston, Surrey. Sausage and Mash Supper, February 19.

Norwood & South London.—First Tuesday in month (R.A.E. and Morse classes), 7.30 p.m., Windermere House, Westow Street, Crystal Palace.
Romford (R.D.A.R.S.).—Tuesdays, 8.15 p.m., R.A.F.A. House, 18 Carlton Road, Romford.
Slough.—March 2, 7.45 p.m., Plough Hotel, Wexham Street, Wexham.
Welwyn Garden City.—March 12, 8 p.m., I.C.I. Recreation Club, Blackfan Road, Welwyn Garden City. (Constructors' Competition).

REGION 8

Brighton (B. & D.R.C.).—February 18 (N.F.D. Discussion), February 25 ("DX Operating" by G3CY), 8 p.m., Eagle Inn, Gloucester Road.
Worthing (W. & D.A.R.C.).—February 21 (Annual Dinner), Channel View Hotel; March 9, 8 p.m. (Film Show), Adult Education Centre.

REGION 9

Bath.—February 16, March 16, 7.30 p.m., 12 James Street West, Bath.
Bristol.—February 20, 7.15 p.m. ("Thoughts on the Applications and Adjustment of Relays," H. J. Gratton, G6GN), Carwardine's Restaurant, Baldwin Street, Bristol.
Exeter.—March 12, 7.30 p.m., "Redcroft," Clifton Hill, Exeter.
Torquay.—March 14, 7.30 p.m., Y.M.C.A., Castle Road, Torquay.
Yeovil.—February 18, 25, March 4, 11, 7.30 p.m., Grove House, Preston Road, Yeovil.

REGION 14

Falkirk.—March 13, 7.30 p.m., Temperance Café.

REGION 15

Belfast.—February 23, 7.30 p.m., 73 Lisburn Road (Discussion on N.F.D. and O.R.M.).

DATES FOR YOUR DIARY

March 14.—Scottish V.H.F. Convention.
March 20.—London Lecture Meeting.
April 12.—Blackpool O.R.M.
April 26.—North Midlands Mobile Rally.
May 2.—Bangor (N.I.) O.R.M.
May 3.—Cornish Hamfest and Mobile Rally, Penryn.
May 10.—Cheltenham Mobile Rally.
May 30.—Fifth International V.H.F./U.H.F. Convention, London.
June 14.—Longleat Mobile Rally.
June 28.—Worthing "Bucket and Spade" Party.
September 13.—Woburn Abbey Mobile Rally. (Provisional)
September 20.—Lincoln Hamfest and Mobile Rally.

English Electric Valve Co. Ltd. Private Exhibition Arranged

THE English Electric Valve Co. Ltd. are holding a private exhibition at the Kensington Palace Hotel from March 17 to 21 both dates inclusive. The display will consist of all that is modern in valve design technique in the world of radar, communications, transmitting, broadcasting (sound and vision) and construction. R.S.G.B. members are invited to attend the Exhibition which will be open from 11 a.m. to 7 p.m. daily.

NORTH WESTERN REGIONAL MEETING

Imperial Hotel, Blackpool
Sunday, April 12, 1959

Tickets, price 15/- each, are available from the Town Representative, H. G. Newland (G5ND), 161 Penrose Avenue, Morton, Blackpool. Hotel accommodation may also be booked if desired.

Symposium on Millimetre Waves

MILLIMETRE waves will be the subject of the ninth international symposium of the Polytechnic Institute of Brooklyn Microwave Research Institute to be held in the auditorium of the Engineering Societies Building, 33 West 39 Street, New York City, on March 31 and April 1 and 2, 1959. Further information may be obtained from Professor Herbert J. Carlin, Microwave Research Institute, 55 Johnson Street, Brooklyn 1, New York.

Fifth International Instrument Show

PRODUCTS from over 50 factories from ten countries will be shown at the fifth International Instrument Show, sponsored by B. & K. Laboratories Limited. The exhibition will be held at the International Instrumentation Centre, 4 Tilney Street, Park Lane, London, from April 6 to 10 and will be open each day from 10 a.m. to 7 p.m. except on Monday (opening 11.30) and Wednesday (closing 9 p.m.).

Applications for tickets should be made to the organizers, either at 4 Tilney Street (GRO 4567) or 57 Union Street, S.E.1. (HOP 4567).

Letters to the Editor...

Neither the Editor nor the Council of the Radio Society of Great Britain can accept responsibility for views expressed by correspondents.

Rotary Space Heaters

DEAR SIR,—My call-sign is not hoary with age, but I've had it long enough to find out that my "rights" as a transmitting amateur are, at best, very nebulous, and like many others I would not attempt to enforce them. As a result my transmissions are progressively more and more proscribed, and I am being slowly but surely, forced off the air. Since, however, my interest in radio goes back to 1919 it is now more or less ingrained, and I find myself spending most of my available time with my receiver.

In such a purely passive role I had not thought to be bedevilled once again by this question of "rights." But what are my rights as a listener? My licence tells me that I can "use the said apparatus for the purposes of receiving messages sent by telephony from authorized broadcasting stations for general reception and messages sent by telephony or telegraphy from licensed amateur stations." I do not want to listen to broadcasting stations "authorized" or otherwise, neither do I want to listen to amateur stations specifically. So presumably I have no rights. I want to browse over the spectrum between 50 kc/s and 32 Mc/s, but I cannot and herein lies the rub. The latest "infernal machine" ensures 100 per cent. obliteration *all the time* of signals other than those on television or broadcast channels. I refer to "rotary space heaters" which, with the aid of a fan, dispense hot air in cold weather, or cold air in hot weather. Owing to the varying efficiency of human circulatory systems, it seems likely that, in a densely populated area, a listener might be within range of at least one for 24 hours a day, as I seem to be.

My particular *bête-noir*, as yet not located, appears to be efficiently suppressed for TVI and relies on the receiver's a.g.c. on the medium and long wave broadcast bands. At 200m tuned off any programme, the noise level is about S7/8, as it is at 1400m. On ten metres, the only band on which I can hope *sometimes* to put out a puny signal without myself causing interference in some neighbouring electrical apparatus, there is a complete wipe-out.

Before my luckless, witless, and entirely unsuspecting neighbour, purchased, or was given, this latest monstrosity, I had thought the local ether had reached saturation point with electrical interference. How wrong I was!

Legally I suppose, I can complain on the score that I cannot receive amateur transmissions, but since I cannot transmit a fully-modulated signal of any potency without annoying most of the people who are annoying me, I don't think I shall get very far. I would, however, be interested to know whether it is practicable to suppress these motor-driven appliances from say, 50 kc/s to 200 Mc/s, and whether anyone else has experience of this latest torture.

Yours faithfully,

Beckenham, Kent.

FRED G. STOW (G3IUP).

Red Herrings from New Zealand

DEAR SIR,—The purpose of my article "Some Thoughts on S.S.B." (August 1958) was to investigate the reason for a comparative lack of enthusiasm for the s.s.b. technique. The resulting correspondence has produced useful pointers, and also a crop of red herrings which could have been avoided by more careful reading before commenting.

With particular reference to the points raised by Mr. Earnshaw (ZL1AAX) in his letter published in January, I made it quite clear that there is a formidable literature explaining the merits of s.s.b. as compared with other forms of modulation. I did not condemn s.s.b. technique in whole, in part, systematically or otherwise. I did not say that I have any difficulty in receiving s.s.b., nor that I lack equipment, nor that I am unaware of procedure and the degree of activity. I did not say that it is unreasonable to turn down the r.f. gain and I didn't mention the a.v.c. at all. The go-ahead spirit and foresight with which Britain is progressing with s.s.b. is shown by the recent article on s.s.b. for the v.h.f. bands. But surely it is agreed that the number of amateurs in all countries who avail themselves of the advan-

tages which s.s.b. offers represent a very small percentage of the total. I asked the simple question, why? As an answer I postulated receiving difficulties and this is the answer frequently given by a.m. operators.

Much of the correspondence has supported my statement that the skilful enthusiast can work satisfactorily with most of the well-known receivers and if he is sufficiently enthusiastic, he will undertake improvements. It has also shown that there are others who don't agree. I am still of the opinion that the receiving technique is the main obstacle.

In conclusion I wish to thank all writers for their interest and desire to further the cause of s.s.b. It is gratifying to receive comments from as far afield as New Zealand.

Yours faithfully,

Ilford, Essex.

A. H. KOSTER, DR. ING. (G3ECA).

No Stagnation Here

DEAR SIR,—Recent correspondence concerning inability to tune s.s.b. signals reminds me of my letter dated June 1953 in which I mentioned several factors which would have to be catered for when receiving or transmitting with s.s.b. Amongst them was the need for improvements in receiver design. Since then I have received s.s.b. on many Service, commercial and amateur receivers ranging from a one valve straight to multi-valve types specially designed for s.s.b. work. One overriding conclusion can be drawn from this experience: it is the need for a slow tuning rate. Whether tuning is by electrical bandspread or by the use of gear trains is immaterial. The tuning knob should be not less than 2½ in. in diameter, preferably fitted with a skirt; and the angle of revolution for one kilocycle should be not less than 15 degrees. This represents 24 kc/s per full knob revolution. Existing receivers can easily be checked by finding the number of revolutions between adjacent 100 kc/s check points and making a simple calculation.

If it is found that the tuning rate is too fast the remedy should not, normally, be beyond the resources of the keen amateur and will probably require either:—

- (a) Introduction of series condensers in band spread tuning.
- (b) Alteration of pulley ratio of string driven tuning.
- (c) Smaller driving pinions for mechanical gear chains.
- (d) Provision of an additional fine tuning condenser in parallel with the oscillator condenser to give about plus or minus 5 kc/s adjustment.

One important point to remember is that the b.f.o. should never be readjusted after it has been tuned to the desired side of the passband.

It should be realised that local oscillator stability is frequently very poor above 14 Mc/s. For this reason many operators prefer crystal converters with lower frequency tuning for the high frequency bands. Nevertheless it is still a perfectly practicable proposition to receive 28 Mc/s s.s.b. on a well constructed one valve straight receiver.

Finally I should like to inform Mr. Earnshaw (ZL1AAX) that the backroom boys are far from stagnant here. Much research has been and is still being carried out in the proper quarters, and there are many excellent amateur built rigs on the air.

Yours faithfully,

A. J. R. PEGLER, Commander,
Royal Navy, A.M.I.Mech.E.,
A.F.R.Ae.S. (G3ENI).

Portsmouth, Hants.

An Appeal

DEAR SIR,—I gathered, when listening to the Light Programme at 6.55 p.m. on January 9, 1959 that the Borchester Amateur Transmitting Society (B.A.T.S.)—not Borchester Radio Amateur Transmitting Society (B.R.A.T.S.) as erroneously reported elsewhere—are seeking permission to occupy Lakey Hill, Ambridge, for N.F.D. June 6/7, 1959. I trust their application will be successful and that none of the anticipated difficulties with sheep, or with the cars on the approach road, will materialize.

The national importance of the B.A.T.S. participation needs no stressing, and the purpose of this letter is to inquire if they are likely to need assistance with operators, transport, tents or the like. Perhaps their Secretary will be good enough to let the Editor know if any difficulties are anticipated. Steps can then be taken to form a suitable committee to help. The undersigned will, it need not be added, do all in his power to assist.

Yours faithfully,

R. W. BAILEY (G2QB).
(G2 Queen's Bowman).

Double Sideband Reduced Carrier

DEAR SIR,—A3b emission has been in use at G3JZK now for six months. An inquiry to the G.P.O., pointing out the advantages of the system as a half-way house to s.s.b. elicited a reply stating that, though not officially to be encouraged, A3b was permissible within the terms of the Amateur (Sound) Licence. The transmitter used consists of two 807s in a high-level balanced modulator circuit, which was originally used as a parallel valve c.w./a.m. p.a. The modification took approximately two hours, enabling the unit to be driven with r.f. from the exciter, as before, and with audio from the driver stage of the class B zero bias modulator.

For reception, a synchronous detector is used, which enables not only d.s.s.c. but s.s.b. to be received, either sideband or a combination of both being selectable. Checks with this show that many so-called s.s.b. signals are, in fact, nearer d.s.b., a considerable quantity of unwanted sideband being radiated. Stations worked on 20m have commented that the d.s.b. signal was no different, from the reception point of view, than s.s.b., and none have even noticed the flutter effect which is supposed to occur. This is that, unless one of the sidebands is attenuated at the receiver, the audio output will be modulated at the beat frequency between the b.f.o. and the suppressed carrier. In practice, only some 6 db of attenuation of one sideband is needed to eliminate this effect; very few receivers in use on the amateur bands today are incapable of providing this!

Finally, the point must be made that it is much easier to produce a clean d.s.s.c. signal than s.s.b.—a poorly made and incorrectly adjusted s.s.b. exciter can wreak havoc on the bands, while a high-level balanced modulator for d.s.s.c. is a virtually foolproof device. Apart from n.b.f.m., d.s.s.c. is the cheapest and easiest modulation system in use on the amateur bands today, as is proved by the popularity in the U.S.A. of a kit transmitter using the system. With reference to Mr. Bagley's (G3FHL) letter in the January issue of the BULLETIN, one could point out that if the Post Office authorities are content to designate d.s.s.c. as A3b, we should be also!

Yours faithfully,

G. T. SASSOON (B.A. Cantab.),
(G3JZK).

DEAR SIR,—In the December issue, Mr. G. Ripley (G3KFW) commented on the types of emission permitted for use by U.K. amateurs, his main point being that A3b is not listed as being authorized.

Having built a d.s.b. rig for 160m I decided to do some research. The following is a quotation from *Radio and Television Reference Book* published by Newnes (General Editor E. Molloy):

"A logical development from the basic s.s.b. emission is independent sideband operation designated A3b (I.S.B.) whereby a second, but completely independent, sideband is also associated with the same pilot carrier and radiated on the opposite side of it. Further intelligence channels are handled in the second sideband."

It would seem then that the official description of A3b is independent sideband operation where, in the amateur sense, two separate transmissions could be made at the same time. As an extreme example, G7ABC and G7XYZ, using the same pilot carrier, switching upper and lower sidebands to respective linear amplifiers, and listening on separate receivers, could conduct completely independent QSOs from one common frequency, occupying only one portion of the band for two QSOs, where only one a.m. transmission could normally be accommodated.

Although A3b is not amongst the systems authorized for use by U.K. amateurs, the application described in the example above appears to be permissible, or does it? I wonder.

The point is, of course, that the double sideband suppressed carrier system is (i) still unclassified, (ii) occupies no more bandwidth than do conventional amplitude or frequency modulated systems, (iii) has no transmitter carrier (removed in the receiver anyway) which a nearby a.m. signal can beat with, causing a heterodyne whistle to ruin the contact.

May I suggest that if the G.P.O. are unable to give a definite ruling, that the matter be taken up by the R.S.G.B. at international level so that amateurs in other countries also know how they stand?

Yours faithfully,

J. R. HUNT (G3KQH).

Overstone, Northants.

Calls Heard and Worked on 2 Metres

DEAR SIR,—I note with some concern the decision to omit details of inter-G calls heard and worked on 2m (December BULLETIN, p. 284).

It implies that contacts with stations outside England are more worthy of mention than those with other Gs. This is not always so. A station on the South Coast may work into France with relative ease, yet may have great difficulty in making contact with, say, the North or South-West of England. Similarly, I can only work stations to the east of Bristol under good conditions, whereas stations in South Wales are "locals." Under the new scheme these contacts are mentioned, yet the difficult G contact is deleted. This is of significance when going through the listener reports to see if one has been heard in a particular area, especially if that listener is in a district which, from the v.h.f. aspect is sparsely populated, e.g. Cornwall.

The need for economy of space is appreciated, but I suggest that it be done in a different way, say by omitting mention of contacts with stations less than 50-100 miles distant.

Finally, changing the subject, listener reports on 2m transmissions from this station are welcomed and will be acknowledged in the usual way.

Yours faithfully,

CYRIL N. CHAPMAN (G2HDR).

Bristol 9.

Taming the 807

DEAR SIR,—There must be many amateurs who, like myself, for reasons of economy, persist in using 807s either singly or in pairs in transmitter p.a. circuits. It is well known that these valves are subject to self oscillation and t.p.t.g. instability unless special care is taken with layout and neutralization. Much to my sorrow, I have spent months of spare time in efforts to stabilize both pi circuits and push-pull circuits using these valves.

I have no specialist knowledge and my successful results have been obtained the hard way. After taking all the well known precautions regarding layout, compact and isolated grid and anode circuitry, adequate screening, etc., I have found that the most significant cure for instability in the valves is to return the grid circuits by low impedance connection *direct to the cathode pin on valveholder(s)* and not to some adjacent connection on the chassis. This point is mentioned in Whalley's excellent

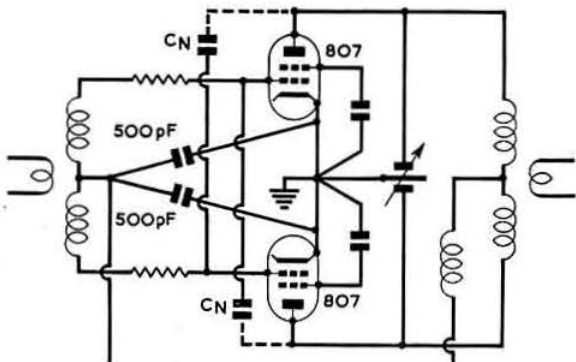


Fig. 1. Stabilization of 807s as described in the letter from G3GNL.

article on pi circuits in the April 1952 issue of the BULLETIN. In the case of "push-pull" 807s, 500 pF condensers connected between the mid-point of the grid coils and each cathode are sufficient in place of the more usual single 1000 pF condenser earthed at some random point on the chassis. (See Fig. 1.)

The p.a. alone should be checked with approximately 250 volts h.t. and zero bias during the test. The anode condenser should be tuned through resonance and any instability will then be instantly obvious on grid and/or anode current meters.

I am convinced that many TVI troubles are caused by insufficient attention to instability in p.a. circuits particularly when using such lively valves as 807s.

Yours faithfully,

M. J. FROST (G3GNL).

Hayes, Bromley, Kent.

New Members

THE following were elected to membership at the December 1958 meeting of the Council.

Corporate Members, Home (Licensed)

- G2ASW J. S. W. Woolford, 33 Waverley Road, Harrow, Middx.
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 G3LXV A. J. Pearce, 12 Cox Avenue, Moordown, Bournemouth.
 G3MAG W. E. G. Allwright, 12 Ashington Gardens, Peacehaven, Newhaven, Sussex.
 G3MVF A. S. Frank, 47 Leyland Road, Harrogate.
 G3MHF M. S. Ockenden, 32a Meads Street, Eastbourne, Sussex.
 G3MIK R. Kerley, St. John's College, Cambridge.
 G3MRB T. L. W. Puryer, 78 Wolverton Road, Haversham, Wolverton, Bucks.
 G3MRO D. P. Heath, 4 Baalbec Road, Highbury, London, N.5.
 G3MVT J. L. Tiptaft, 42 Hutton Road, Birmingham 20.
 G3MWW/T D. G. Blake, Rectory Cottage, Gresham, Norwich.
 G3MYA A. Martindale, 1 Dinsdale Road, Leiston, Suffolk.
 G3MYC C. J. Cheate, 961 Chester Road, Erdington, Birmingham 24.
 G3MYP J. M. Worrall, c/o Cable & Wireless Ltd., P.O. Box 412, Nicosia, Cyprus.
 G3MZJ D. C. A. Dixon, 22 Lovatt Drive, Blechley, Bucks.
 G3MZR J. G. W. Gay, 84 Bonner Road, London, E.2.
 G3NAB E. F. Edwards, 49 Bruce Grove, Chelmsford, Essex.
 G3NAE C. K. Richardson, 11 Firs Glen Road, Winton, Bournemouth.
 G3NBL J. E. Larson, 25 Roseberry Flats, Billingham, Co. Durham.
 G3NCR O. D. J. C. Rae, Branting Balk, Shoppenhangers Road, Maidenhead, Berks.
 G3NES G. Gardner, Mellow End, Broad Oak, Nr. Canterbury, Kent.
 G3NFG/VK3ACS K. C. Seddon, 15 Holmesdale Road, Sevenoaks, Kent.
 G5JZ J. C. W. K. Sands, Corona, Heathfield, Sussex.
 G5PJ J. C. G. Phillips, O.B.E., 6 The Fairway, Northwood, Middx.
 G5ZG J. Sir Roger Hawkey, "Great Coopers," Takeley, Essex.
 G6NV J. A. Hargreaves, No. 6 "Jordan," Damhead Hall, Glazebrook, Manchester.

- G8MD J. A. Drinkall, 25 Garstang Road (North), Wesham, Nr. Kirkham, Lancs.
 GM3BE T. M. Bowden, 32 Laverock Road, Kirkwall, Orkney.
 GM3LNE R. W. McInnes, Station House, North Queensferry, Fife.
 GMSLF J. R. M. McRobb, 41 Rowallan Drive, Kilmarnock, Ayrshire.
 GW3NDB J. Wyatt, 177 Barry Road, Barry, Glamorgan.
 GW3NDR D. Harris, 27 Stanfield Street, Cwm, Ebbw Vale, Mon.
 GW8AM R. T. Mathews, 4 Church Place South, Penarth, Glam.

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 UB5DW A. Chichko, P.O. Box 58, Kiev 1, U.S.S.R.
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 W5PQA H. W. Merideth, 3912 Anderson Avenue, S.E. Albuquerque, New Mexico.
 W6HG G. P. Dery, 9658 Cloverwood Street, Bellflower, California.
 W7LEV Herman J. Paas, Jr., Route One, Benton City, Washington.
 W8PUD John J. Schleich, 1961 Seneca Drive, Cleveland 17, Ohio.
 W0JRI Jack C. Chapman, Shady Ridge, Hutchinson, Minnesota.
 ZS6AOQ O. G. Rees, Germiston Aeradio, Rand Airport, Germiston, South Africa.
 ZB2Z R. W. Bush, Room 1, "C" Block, R.A.F., New Camp, Gibraltar.
 4X4AS S. Menuhin, 19 Wuzmann Street, Rehovot, Israel.

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 22100 N. Penketh, 38 Devon Street, St. Helens, Lancs.
 22101 V. J. T. Weale, 25 Dyserth Road, Penarth, Glamorgan.
 22102 G. Bradley, 26 Carlton Grove, Ermine Estate, Lincoln.
 22103 G. R. Sweet, 9 Southall Court, Lady Margaret Road, Southall, Middx.
 22104 D. R. Osborne, 988 Crystal Palace Park Road, Sydenham, London, S.E.26.
 22105 I. H. P. Doherty, M.B., Primrose House, Dalrymple Loan, Musselburgh, Midlothian.
 22106 P. T. Baber, 64 Latham Road, Bexleyheath, Kent.
 22107 W. Browning, 47 Brampton Grove, Hendon, London, N.W.4.
 22108 D. B. McCutcheon, Royal Ulster Constabulary, Newcastle, Co. Down.
 22109 Miss E. Cooper, Flat 1, Little Eggerton, Godmersham, Canterbury.
 22110 E. Lloyd-Jones, 17 Royal Gardens, Hanwell, London, W.7.
 22111 E. W. Gent, Green Marsh Farm, Terrington Street, Clement, Kings Lynn, Norfolk.
 22112 P. J. Atkins, 16 Carmalt Gardens, Putney, London, S.W.15.
 22113 C. H. McLewee, 111 Camborne Road, Morden, Surrey.
 22114 T. A. Wilson, 42 Carsdale Road, Woodhouse Park, Wythenshawe, Manchester 22.
 22115 B. J. Houghton, 11 Windsor Gardens, Ealing, London, W.5.
 22116 A. Capes, 37 South Hermitage, Belle Vue, Shrewsbury.
 22117 W. H. Louis, 15 Brecon Road, Handsworth, Birmingham 20.
 22118 C. H. Sutton, 1 Princes Square, London, W.2.
 22119 R. G. Harrison, 171 Laleham Road, Staines, Middx.
 22120 D. V. Hubbard, 37 Rothamsted Avenue, Harpenden, Herts.
 22121 T. Lewis, 1 Pennyfoot Street, Nottingham.
 22122 W. G. Phillips, 130 Hillbury Road, Warlingham, Surrey.
 22123 J. R. Selkirk, T.C.A. Rep., c/o Vickers-Armstrong Ltd., Weybridge, Surrey.
 22124 E. I. Bardos, 36 Moorlands Road, Bridgend, Glamorgan.
 22125 A. Evans, 99 Cherry Tree Lane, Great Moor, Stockport.
 22126 F. E. Usher, 40 Beresford Road, Kingston-on-Thames, Surrey.
 22127 W. G. Roberts, 44 Middleton Avenue, Chingford, London, E.4.
 22128 P. R. Bonfield, Maple Villa, Waterford, Hertford.
 22129 R. Dobson, 26 St. Johns Street, Lord Mayors Walk, York.
 22130 J. C. E. Ramsay, 3 Summerhill Road, Dartford, Kent.
 22131 T. F. Smith, 14 Elia Street, Islington, London, N.1.
 22132 R. C. Reynolds, 502 Heathway, Dagenham, Essex.
 22133 S. T. Woods, 111 Stradbroke Grove, Ilford, Essex.
 22134 J. Hemmings, 12 Cotman Gardens, Edgware, Middx.
 22135 P. V. Lingham, 7 Richmond Place, Brighton, Sussex.
 22136 I. J. Canwell, 49 Selwyn Road, Cambridge.
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 22140 R. J. Nash, 34 Ferney Road, East Barnet, Herts.
 22141 K. R. Lee, 44 Ascot Gardens, Southall, Middx.
 22142 G. H. Manners, 24 Dryhill Road, Belvedere, Kent.
 22143 L. W. Betty, 1 Burrow Road, Seaton, Devon.

- 22144 P. T. Connolly, 37 Market Street, Watford, Herts.
 22145 P. J. Craig, 64 Carlton Avenue West, North Wembley, Middx.
 22146 S. A. Scott, 6 Fieldside, Abingdon, Berks.
 22147 J. Grant, 153 New Row, Dunfermline, Fife.
 22148 *W. E. G. Lishman, 21 Brentor Road, Plymouth, Devon.
 22149 *D. J. Craven, 14 High Street, Boston, Lincs.
 22150 *P. G. Male, 31 Rosslyn Hill, Hampstead, London, N.W.3.
 22151 *A/2c, M. Lewis, AFI2545337, 5010th A.B.Wg. Trans. Qtrs., (AAC), Box 937, Seattle, Washington, U.S.A.
 22152 C. V. Taft, 239 Hagley Road, Edgbaston, Birmingham.
 22153 D. E. Godfrey, Upalond, Shepherds Hill, Mersham, Surrey.
 11580 *F. L. Harris, 80 Queens Walk, Ashford, Middx.
 19135 *J. Whitehead, 54 Railway View, Great Harwood, Blackburn.
 20835 *R. H. McMillan, 2 Sutton Place, Homerton, London, E.9.

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 1000 J. E. C. Heaver, 12 Sutton Avenue, Portland, Victoria, Australia.
 1001 D. A. Williams, Amen-House, P.O. Box 57, Ibadan, Nigeria.

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 1775 R. A. C. Doe, 1 Boughton Ham Cottages, Send, Woking, Surrey.
 1776 B. J. Fox, 268 Lillie Road, London, S.W.6.
 1777 J. M. Nisbet, 57 Haling Park Road, South Croydon, Surrey.
 1778 C. Whelan, 14 Llandinam Crescent, Gabafla, Cardiff.
 1779 R. S. Mason, 248 Hull Road, Anlaby Common, Hull, East Yorks.
 1780 M. W. J. Bensley, 34 Hilldale Road, West Sutton, Cheam, Surrey.
 1781 M. Duce, 26 Salisbury Road, Grays, Essex.
 1782 C. M. Goadby, c/o Lloyds Bank Ltd., Reigate, Surrey.
 1783 M. J. Heard, 16 Patricia Drive, Hornchurch, Essex.
 1784 J. B. Green, 30 Cobham Road, Westbury Avenue, London, N.22.
 1785 W. J. King, 219 Baldwins Lane, Croxley Green, Rickmansworth, Herts.
 1786 S. W. C. Harbour, Station House, Orton, Waterville, Peterborough, Northants.
 1787 J. P. Dyer, 10 Blakeney Road, Beckenham, Kent.
 1788 Miss I. L. Hayes, 7 Brownings Avenue, Chelmsford, Essex.
 1789 A. R. McHardy, 53 Grosvenor Road, Petts Wood, Orpington, Kent.
 1790 J. C. Lennox, Sunnymead, Deans Bridge, Armagh.
 1791 J. M. Smith, 46 Westward Ho, Bargaite, Grimsby, Lincs.
 1792 C. D. Barr, 7 Boxtree Lane, Harrow Weald, Middx.

- 1793 S. Burgess, 17 Central Avenue, Hounslow, Middx.
 1794 D. H. Pratt, St. John's Vicarage, Sandylands, Morecambe, Lancs.
 1795 M. S. Box, Mount Langton, Connaught Road, Weymouth, Dorset.
 1796 P. G. Robson, 70 Lower Road, Higher Denham, Uxbridge, Middx.
 1797 K. M. Marchant, 6 Tovey Road, Swindon, Wilts.
 1798 P. J. Baxter, 64 Chamberlayne Road, Kensal Rise, London, N.W.10.
 1799 G. E. Williams, 11 Beverstone Road, Thornton Heath, Surrey.
 1800 J. F. Turner, 31 Cornwall Avenue, Swindon, Wilts.
 1801 M. J. Dibsdall, 19 Cadshill Road, Eastville, Bristol, S.
 1802 R. A. Gledhill, 7 Oaklands Avenue, Crews Hill, Enfield, Middx.
 1803 P. J. Bromfield, Monkton, Wyld Farm, Charmouth, Bridport, Dorset.
 1804 B. E. Fry, 34 Crooked Mile, Waltham Abbey, Essex.
 1805 T. B. K. Gregory, 2 Elmsleigh Cottages, Cribbs Causeway, Westbury-on-Trym, Bristol 9.
 1806 R. W. Meacham, The Bungalow, Epping House, Little Berkhamsted, nr. Hertford.
 1807 T. R. Salter, 3 Hart Grove, Southall, Middx.
 1808 R. C. Lowe, 2A Percival Road, Enfield, Middx.
 1809 D. A. Sochachewsky, 538 Kirgs Road, Chelsea, London, S.W.10.

* Denotes transfer to Corporate Grade.

† Denotes previously a member.

R.S.G.B. QSL Bureau Sub-Managers

THE following is a list of the R.S.G.B. QSL Bureau Sub-Managers showing the call-sign groups for which they are responsible:

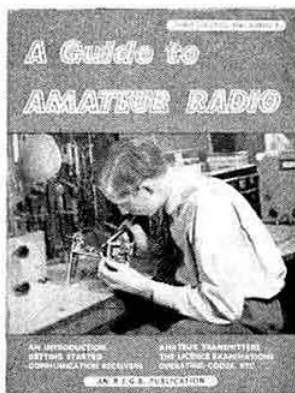
- G2 and DL2 calls:** G. Verrill (G3IEC), 10 Seahorse Street, Gosport, Hants. (Certificates Manager).
 P. Jones (G3ESY), 94 Holme Lacy Road, Hereford.
G3,4 and 5 two-letter calls & GC
G6 calls: A. J. Mathews (G6QM), 62 Ashlands Road, Hesters Way Estate, Cheltenham.
G8 calls: A. W. Gover (G4AU), 20A, Cambridge Road, Bromley, Kent.
G3AAA-BZZ: M. Hassall (G3EMD), 99 Shenstone Valley Road, Quinton, Birmingham.
G3CAA-DZZ: C. A. Bradbury (B.R.S. 1066), 13 Salisbury Avenue, Cheltenham.
G3EAA-HZZ: W. J. Green (G3FBA), 82 Bloomfield Avenue Bath.
G3IAA-KZZ, B.R.S. and A numbers C. Usher (G2CCD), 24 Carlisle Road, Dartford, Kent.
G3LAA-MZZ: G. C. Voller (G3JUL), 13 Marlborough Road, Ashford, Middlesex.
G3NAA onwards G. Verrill, (G3IEC), 10 Seahorse Street, Gosport, Hants.
GD calls: T. R. Moore (GD3ENK), "Glyn Moar," St. John's, Isle of Man.
GI calls: W. H. Martin (GI5HV), "Swallow Lodge," Greenisland, Co. Antrim, Northern Ireland.
GM calls: D. Macadie (GM6MD), 154 Kingsacre Road, Glasgow, S.4.
GW calls: J. L. Reid (GW3ANU), 28 Walterston Road, Gabafla, Cardiff.

Envelopes for the collection of cards should be sent direct to the Sub-Manager concerned and not to the QSL Manager (Mr. A. O. Milne). Outgoing cards should not be sent to the Sub-Manager unless they are in the call-sign group for which he holds envelopes. For example, the holder of G3J-- call may send cards for calls in the series G3IAA-G3KZZ to his own Sub-Manager, together with envelopes for the collection of cards, but he should not send to him cards in any other call-sign series. Sending cards for general distribution to the Sub-Managers only involves the cards in delay and the Society in needless expense. Mr. Milne's address is 29 Kechill Gardens, Bromley, Kent.

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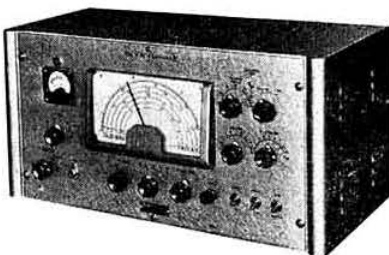
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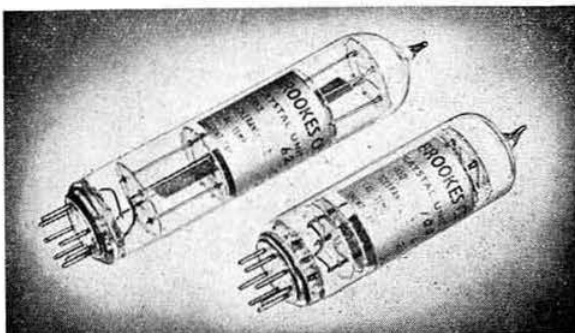
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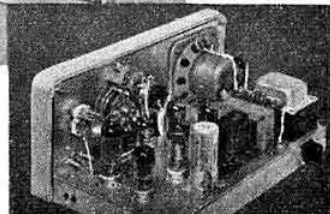
To test the generator, it is therefore only necessary to know the frequency approximately at one point. In the absence of other

methods, a wavemeter gives the best identification since it ignores harmonics. For example, if the unknown generator has a frequency of approximately 20 Mc/s, the approximate frequency may be found with the 10 Mc/s harmonic, the crystal and counters being switched off to avoid any confusion. The crystal oscillator is then switched in, and the harmonics of 1 Mc/s allow exact calibration of the scale. The 100 kc/s output is then added to allow finer calibration between the 1 Mc/s intervals.

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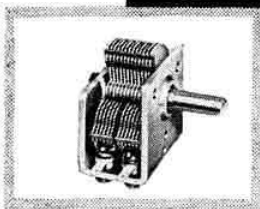


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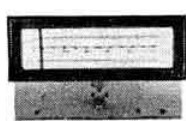
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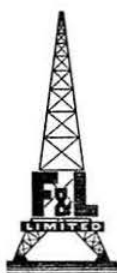
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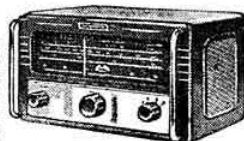
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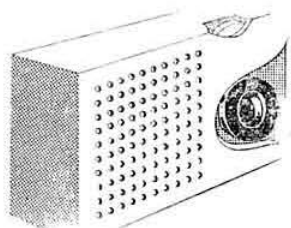
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(continued on page 416)

EXCHANGE & MART SECTION (Contd.)

PANDA ATU, all bands, as new, £12.10.0; also Radiocraft type 21M modulator, £4.—G3JQC, 19 Cambridge Street, Heckmondwike, Yorks. (849)

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WANTED.—All types of communications receivers, test equipment, tape recorders, amplifiers, etc. Prompt cash payment.—Details to R. T. & I. Service, 254 Grove Green Road, Leytonstone, London, E.11. (LEYton 4986).

WANTED.—BC610 Hallicrafters, E.T. 4336 transmitter; BC312 Receivers, BC221 Frequency Meters and spare parts for all above. Best cash prices.—P.C.A. Radio, Beavor Lane, Hammersmith, W.6. (266)

WANTED.—Accurate Frequency Meter covering 14/28 Mc/s. Also good straight key, G.P.O. Marconi 356A or similar. Details and price to—G4AH, 160 Cat Hill, East Barnet, Herts.

WANTED.—Circuit and manual for BC 1147/A, 13 valve U.S. Signal Corps Communications Receiver.—Lumsden, 33 Hillview Drive, Edinburgh, 12. (841)

WANTED.—BC453 Q-iver in perfect order. Sale or swap Command transmitter, 2-1-3 Mc/s, brand new and boxed, £2.—G3KAI, 57 Bradshaw Road, Honley, Huddersfield. (861)

WANTED.—Labgear LG300. Condition not important.—Box No. 862, The National Publicity Co. Ltd., 20-21 Red Lion Court, Fleet Street, London, E.C.4. (862)

WANTED.—Mint condition or brand new unused, latest current model U.S.A. communications receiver. Also transmitter and mobile transmitter/receiver. Full details and price, etc. Please, only first class gear, factory new and guaranteed. Wanted for personal use.—Box No. 863, The National Publicity Co. Ltd., 20-21 Red Lion Court, Fleet Street, London, E.C.4. (863)

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VACANCIES exist in the Test Department of a Government establishment in Boreham Wood. Applicants should have passed the 3rd Year examination for City and Guilds Telecommunications or National Certificate. Practical experience with modern transmitting and receiving equipment is to be desired, as applicants will be required to undertake detailed measurements on the performance of communications apparatus. Salary £695 to £870 per annum. Full details giving age, qualifications, and reference to Box No. 853, The National Publicity Co. Ltd., 20-21 Red Lion Court, Fleet Street, London, E.C.4.

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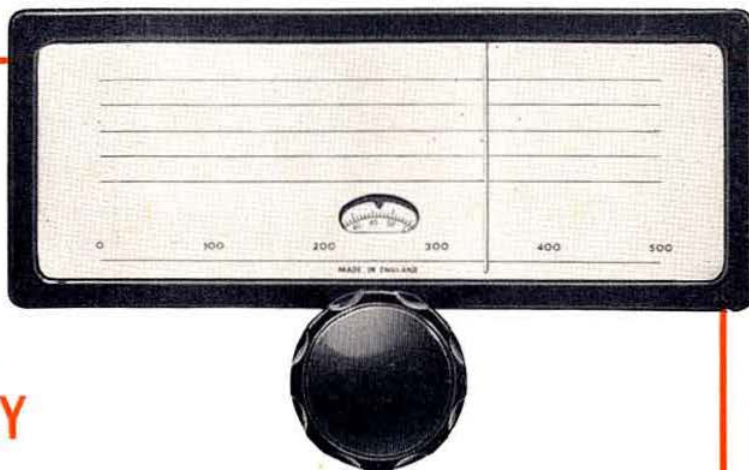
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