RSGB

BULLETIN

MAY 1965
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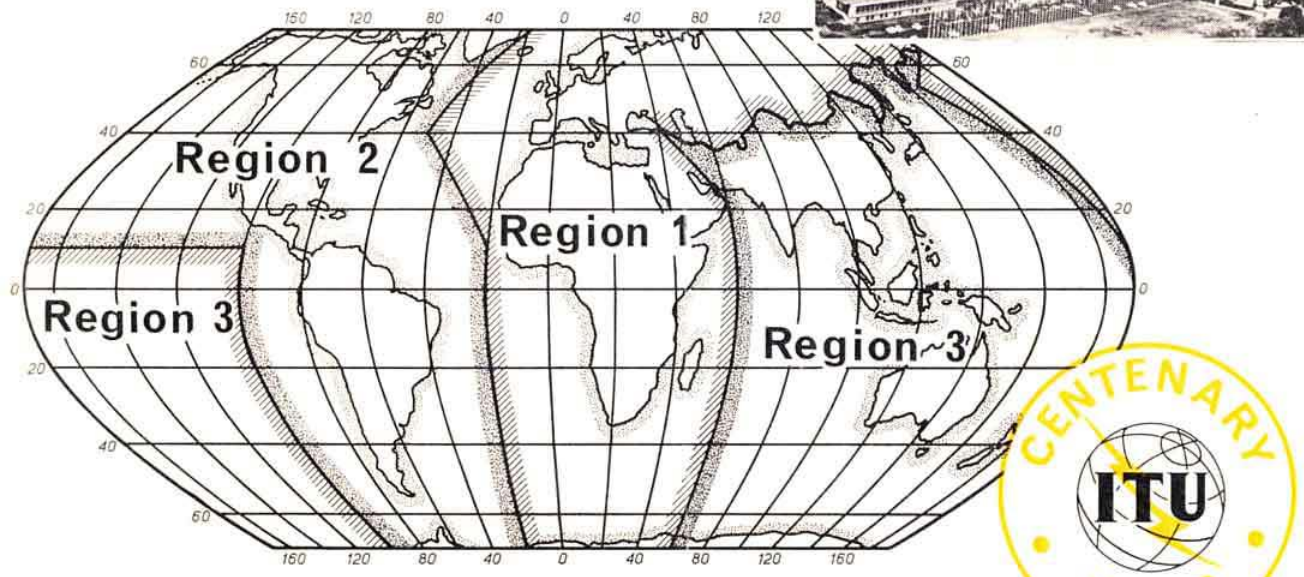

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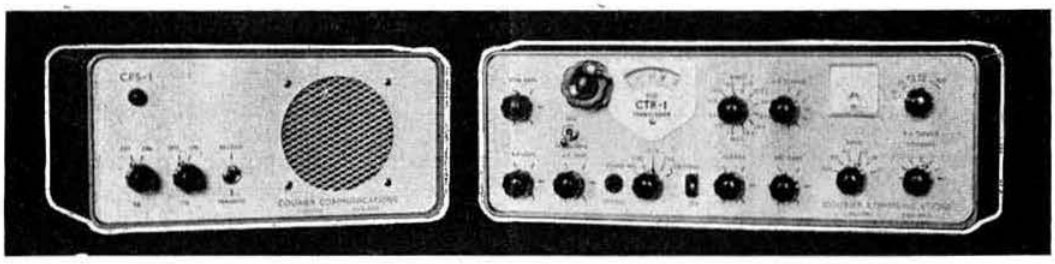

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Volume 41 No. 5

May 1965

3/- Monthly

R S G B BULLETIN

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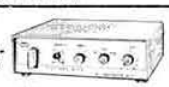

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EVOLUTION OF THE ITU

THE first treaty on record designed to link the telegraph systems of two states was signed on October 3, 1849, between Prussia and Austria. It provided for the connection of Berlin to Vienna by an electric telegraph line running along the then existing railway. That agreement was followed by similar agreements between Prussia and Saxony in 1849, and between Austria and Bavaria in 1850. Prussia, Austria, Bavaria and Saxony went a step further in 1850 by creating an " Austro-German Telegraph Union." The Union, which remained in existence until 1872, worked well, other German states joining, as did the Netherlands. Meetings of the Union were held in Berlin (1853), Munich (1855) and Stuttgart (1857). At the Stuttgart meeting a step was taken which is still, today, the guiding rule of the International Telecommunication Union. All the international provisions which were considered of a rigid nature, such as the legal relations between contracting states or the bases for the fixing of tariffs, were placed in a Convention. Other provisions more likely to alter were embodied in Regulations annexed to the Convention.

The success of the Austro-German Telegraph Union led to imitation by other countries. For example, France had signed agreements with Belgium (1851), Switzerland (1852), Sardinia (1853) and Spain (1854), when delegates from these five countries met in Paris in 1855 to create the West European Telegraph Union.

Birth of the International Telegraph Union

Belgium, France and Prussia had earlier signed a Convention in Paris, in 1852, by which the three Governments undertook to construct telegraph lines to pass frontiers without interruption; they recognized the right of every individual to use the international service upon payment of the necessary charges at the point of origin and they guaranteed the secrecy of telegrams sent. Between 1859 and 1861 a further 11 independent states signed the Convention. In order of signing they were Switzerland, Spain, Sardinia, Portugal, Turkey, Denmark, Sweden and Norway, the Papal States, Russia, the Two Sicilies and Luxembourg. But still the free flow of telegrams between countries was impeded. The final and one logical answer came in 1865. A year earlier the French Imperial Government had sent out invitations to all the major countries in Europe to attend a Conference beginning in Paris on March 1, 1865, to negotiate a uniform international telegraph system. Twenty states accepted this invitation and their delegates met in Paris on May 17, 1865 to sign the first International Telegraph Convention. This was the date of birth of the International Telegraph Union. The states represented on that important occasion were Austria, Baden, Bavaria, Belgium, Denmark, France, Greece, Hamburg, Hanover, Italy, the Netherlands, Norway, Portugal, Prussia, Russia, Saxony, Spain, Sweden, Switzerland, Turkey and Würtemberg. Great Britain, the only European state with an important telegraph network, was not invited to the Conference because her telegraph services were then in the hands of private companies.

Although the United States of America had been linked to Europe by two Atlantic cables since 1866 it was not until the Berlin Conference of 1885 that the first American appeared—a representative of the Western Union Company.

Plenipotentiary Conferences took place in Vienna (1868), Rome (1871) and St. Petersburg (1875). At these Conferences the Members of the Union were represented on both the diplomatic and administrative level. So successful was the revision of the Convention in 1875 that there was no further Plenipotentiary Conference until the one held in Madrid during 1932. It was in Madrid the decision was taken to combine the Radiotelegraph Convention with the International Telegraph Convention and to write the International Telecommunication Convention which is still the Charter of the Union.

Berne Bureau

The major achievement of the Vienna Conference in 1868 was the setting up of a permanent Bureau to deal with the routine administrative work of the Union. It was located at Berne from 1868 until 1948 when it moved to Geneva and became the General Secretariat of the ITU.

It was not until the Rome Conference in 1871 that Great Britain, at last, became a Member of the Union, having qualified for membership by nationalizing her telegraph service. The Rome Conference also agreed to allow private telegraph companies to be represented at future meetings but without power to vote.

The outstanding result of the St. Petersburg Conference in 1875 was the redrafting of the International Convention when it was decided that technical experts would in future be responsible for keeping the Telegraph Regulations up to date. Administrative Conferences were held in London (1879), Berlin (1885), Paris (1890), Budapest (1896), London (1903) and Lisbon (1908), by which time the membership of the Union had increased to 52 countries and 25 private companies. World War I brought an end to this series of Conferences.

After the war there were only two further Administrative Conferences, Paris in 1925 and Brussels in 1928. The most important achievement of the Paris Conference was the organizing of two Technical Consultative Committees, one concerned with Telegraphy and the other with Telephony.

The International Telecommunication Union

Such then was the organization and structure of the International Telegraph Union from the time of its birth in 1865 until 1932 when in Madrid it joined with the International Radio Telegraph Union to become the International Telecommunication Union. Much of its structure and organization was taken over and continued until the Atlantic City Conference in 1947. It was during the Atlantic City Conference that the Union entered into an agreement with the United Nations as a Specialized Agency. The Union is the oldest of the Specialized Agencies of the United Nations.

Radio Telegraph Conferences

Although the International Telegraph Union was concerned, initially, with line and cable telegraphy the development of radio telegraphy led to matters concerning the new medium of communication coming up for discussion early in the 20th Century.

In 1903 Germany convened a preliminary Radio Conference in Berlin. Nine states attended, including the United Kingdom. Three years later the first International Radio Conference was held, also in Berlin, with 29 states represented. In 1912 the second Conference took place in London when new Radio Regulations were approved. In 1927 the third Conference took place in Washington with 80 states represented. It was there that an International Radio

Consultative Committee (CCIR) was first set up and frequencies assigned for the first time to specific radio services. Then, in 1932, at Madrid came the merger between the International Telegraph Union and the International Radio Telegraph Union which led to the decision to change the title of the senior organization to the International Telecommunication Union.

Since 1932, Administrative Radio Conferences have been held in Cairo (1938), Atlantic City (1947), and Geneva (1959). Plenipotentiary Conferences have been held in Atlantic City (1947), Buenos Aires (1952) and Geneva (1959).

The International Amateur Radio Union, one of the international organizations authorised to appoint observers to attend ITU Conferences, has been represented at all Radio Conferences since Washington 1927 and the RSGB has itself been represented at all Radio Conferences since Madrid in 1932.

* * *

The writer is indebted to the Editor of *Telecommunication Journal* and to the General Secretariat of ITU for assistance in providing the facts upon which this article is based.

G6CL.

PROFILE

Arthur O. Milne, G2MI

ARTHUR MILNE holds an unique record in RSGB History, having been a member of the Council for 30 years, except for two years during the war when he was stationed in the North.

Born on August 25, 1907, he became interested in Amateur Radio while still at school and obtained a receiving licence in 1921 when he lived at Margate. Early in 1932, he had one of the first A.A. licences with the call-sign 2AIF and obtained the call 2MI on November 24, 1924. His first QSO was with 5QV at Clacton on 200m using a 120 volt dry battery to drive a self excited DE5B valve. Since then, except for the war years, hardly a week has gone by without G2MI appearing on one of the amateur bands; even during a spell after an operation, G2MI/A was on the air from a bed in Bromley Hospital.

Always keenly interested in DX, his early years as an amateur were limited in scope by having to use dry batteries and, later, h.t. accumulators as a power supply. The acquisition of d.c. mains and a motor generator effected a great improvement with many transatlantic contacts on the old 45m band, but it was the move to the village of Larkfield, near Maidstone, in 1932 which brought the longed-for a.c. mains and put G2MI firmly on the DX map. He well remembers when the only signals to be heard on the 40m band in the early winter evenings of 1933-35 were VKs, and has many QSL cards to prove it. During this period, he was a keen member of the Medway Amateur Radio Society and was its secretary in 1933.

Christmas Eve, 1934, nearly saw a sudden end to the activities of G2MI when he received an 1100 volt shock from his equipment. Arthur Milne owes his life to the odd fact that his measured body resistance is nearly three times normal!

In 1936 he moved to his present home at Hayes, Kent—"the world's best known private address," he once said, from behind a pile of QSL cards!

Always a home constructor, the only piece of commercial equipment in his station is his trusty SX25, and even that followed a receiver which was partly home constructed. In 1949, he built the full-sized 20m rotary beam and wooden lattice tower which has since dominated his garden and the surrounding landscape, and which is familiar to members as the frontispiece of the *Handbook*.

His services to the Society have been many and varied. From 1932, he became a member of the old Editorial Committee and from 1934 until 1942 drew all the circuit diagrams and many cartoons and other illustrations used in the BULLETIN.

He was Honorary Treasurer in 1938 and Honorary Editor from 1939-40 and 1944-50. During the war, his earlier experience as DR for District 16 (Kent and Sussex) from 1934-40 was transferred to the See of York where he became DR of District No. 2 during 1940-42. In 1942, his work took him back to London and he was re-elected to the Council as Honorary Editor, became Honorary Secretary in 1952, Executive Vice-President in 1953 and President in 1954.

From 1939 until 1954, he wrote the BULLETIN's regular feature *The Month on the Air*, which appeared right throughout the war years as *The Month off the Air*, giving it up only on becoming President. In addition, he contributed a number of technical articles and Editorials to the BULLETIN, probably the most memorable of which was the forceful Editorial in early 1953 which launched RAEN.

In 1949, he was awarded the ROTAB Trophy and in 1953 the Calcutta Key.

From 1950, when he attended the IARU Reunion in Paris until the Region I meeting in 1958 at Bad Godesburg, he was Secretary of the Region I Division IARU and saw it through its formative years, travelling widely in Europe in the interests of Amateur Radio, laying the foundations upon which the present virile organization now stands.

There is no doubt, however, that G2MI is best known as the Society's QSL Manager, a post he has held since September 1939. The quarter century of service in this capacity was recently recognized by the Council when he was elected as an Honorary Vice-President and presented with a silver QSL card.

A few of his other contributions to our history are that he claims, with no great show of pride, to have coined the word "transceiver" which first appeared in an article written by him in the August 1932 BULLETIN. He also designed the familiar call-sign badge and the special Empire DX Certificate lapel-badge. He holds both pre-war and post-war DXCC, a phone and c.w. EDX together with most of the leading DX certificates. For his services to Austrian radio amateurs during the four-power occupation, he was made an Honorary Member of OVSV.

By profession, he is an Executive Engineer in the GPO Engineering Dept., Equipment Branch, and is concerned with the welfare of technical visitors and trainees who come to the Post Office from all over the world for information and training. He has been married for 32 years and his wife Lucy is the "other half" of the QSL Bureau. They have two sons and a daughter.

At 57 he is still a keen and active amateur, both fixed and mobile, and does not mind being referred to as a "radio ham"!

His biggest disappointment in Amateur Radio has been never to have won the Braaten Trophy in the ARRL C.W. DX Contest. "Second place is the best I've ever managed" he says, "and now I feel that the strain of two 48 hour stretches of continuous operating is for the younger man."

G2MI is in considerable demand as a lecturer and is well-known for his talks on "The International Scene," "Ham History," etc., illustrated with his own colour slides and recordings.

Locally, he is a member of the thriving Cray Valley Amateur Radio Society which has, this year, elected him as President.

Broadband Cage Aerials

By N. H. SEDGWICK, G8WV *

RADIO amateurs who are faced with space restrictions for aerial arrays have shown a decided inclination towards using " gadget " type aerials. Very often these are high *Q* arrangements which are difficult to adjust for maximum efficiency, and in which substantial losses exist unknown to the user—mainly because he has not the equipment to accurately check radiation performance.

Cage Aerials

For many years, commercial operators have been using low-*Q* cage aerials for general communications purposes.

The advantage of these aerials is that, having a very wide bandwidth, they are not particularly difficult to adjust, and, moreover, since no really high voltages appear on them there are no points where significant losses can occur. Considering the wide frequency range, the standing wave ratio is quite low, ranging up to about three to one maximum. Such losses as this introduces are more than compensated for by the advantages that the system offers.

The writer has constructed two types of cage aerials for use on the amateur bands, one vertically polarized for 7 Mc/s, 14 Mc/s and 21 Mc/s, and the other horizontally polarized for 14 Mc/s and 21 Mc/s. The crux of the advantages of these aerials is that no adjustments are required when changing bands.

The vertically polarized aerial may conveniently be described as a cage unipole, and the horizontally polarized version as a cage dipole. Both are inexpensive to construct and take up little space, except that the cage unipole requires an earth screen. This screen necessitates access to a ground area some 50 ft. in diameter for the purpose of burying the radials which form the screen. Once they are buried, the ground may be cultivated in the usual manner.

General Construction

Both cages consist of eight wires mounted on wooden spreaders, and they are electrically equivalent to sheet metal structures of smaller diameter. The design is first computed on the basis of a sheet metal structure, and then converted into the equivalent cage system.

It is not proposed to discuss the design theory in detail in this article because variation of the frequency band covered may be achieved by altering the dimensions in proportion to the change of wavelength. In relation to the frequency band covered, it should perhaps be mentioned that cage aerial systems have their greatest utility in the general h.f. region. At 3·5 Mc/s they become rather cumbersome, while at 28 Mc/s high gain directive arrays are physically easy to construct and offer many advantages.

Prior to describing details of the actual construction of cage aerial systems, some notes on matters common to both aerials are in order.

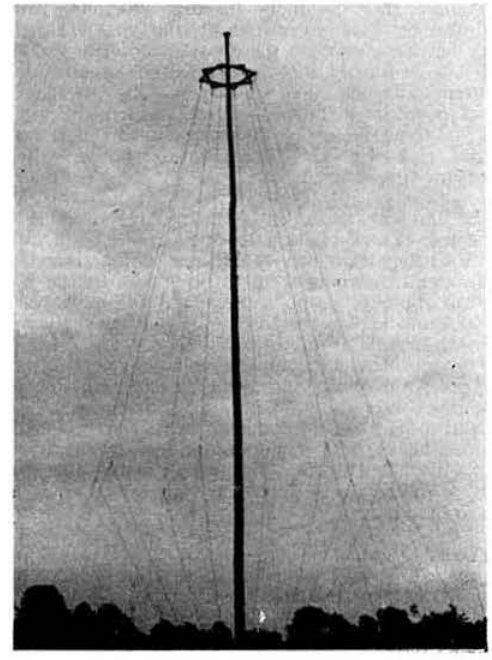
Handling the Wire

Since cage aerials use eight times as much wire as their single wire counterparts, the wire itself is a major consideration. Ideally, either hard drawn copper, or cadmium copper wires should be employed. Soft drawn copper wire could be used, but it is essential that it is pre-stretched, and in the case of the cage dipole, each individual wire in the assembly must be stretched to the same tension.

Irrespective of whether hard drawn or soft drawn wire is utilized in the construction of these aerials, all wires must be measured under tension, marked at the cutting point with sticky tape, the tension released, and then cut to the required length. Once the length of the first wire has been marked, a stake should be driven into the ground so that its edge coincides with the mark on the wire. All the other wires can now be marked off at the edge of the stake whilst they are under tension, and in the same position as the original guiding wire. This method saves time, and is far more accurate than trying to measure each wire individually with a tape.

When terminating wires in insulators, they should not be twisted back on themselves. The correct method is to pass the end of the wire through the insulator, and then form it back so that it runs parallel to itself. The parallel wires should be bound with 18 s.w.g. tinned copper wire, starting at the insulator for a distance of about 1 in. The *ends* of this binding wire should be *lightly* caught with solder, taking care that the solder does not penetrate through to the aerial wire itself, and that it does not run down the whole length of the binding. The short end of the aerial wire itself should be clipped about $\frac{3}{16}$ in. beyond the end of the binding, and then bent out at 90°.

In general, soldering on aerials should be avoided except where it is strictly necessary to ensure a good electrical connection. In the case of both aerials, wires which cross at 90° have to be so connected, and this is accomplished by binding them together with thinner wire and soldering, using the minimum of solder.



The cage unipole.

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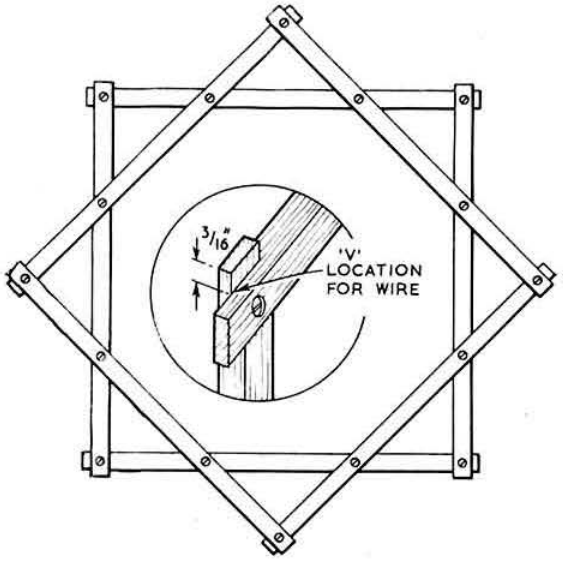


Fig. 1. Construction of the wooden spreaders. The inset shows the method of half-jointing the struts to provide a V-notch for the wire.

Construction of Spreaders

The wires which form the cage are maintained in their correct positions by spreaders. These are made from either ramon or Japanese oak and their construction is shown in Fig. 1. For the unipole use 1 in. and the dipole ½ in. square section timber.

Two squares are made up for each spreader unit, half lap joints being used on the corner of each square. When cutting these joints, they should be cut back along the length of the timber by $\frac{3}{16}$ in. more than the thickness of the timber. When they are assembled, these extra length cuts will cause a small *V* to be formed at each corner of the square, and these are used to locate the wires forming the cage into their correct positions. The two squares, which are joined together as shown in Fig. 1, make up one spreader, and give, in total, eight *Vs*. Only brass screws should be used to secure one square to the other.

Masts

The use of well creosoted wooden poles is favoured at G8WV as they are more stable than tubular metal masts. In any event, it would seem to be unwise to use a metal mast for the cage unipole. Seasoned and prepared poles can be quite expensive, and in view of this, the writer's approach may be of interest.

A timber merchant supplied and delivered four newly felled poles, full of sap, and with their barks still on, for £10. These poles were about 35 ft. long, 2 in. in diameter at the top, and some 5½ in. in diameter at the bottom. Although extremely heavy, they were erected in their green state by the use of a block and tackle. After two years they were lowered, the bark easily stripped off, creosoted, and then hauled back to the vertical.

The Cage Unipole

A vertical aerial fed against earth relies upon the earth image to complete the circuit, consequently a poor earth is fatal. The earth resistance must be very low when compared to the expected load resistance of the aerial itself. For this reason, the cage unipole aerial is worked against an earth screen, the construction of which may present some difficulty since it is made up of a number of radials spreading out from the mast itself.

It is not that the burying of these radials is a problem. This is simply done. The difficulty is likely to occur where gardens are less than 50 ft. wide, for in this case, unless permission can be secured from neighbours to allow these radials to be continued into their gardens so that they are of the correct length, there is no point in continuing with the project of a cage unipole.

Fig. 2 illustrates a simple method of fabricating and supporting the cage. Each wire of the cage also acts as a stay for the mast itself, and consequently, the whole structure becomes very robust, particularly as all the loading on the mast is downward, and not horizontal as usual. Due to the compression loading, a lightweight pole can be used, and this need not be larger than 1½ in. in diameter at the top, and 4 in. in diameter at the bottom.

Two steel rack-side channels are spaced apart by the thickness of the pole, and cemented into the ground for a depth of about 18 in., leaving about 2 ft. projecting above ground. Two pieces of 3 in. by 2 in. oak would serve equally as well, but in this case, the cement should be sloped away from them to prevent water accumulating around the posts and causing rot. Whichever supports are used, they should have their spacing set by a piece of wood firmly fitted between them, one separator being below ground and buried in the cement, and another one—to be removed prior to fitting the pole—positioned between the supports above ground level.

The earth radials should be placed in position at the same time as the foundation posts are cemented. A total of 16 radials are needed, and these are laid so that they come to within 0·047*H* of the mast supports. The factor *H* is the height of the cage. The length of each radial is equal to *H*, and they should radiate from the mast at equal angles.

The radials do not have to be buried deeply. However, in relation to this, their depth should, of course, be sufficient to prevent them being damaged by subsequent cultivation

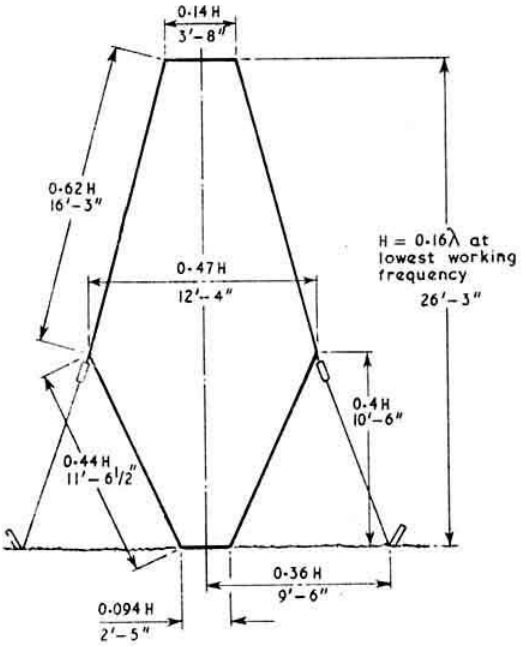


Fig. 2. Outline proportions of the cage unipole, with dimensions for a lowest working frequency of 6 Mc/s.

Over lawns a suitable slot can be made by a single spade cut, the radial positioned into the bottom of the slot, and the earth trodden back into its proper position. After a few days all signs of this operation will have disappeared.

Eight metal tent pegs are now placed radially around the pole, again at equal angles, at a distance from the pole equal to $0{\cdot}36H$. If the ground is likely to become waterlogged and so make them insecure, they should be set in cement. Take care not to disturb the now buried radials. These pegs serve as anchor points for the guying system to be described later.

From Fig. 2, which only illustrates two diagramatically opposite wires of the cage—there are eight in total—it will be seen that the final cage takes the form of a double cone, one on top of the other, broad bases together, each cone having its apex flattened. One apex is at the top, and the apex of the other, an inverted cone, is at the bottom.

The wooden spreader is shaped so that the distance between opposite points is $0{\cdot}14H$, which, for a minimum operating frequency of 6 Mc/s, makes each side of each square 31½ in. long. Since the top spreader is suspended from the mast by eight wires of equal length, the pole will have to be about 2 ft. higher than the calculated height of the cage. These suspension wires are adjusted so that the final cage is positioned correctly.

The first stage in constructing the aerial is to fit insulators to each of the eight corners of one of the spreader assemblies. It will be noted that since the spreader is made from two squares mounted one on top of the other, then the insulators will not hang level. This is overcome by fitting the four on the lower square so that they are as close as possible to the woodwork, while suspending the other four fitted to the upper square on sufficient length of wire so that they do hang level with those already fitted.

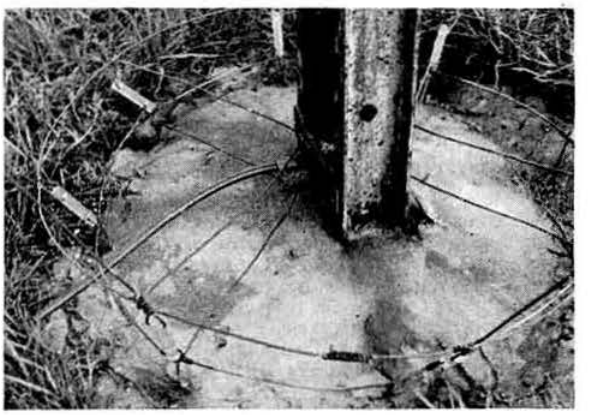
Cutting and preparing the wires which will form the cage needs some care. The wire should be 12 s.w.g. and attention is drawn to the previous remarks concerning the type of wire to be used, and the possible need to pre-stretch it. As has been mentioned, the wire must be under tension when it is measured, but be very careful to release the tension prior to cutting the wire otherwise the vicious spring of the wire may cause bodily harm, particularly to the eyes.

The tension required is of the order of 50 lb. The simplest way of securing this is by filling a 5 gallon oil drum with water—one gallon of which weighs 10 lb.—tying this to a nylon rope which passes over a sheave pulley, the rope then terminating on the wire to be measured, the other end of which is fixed. The wires should be cut to $1{\cdot}06H$ plus a few inches for securing to the insulators. Before cutting the wires they should be measured and marked as follows: $0{\cdot}62H$ plus a known number of inches for securing to the top insulator, and then a further $0{\cdot}44H$ plus again a number of known inches for securing the wire to the lower insulator.

After cutting, the intermediate insulator should be fitted at the $0{\cdot}62H$ mark. The insulator should be fitted to the cage wire by passing a length of 18 s.w.g. copper wire through the insulator, bending this into a *U* and taking each arm of the *U* in turn and winding it three times around the cage wire in a direction that is *away* from the insulator itself. The two ends of the *U* are then tightly twisted together, so causing the cage wire to be drawn round the insulator and the two to be locked together.

Each of the insulators attached to the $0{\cdot}62H$ mark are fitted with 14 ft. of 100 lb. polythene guy line, the free ends of which will eventually be tied off to the metal tent pegs previously mentioned. These ends should be formed into a sliding hitch in the same manner as a tent guy rope.

The free end of the $0{\cdot}62H$ section of each cage wire should now be fitted to the insulators on the spreader, one wire to each insulator. Remember to take up the extra length allowed for this purpose, and fix the wires in the manner previously described. These wires are now all electrically connected together by binding on a closed circle of wire $0{\cdot}14H$ diameter as close to the insulators as possible. Lightly solder all connections.



The base of the cage unipole, showing the method of terminating the radial wires.

Fit the mast to the ground stakes by means of a large coach bolt passing through the stakes and the base of the pole, and positioned so that when raised, the base of the pole will be about 4 in. above ground level. Raise the mast a little and position the spreader suspended by eight wires as previously indicated. Now raise the mast to the fully vertical position and temporarily rope it into position. Drill another hole through the supports and the mast, positioning this near to the top of the supports. Fit another coach bolt to lock the pole in place, and remove the rope.

Take each of the polythene guy ropes in turn, and hook them around the appropriate peg, taking up the slack on each until the wire above the insulator is tight. When this operation is completed, the upper cone will have been formed, while the wires which will make the lower cone will be hanging down.

Fit an insulator to alternate earth radial wires where they project above the level of the concrete, and start this by choosing an earth radial which is directly beneath one of the hanging wires. The hanging wires, which are a continuation of the upper cone, are now made off tautly to these insulators, so forming the lower inverted cone.

Bind a closed circle of wire around the lower ends of the insulators to form a ring around the earth radials. Make a good electrical connection from each of the 16 radials to this ring, and lightly solder each connection. Similarly bind a circle of wire around the tops of the insulators, and electrically connect each wire of the cone to this ring.

Fit a waterproof co-axial socket to a strip of bakelite mounted on one of the pole ground posts. Connect four wires at 90° to the earth radial ring and bring them to the shell connection of the co-axial socket. Connect four wires at 90° to the cone ring, and join them to the centre pin of the co-axial socket.

The unipole is fed with 75 ohm co-axial cable, and this should be run either at ground level, or buried until it reaches the perimeter of the earth radials.

Unipole Operation

The unipole can be operated over a frequency range of 4 : 1 when its v.s.w.r. should not be worse than 2·7 : 1.

Due to its height to diameter ratio, the physical length is considerably shorter than its electrical length, and it behaves similarly to a vertical quarter wave with a physical height of

0·16 wavelength. The load impedance at the lowest frequency is something less than 30 ohms, and it is here that the worst v.s.w.r. occurs. As the frequency is increased, the impedance rises and the v.s.w.r. improves until the aerial is worked as a vertical half-wave when the feed impedance looks like 150/180 ohms. Increasing the frequency further will again cause the impedance to drop until, at the third harmonic, it becomes $\frac{3}{4}$ wavelength long.

From this it will be appreciated that if the aerial is designed for 7 Mc/s, on the three bands 7 Mc/s, 14 Mc/s and 21 Mc/s it will always be operating at its worst v.s.w.r. However, by designing for a lowest frequency of 6 Mc/s, the high and low impedance points will fall outside the amateur bands, and, as a consequence, the v.s.w.r. can be made quite reasonable. At 6 Mc/s the mast height will be about 28 ft., which is perfectly manageable.

Measuring at the actual feed point to the aerial, the current at 7 Mc/s should not be more than twice that indicated at 14 Mc/s and 21 Mc/s.

The aerial is completely omni-directional, and has a low angle of radiation. The writer heard two VK stations working each other on 7 Mc/s within a few minutes of completing the aerial, and later a contact was made with a maritime mobile off Bombay on 21 Mc/s.

Being vertically polarized, it is strongly recommended that the transmitter output circuit should employ a pi-network, and that a low pass filter be included in the feed to the aerial in order to reduce the possibility of TVI.

The Cage Dipole

This is a centre fed full-wave arrangement with a polar diagram and general performance similar to that of a collinear of two half-waves in phase. It shows some gain over a half-wave dipole, and somewhat greater directivity.

The length is arranged so that it is an electrical full wave at the mean frequency, and the aerial to be described will operate between 13 Mc/s and 22 Mc/s. However, it is worth noting that if it is fed with tuned feeders, it also makes an excellent half-wave dipole for 7 Mc/s. Since the aerial requires an open-wire 600 ohm feeder, the length of the line need only be adjusted to a multiple of a quarter-wave to enable it to be used as a flat line on 14 Mc/s and 21 Mc/s, and as a tuned feeder on 7 Mc/s.

Unlike the cage unipole which is inherently robust, the cage dipole requires careful construction if it is to withstand our British weather. In this connection, it is essential that each individual wire on the cage takes its fair share of the strain, and this can only be achieved if each wire has been tensioned to the same amount during measuring.

To prevent the aerial sagging significantly due to the connection of the 600 ohm feed line, much stouter poles are required than that which may be used for the unipole and, furthermore, they must be fitted with back stays. In addition, provision must be made for automatically taking up, and compensating for, changes in length due to expansion and contraction. This is achieved by making one end fast, looping the halyard at the other end over a pulley, and then attaching it to a weight cast in cement.

Mast Groundwork

Each pole is supported between two grade B railway sleepers cemented into the ground. The sleepers are cut to 6 ft. in length, heavily creosoted, fitted with substantial distance pieces at their lower ends to maintain them the correct distance apart, and then set in $2\frac{1}{2}$ ft. of concrete, leaving the balance of $3\frac{1}{2}$ ft. above ground.

A solid oak strap at least 2 in. by 3 in. should be fitted across the top of the sleepers using 3 in. coach screws, positioned so that when the pole is raised it rests against this strap. Another similar strap is prepared, and once the pole has been raised, this is positioned in front of the pole to lock it firmly in place.

Once the sleepers are in position, a $\frac{7}{8}$ in. hole is bored through both, central to their width, and 2 ft. 9 in. down from the top. These holes must be accurately aligned. Into each of these holes is fitted a length of $\frac{1}{2}$ in. steel water pipe which will serve as a bearing for the rod which will eventually pass through the sleepers and the pole.

Behind the sleeper assembly, two pieces of steel angle should be cemented into the ground so that they project by about 8 in. (See Fig. 3). These have $\frac{3}{8}$ in. holes drilled in them near to the top for the passage of a $\frac{3}{8}$ in. coach bolt.

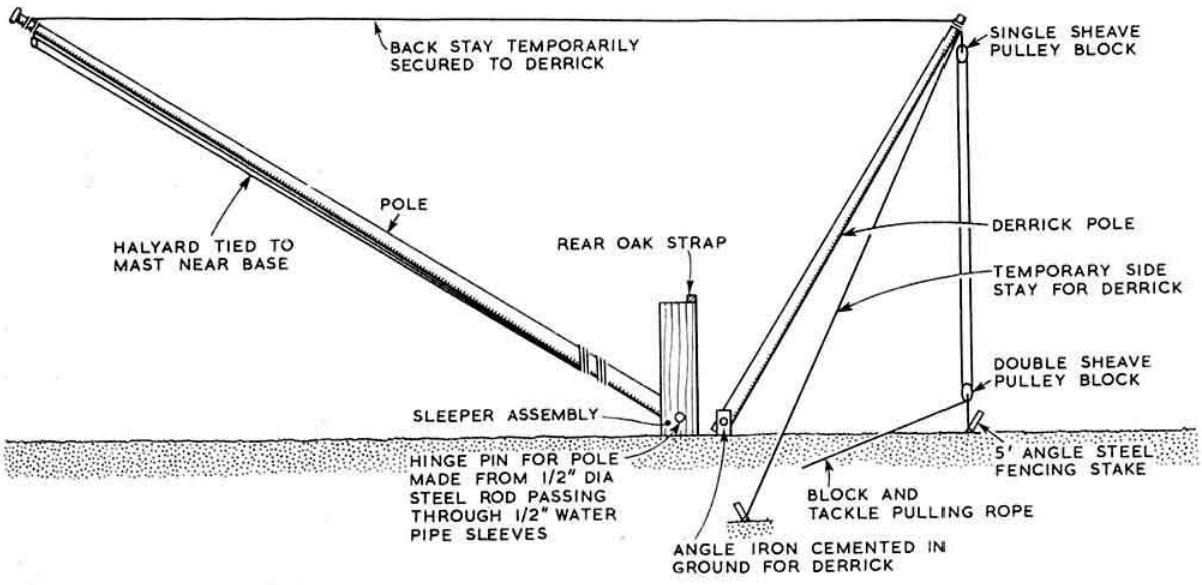


Fig. 3. Method of raising and lowering the pole using a derrick.

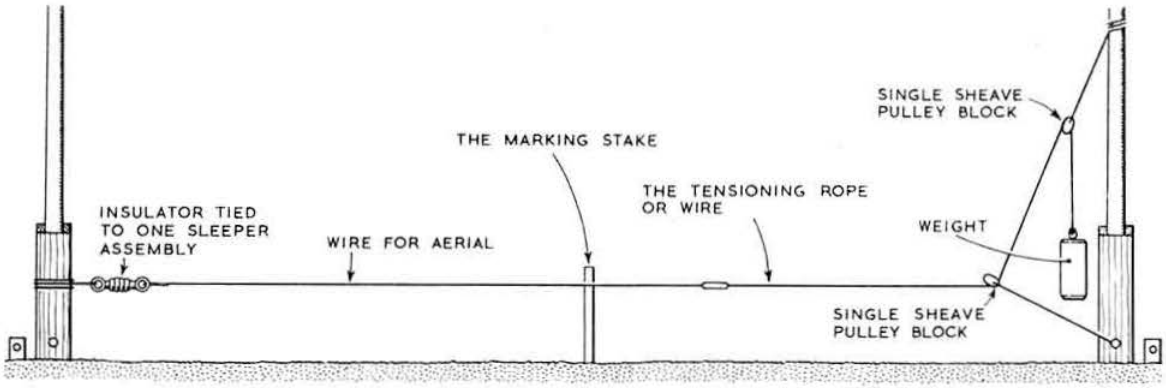


Fig. 4. A recommended method of stretching and measuring the wires for the cage dipole.

The purpose of these angle irons is to support the lifting derrick, and they should be separated by a distance equal to the thickness of the derrick pole.

The distance between the sleeper posts at each end of the system should be about 56 ft., and there should be a further clear space behind them of 15 ft. at each end. The overall length therefore becomes 86 ft.

Getting the Poles Vertical

This can be a pretty heavy operation, but it is greatly simplified by the use of the derrick system illustrated in Fig. 3. The derrick is 15 ft. long and can either be a stout scaffold pole, or a length of 3 in. by 3 in. sawn timber. The back stay, which is of 12 s.w.g. galvanized iron wire, is fastened to the top of the derrick, the derrick pole itself being fitted between the iron stakes to the rear of the sleepers.

A block and tackle arrangement made up of one double sheave pulley and one single sheave pulley is arranged as shown in Fig. 3. The 5 ft. steel angle fencing stake is positioned 15 ft. to the rear of the sleepers, while the side stays are arranged some 6 ft. to each side in line with the iron stakes and at 90° to the derrick at the points where they are secured to their pegs. The rope running around the block and tackle system will need to be at least $\frac{1}{2}$ in. in diameter.

Initially, the derrick is pushed up against the sleepers. A $\frac{3}{4}$ in. diameter hole is drilled through the base of the mast, and a length of $\frac{1}{2}$ in. water pipe fitted into this hole. The mast is then manhandled into position between the sleepers, the hole in the mast aligned with the holes in the sleepers, and a length of $\frac{1}{2}$ in. diameter steel rod passed through all three.

The pulley and halyard for hoisting up the aerial are fitted to the top of the pole, together with the mast back stay. Pulling on the free rope of the block and tackle pulls the derrick down towards the ground, and the mast, suspended on its back stay, rises towards the vertical. As the mast nears the vertical much less effort will be required, and care should be exercised to "ease" the mast into its final position between the sleepers. Finally the front strap is fitted across the sleepers to lock the mast.

Tensioning Weight

The weight which will act as the tensioner for the whole of the aerial array is cast in concrete, and this can be conveniently manufactured at the same time as the sleepers are cemented into position. A wooden box with interior side widths of 6 in. by 6 in., and a length of 33 in. is produced. One end is closed, and the other end is fitted with a locating lid. In the centre of this lid, a $\frac{1}{4}$ in. diameter hole is drilled.

Pass a 39 in. length of $\frac{1}{4}$ in. diameter mild steel rod through the hole in the lid, and bend the bottom end of this rod into a shape approximating to half a letter "Z." This will lock the rod into the cement. Form the other—and outside—end into a circle.

Mix up a 3 : 1 sand and cement mix using rather more water than usual, but not so much that the cement content drains out. Pour enough of this mixture into the box to produce about a 3 in. layer in the bottom. Set the *Z* end of the bar on to this, and then continue to pack the mixture all around it until the box is full. Place the lid in position to maintain the rod correctly. Set aside to dry out. Being a wet mix, this may well take about three days. Do not be in a hurry to break open the mould box.

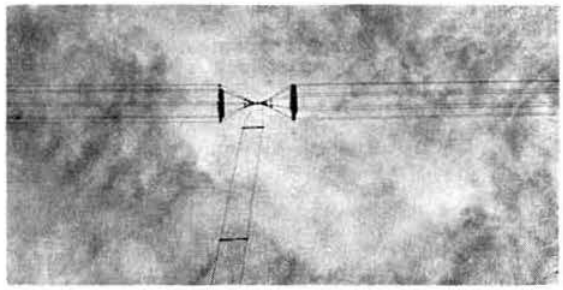
Constructing the Dipole

The aerial requires three good insulators of the Pyrex variety having holes sufficiently big to accommodate eight 16 s.w.g. wires. Being subject to appreciable tension, these insulators must be mechanically above reproach.

All the wires which go to make up the cages are measured under tension, and the weight which will be used to counterbalance the whole system is employed for this purpose. Fig. 4 illustrates the method, and it will be seen that, as with the unipole, a marking stake is used to determine wire lengths rather than measuring each one individually with a tape.

Fig. 5 shows the essential details of the cages, together with the various dimensions. The wire is 16 s.w.g. throughout.

With the unipole, only one spreader was required, but in the case of this dipole, four spreaders are used, two for each cage. The construction of the spreaders is the same as that



The cage dipole. The wire rings close to the points of the cages are for terminating the feeder wires.

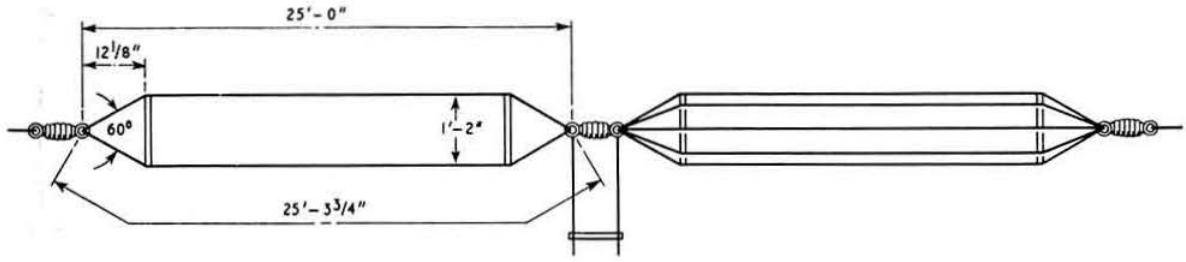


Fig. 5. The cage dipole. The dimensions are for a working bandwidth of 13 to 22 Mc/s.

shown in Fig. 1, the side lengths of each square making up the spreader being 10¼ in.

To make a cage, one insulator is tied off on one of the masts as shown in Fig. 4. A 16 s.w.g. wire is anchored to it in the manner previously described and then subjected to the tensioning strain. It is marked at the cutting point with sticky tape, the tension released, and then cut. The next wire is terminated on the insulator, stressed, marked, released and then cut. This is repeated until all eight wires are fitted to the first insulator. The free ends are made off on another insulator, taking care that they are terminated in exactly the same sequence as they were connected to the first insulator.

The " free end " insulator is connected to the tensioning system and the heavy concrete weight replaced by a bucket of sand. The first spreader is now inserted into the wire system, each wire being positioned into one of the *V* slots, and then the spreader is pushed along to one end until it is the correct distance from the insulator.

Each wire is now bound into position in its slot. A length of 18 s.w.g. wire is formed into a *U*, the base of which is hooked under the *V* in the spreader beneath the wire to be secured. The ends are taken up and bound three times around the cage wire in a direction that is away from the notch locating the cage wire, one end going one way, and the other in the opposite direction. These ends are then drawn down under the *V* and tightly twisted together, so causing the cage wire to kink slightly and become locked to the spreader. Cut off surplus. *Do not solder this binding.*

The second cage is produced in the same way. In this case it must be remembered that the " free " insulator for this second cage is one of the insulators already fitted to the other cage.

Feeders

The feeder is a 600 ohm open wire line, and this is constructed from 7/26 s.w.g. on spacers which maintain the wires 5 in. apart. To terminate the feeder on to the aerial, pass one of the feeder wires through each hole in the centre insulator, and bind them in place leaving about 6 in. of the feed line free.

Bind a circle of wire around the cage wires about 4 in. from the insulator, lightly soldering each connection. Terminate and solder the free ends of the feed line on to these rings, one to each cage.

The aerial may now be hoisted into position. This should be done carefully, pulling on each halyard in turn. One halyard is made fast, and the other fitted with the cement weight which is allowed to gently take up its natural position.

Conclusion

No matter how good the transmitter, or the receiver for that matter, it is the aerial itself which finally decides the performance. Care and attention to this department will be well rewarded.

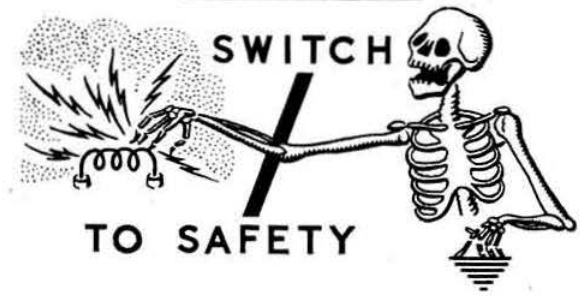
Assisting Chassis Cutters

Punching holes for valve sockets, etc, in an aluminium chassis by means of the popular type of chassis cutter can be quite easy, particularly if one has learnt by experience to put aside the large Allan-key supplied with the punch, to clamp the flats of the male punch in a vice, and turn the whole chassis by hand. However, matters are rather different if the punch has lost its initial cutting edge, and the chassis happens to be made from a rather hard grade of 16 s.w.g. steel. On a recent occasion the writer was uncertain whether the punch, the Allan-key or the operator would give-way first, but it certainly did not seem likely to be the required hole!

A little study brought to light a trick to improve matters. The male punch has two leading tips to the cutting edge, which must pierce the chassis before the main shearing action of the punch can start. These are the portions which do the hardest work, and become blunt long before the rest of the shearing edge has suffered. Two small holes were therefore drilled in the chassis beforehand, at opposite ends of a diameter of the required final valve-socket hole, and large enough just to accept the tips of the punch, which are then spared the work of breaking through the chassis initially. This greatly eased the work, and the remainder of the punch cut through the steel without great difficulty.

Of course the two leader holes will show slightly after the chassis has been cut as small semi-circular additions extending beyond the edge of the valve-hole but as a rule they will be covered up by whatever component is to be mounted through the hole, and are thus unimportant except in the rare instances where the hole will be exposed. Do not forget also that a little Molyslip or similar lubricant smeared on to the thread and washer of the Allan-screw makes an unbelievable difference to the ease with which it will pierce the chassis.

Ernest Gardiner, G6GR



TECHNICAL TOPICS By PAT HAWKER, G3VA

Amateur Radio "Image" . Californian Kilowatts
Rate of Change Noise Limiter . Makino Limiters . Potentiometer Tracks
Microphone Pre-amplifier . Two-valve 10 Watt Modulator . "Music" Ratings
Multee Aerial . Lincompex . Station Costing

MOST amateurs are well aware that their continued occupation of valuable portions of the frequency spectrum depends in the long run upon maintaining the goodwill of their administrations who, through the International Telecommunications Union, apportion frequencies—and whose decisions are to some extent influenced by the pressures exerted by many different bodies and ultimately by the public. For this reason the "image" of amateur radio—as seen by those concerned with professional telecommunications and by the public at large—is of vital concern to all amateurs.

This has, of course, long been recognized. Fortunately, on the whole, amateur activities in the UK are favourably presented and reported by both the technical and the lay press. The occasional bad publicity often arises almost accidentally and is frequently due to the attraction of a short three-letter word like "ham" to those whose job it is to fit a headline into a narrow newspaper column. But such stories are more than compensated for by the many complimentary, if sometimes garbled, stories which get into print.

But being one of those whose job brings them into touch with a considerable number of professional communications engineers of various nationalities, we cannot help noticing that there is much less readiness on the part of British engineers to admit to being (or to ever having been) interested in Amateur Radio than is evident, for instance, among their American counterparts. Indeed the proportion of engineers who have in fact been amateurs is much lower in the UK than in North America, except perhaps in a few special categories. In the United States, the amateur movement seems to have become much more closely integrated both with the public and with the radio and electronic industries.

This was brought home to us strongly during a recent trip to the centre of those famous Californian kilowatts—the Los Angeles region where, in one of the largest urban areas in the world, are concentrated some 15,000 amateurs, or roughly half as many again as in the whole of the UK. The trip—to visit on behalf of *Electronics Weekly* the Hughes Aircraft space systems division where the *Early Bird* Communications satellites are built and tested—was too short to allow us much time to contact local amateurs (though G3OOH was another member of the party). But one does not have to go far to see the many rotary beams rising up among the forest of television aerials and overhead power lines (which we gather are the bane of the locals). One also spots quite a number of loaded whips on cars, some with call-sign number plates, though we gather that for various reasons many amateurs prefer not to take advantage of this particular concession.

But, in support of our earlier remarks, we were delighted to find out in casual conversation that Sheldon Shallon, who is chief scientist for Hughes on the *Surveyor* space project, is none other than a K6CYG and an extremely keen s.s.b/c.w. DX operator. *Surveyor* is the space probe which is designed to make the first "soft" landing of instruments on the moon later this year, so that Sheldon is well placed to get the first "QSL" from, or at least QSO with, a station actually operating on the surface of the Moon! He was not the only one among the Hughes people we met who readily admitted an interest in Amateur Radio, and we gather that many of the 15,000 are employed in the local aerospace plants.

The point we are trying to make is that this willingness to admit identification with Amateur Radio is not always so apparent in the UK.* It is of course an excellent thing that amateurs should be drawn from both within and from outside the industry. But it is the engineers and administrators who are often in a particularly good position to keep an eye on those vital frequency allocations, and it would seem that this is an area in which some careful public relations activities could well pay dividends in the years ahead.

Perhaps we need to stress more often that many who start in Amateur Radio as youngsters tend to finish up in the electronics industry; and that this early enthusiasm can prove an extremely valuable asset for the country as a whole. The point can well be made now that there is such serious concern that so many of the higher educational courses for engineers are not being taken up in this country.

With regard to California we must mention that we heard a rumour that one well-known local station was now off the air—after being caught running a cool 17 kW! And think of the TVI problems in an area where there are six different v.h.f. TV programmes being radiated continuously from about 6 a.m. until the small hours of the following morning.

Noise Limiters

From time to time a number of automatic noise limiter circuits have been included in *TT*, but two systems which have become popular in amateur circles in recent years have so far not been covered. These are the "rate of change" and the "Makino limiters."

The rate of change limiter (often called the "following" limiter) was used for more than a decade in some British television receivers—we believe the circuit was originated by Pye—but in recent years has also appeared in some communications equipment. Like all noise limiters it tends to be more efficient on wideband v.h.f. reception than for

* Since writing these notes we have seen the interesting remarks by G3JDK (*Short-wave Magazine*, April, 1965) which confirm once again that the "image" of amateur radio among professional engineers in the UK is still far below what would be desirable.

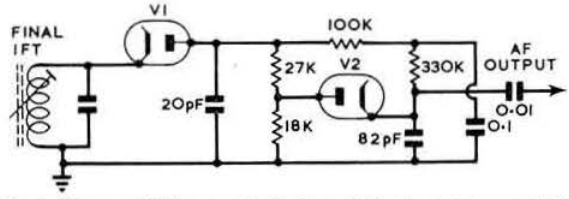


Fig. 1. The rate-of-change noise limiter. V1 is the detector, and V2 is the limiter diode. A 6AL5 may be used as V1 and V2.

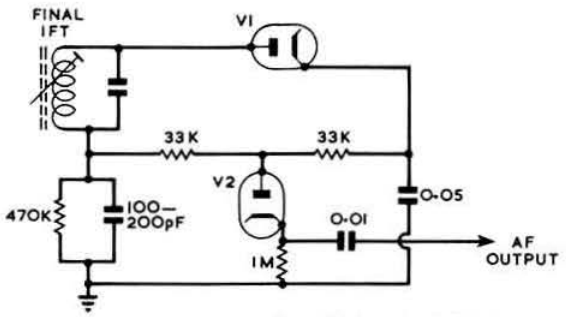


Fig. 2. The basic Makino detector/noise limiter circuit. V1, detector; V2, limiter diode.

narrow-band h.f. working. The circuit of Fig. 1 is taken from an interesting review of methods of eliminating impulse noise by Jim Kyle, K5JKX in *Electronics World* (March, 1965). In effect when a noise pulse occurs the limiter switches the audio output line to a series-resistor-capacitor circuit in which the capacitor is initially discharged. As the capacitor charges up at a rate governed by the time-constant, the voltage across it rises exponentially and this rising voltage is applied to the limiter output as a substitute audio signal for the duration of the noise pulse. A high peak of noise thus produces only a small blip on the output waveform.

The other system which has been attracting increasing attention of late is the " Makino " noise limiter which is based on a Japanese circuit originally developed for a.m. transceivers in helicopters and which uses essentially an amplitude sampling technique. This differs from the usual a.n.l. in two important respects: the d.c. and a.c. earth points are at the opposite end of the detector load resistor; secondly, the overall impedance level is very much lower than the normally used values. It should, however, be noted that the available d.c. output from the detector is much lower than with a conventional detector/a.g.c/a.n.l. circuit, and this can mean that in some receivers it may prove difficult simply to replace an existing detector, although in others this may prove no handicap. Fig. 2 shows a basic Makino circuit from the article already mentioned.

Also in the same issue of *Electronics World* is a combination circuit for a high-*Q* detector and noise limiter system (Fig. 3), comprising a cathode-follower and Makino-type detector/a.n.l. circuit. The particular valve used, a 6FM8, is a double-diode triode with separate cathodes but could be replaced by a combination such as a 6C4 and 6AL5. The cathode-follower reduces the damping on the final i.f.t. and thus improves selectivity characteristics without introducing the problems of an infinite impedance detector.

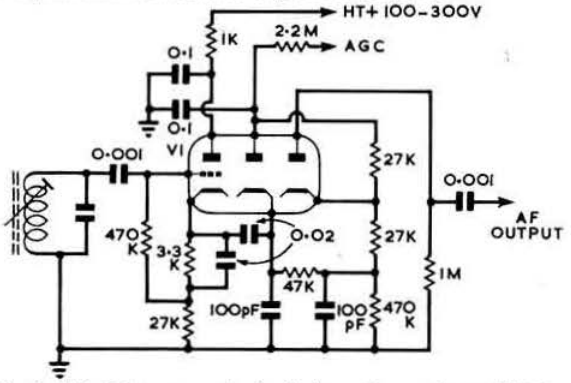


Fig. 3. High-Q detector and noise limiter using one form of Makino circuit. V1, 6FM8, or 6C4 + 6AL5.

Potentiometer Tracks

Most amateurs appreciate that when choosing or replacing a potentiometer it is necessary to use a component which is not only of the correct resistance value but also has the appropriate track law (taper) for the particular circuit concerned; indeed the correct taper is often of more importance than the precise resistance value. However, there may still be some readers who are a little hazy as to the exact meaning of such terms as " log " and " anti-log " etc., so we will try to clarify the subject a little using some notes which we originally prepared for the 1964-65 volume of *Newnes Radio & Television Servicing*.

The resistance law or taper is the manner in which the resistance changes with rotation of the shaft. There are now a considerable number of different tapers in common use, including linear, logarithmic (sometimes called " audio taper "), anti-logarithmic (" reverse taper "), and various intermediate types such as semi-log and linear-tapered.

Fig. 4 shows the basic laws found in the vast majority of radio applications. It should be noted, however, that when a carbon-track potentiometer includes a switch the first 20 per cent of the rotary movement is concerned with the switch function; the resistance variation is then condensed into the remaining 80 per cent of the rotation.

Curve 1 shows the straightforward *linear* taper where the resistance change is strictly proportional to shaft rotation. This type of resistance law is commonly used on voltage control potentiometers, on tone controls and other applications requiring straightforward division of the input voltages.

With curve 2, or log law, the resistance increases only gradually during the early clockwise movement of the shaft, squeezing almost 80 per cent of the resistance variation into the final 20 per cent of the rotation. This type of taper is roughly in accordance with natural sensation of loudness (our ears follow a logarithmic law in their sensitivity to sound), and such components are necessary for the conventional type of volume control in order to provide an apparent linear increase in sound output as the shaft is rotated; if we use a linear control for this purpose almost the entire noticeable change in volume takes place in the first few degrees of rotation.

Anti-log law tracks, as shown in curve 3, are the opposite of the log law taper, providing a big change in resistance in the first half of the clockwise motion. These tracks are

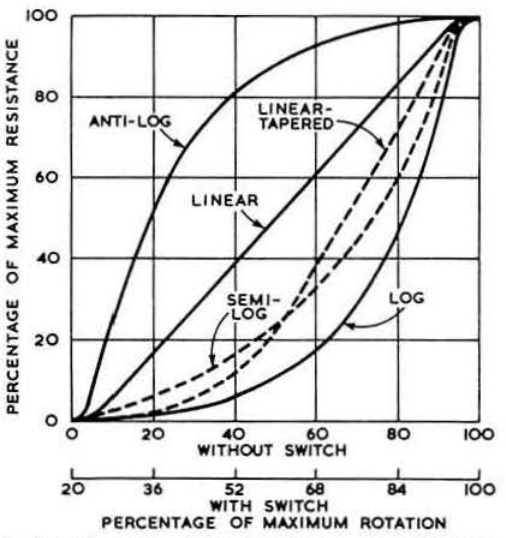


Fig. 4. Approximate potentiometer tapers. 1, linear; 2, log; 3, anti-log; 4, semi-log; 5, linear tapered. Considerable tolerances in the case of carbon-track potentiometers should be expected.

useful in such applications as cathode gain controls and for some biasing networks.

Where the resistance law of a potentiometer is unknown it can be fairly readily found with the aid of an ohmmeter. First measure the full resistance value; then the resistance with the shaft turned about half-way along the track. If the second resistance value is about half the total, the track is almost certainly linear; if only 10-20 per cent of total, then it is a log law component; and if about 80 per cent of the total, then it is anti-log. Semi-log and linear-tapered tracks (curves 4, 5) have values roughly mid-way between linear and log; to decide exactly which of these two it will usually be necessary to draw a rough graph, plotting resistance values against shaft rotation. However, neither of these tapers are very common, although semi-log is used in some tone control circuits.

Microphone Pre-amplifier

When a new or better quality microphone is obtained, the need often arises for additional pre-amplification or for impedance matching. Fig. 5 from *Funk-Technik* (No. 4, 1965) shows a circuit intended for use with a dynamic or similar microphone and drawing power from the main speech amplifier. It is designed for an input impedance of 30-50 ohms and with an output impedance of about 4000 ohms.

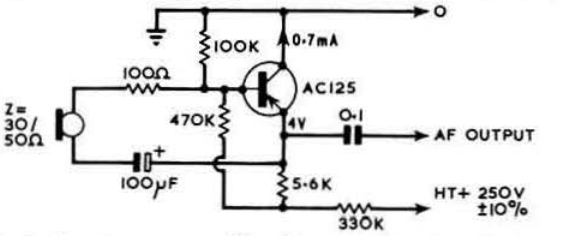


Fig. 5. Microphone pre-amplifier. The output impedance is about 4,000 ohms.

Two-valve 10-watt Modulator

For some of us, the older type numbers of valves have become so ingrained that we often forget that many useful new types continue to be introduced. We have already referred once before to the ECLL800 which squeezes two output pentodes and a triode into the same miniature B9A envelope.

DL1HM in *DL-QTC* (January, 1965) shows how one of these, plus a miniature double-triode valve, can be used for a compact modulator or amplifier with an output of some 10 watts when used with a 250-volt h.t. supply and about 11 volts of fixed bias. The two-stage speech amplifier is followed by a phase splitter and push-pull output stage: see Fig. 6. The original article also provides constructional details of the multi-impedance modulation transformer.

Audio Output Ratings

For many years it has been the standard practice in the UK to rate modulators, high fidelity amplifiers, etc., in terms of the maximum possible sustained r.m.s. output power for a specified degree of permissible distortion. This is normally measured by applying a sine-wave input to the stage and measuring the output.

In the audio field, critics of this system have long pointed out that sine waveforms are seldom encountered in nature—a sustained whistle being the necessary approach, and that the maximum possible undistorted output on the spiky waveforms of normal speech and music is usually appreciably greater than the r.m.s. rating. This is mainly because of deficiencies in the regulation of the supply voltages to the electrodes. Since, in practice, an output stage is called upon to deliver high output only for short periods of time before the drop in voltages makes itself felt, the poor regulation has much less effect upon normal signals than would be suggested from measurements with sine-wave signals.

This argument led to the general adoption in the United States of an alternative form of output stage rating for high fidelity work, the so-called " music rating." This can roughly be regarded as the output which would be delivered with a sine-wave input were the stage being operated with perfectly regulated power supplies. While this rating gives a more realistic idea of the maximum power available it is considerably more difficult to measure or check.

Music ratings are considered to be particularly suitable for transistor (" solidstate ") audio equipments. Some of these may provide only a modest sine-wave output when operated from the associated power supplies, and possibly for this reason there is an increasing tendency for British firms to use these music ratings.

The point is probably not of great importance in so far as amateur operation is concerned, but it is worth realizing that an equipment rated in this way is not quite what one may think, unless the difference between the two forms of ratings is understood.

The W6BCX Multee

A two-band aerial with a top portion only 35 ft. long for use on 3·5/7 Mc/s, or 70 ft. for 1·8/3·5 Mc/s clearly has some attractions to those with restricted space. But rather surprisingly the " W6BCX Multee," although included in some editions of *The Radio Handbook* has never been widely used over here. We were therefore interested to note that this aerial turns up again in an article by W6WAW on short folded dipoles (*73*, December, 1964). Fig. 7(a) shows the usual arrangement with both horizontal and vertical sections formed from 300-ohm line.

On the higher of the two bands, the top section forms a quarter-wave folded dipole (feed impedance about 6000 ohms) with the vertical section forming a quarter-wave matching transformer. On the lower frequency band the entire system forms a top loaded vertical. A very good

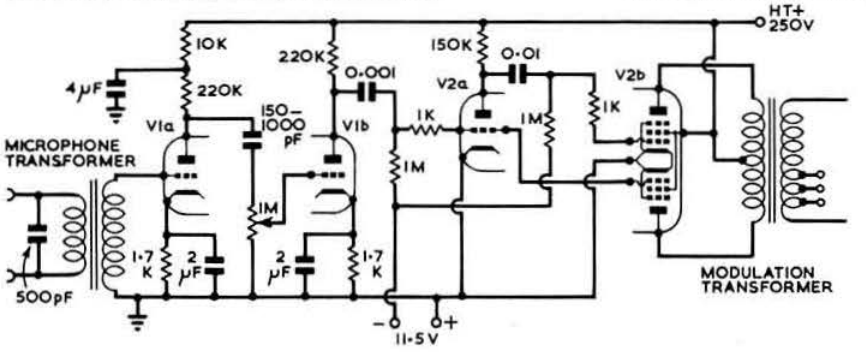


Fig. 6. Two-valve, 10 watt amplifier suitable for use with a dynamic microphone. V1, ECC808; V2, ECLL800.

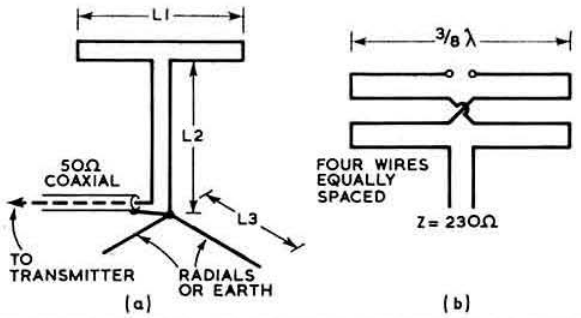


Fig. 7. (a) The Multee two-band aerial. L1 is ½λ, and L2 is ½λ times the velocity factor of the feeder.

	1·8/5·5 Mc/s	3·5/7 Mc/s	7/14 Mc/s
L1 (ft.)	65	33	17
L2 (ft.)	54	27	13·5
L3 (ft.)	50	25	12

(b) A basic ⅜λ folded dipole.

earth system is recommended, preferably in the form of four or six radials buried just below the surface of the ground; but an ordinary water pipe earth will function with some decrease of efficiency.

For the lower band, where the vertical portion forms the radiator, this section should be as nearly vertical as possible, but if main operation is on the h.f. band this is less important.

W6WAW also describes the little known ⅜ wavelength folded dipole arrangement (Fig. 7(b)) which can be used where space is insufficient for the usual half-wave span. In this case feedpoint impedance is roughly 230 ohms but this is close enough to 300 ohms to allow the use of ribbon or other 300 ohm line.

Lincompex

Recently we went along to the Post Office Research Station at Dollis Hill to listen to some recording tapes made on the long-distance h.f. point-to-point London–Delhi route showing the remarkable effects of a new technique called Lincompex—from LINked COMPressor and EXpander. This technique was referred to briefly a couple of years ago (BULLETIN, May, 1963, page 600) when it was still in the early stages.

The tapes showed clearly that this type of terminal equipment can produce a tremendous improvement in the intelligibility of h.f. circuits under very poor propagation conditions and render them much less susceptible to interference. Basically, in Lincompex circuits all the syllable-to-syllable variations of speech amplitude are smoothed out in a compressor, so that the transmitter can be kept fully modulated at all times. The original variations of loudness are signalled to the receiver via a narrowband f.m. circuit and used to control the gain of a fast-acting expander, so that the original waveform is restored.

An interesting point is that it has proved possible to transmit both the speech and the control signal within the normal 3 kc/s bandwidth of point-to-point circuits. This is done by shifting up the speech frequencies about 500 c/s and using the lower 500 c/s or so for the n.b.f.m. control signal. There is thus now no question of needing an entirely separate f.m. control channel as we suggested in 1963. Although clearly the instrumentation for this system is pretty complex, with the need for matched compressors and expanders, high stability discriminators, etc., there would seem to be nothing which would completely rule out its use for amateur a.m. or s.s.b. transmissions. This is thus another of those new techniques worth keeping an eye on.

We also note from *QST* advertisements that the Kahn Research Laboratories (who did much to pioneer compatible single sideband for broadcasting) have introduced for "commercial operators and advanced amateurs" a new Echoplex system which is claimed to provide a five-to-one signal-to-noise gain and to reduce the effects of fading "by transmitting the same information three times (time diversity"). The equipment, it is said, can be used with existing amateur s.s.b. or a.m. transmitters but from the very limited information in the advertisments it is not clear whether there is any increase in transmission bandwidth and no indication is given of the price.

Station Costing

Mentioning price, we noted an article in *Electronics Illustrated* (March, 1965) which although intended primarily for would-be amateurs could nevertheless form the basis for some interesting armchair station assembly. The article provides "shopping lists" for complete amateur stations in four different price ranges: $100 (about £35); $250 (£90); $500 (£175); and $1000 (£350). Each list includes a receiver, transmitter and basic assessories such as key, etc. The lowest price slot in the examples given would put a newcomer on to 7 and 14 Mc/s c.w. (Knight Kit T60 transmitter kit and Lafayette KT320 semi-kit receiver). The middle two ranges cover multiband c.w./a.m. working (one with Heathkit HR10/DX60, the next with ready built Ranger II and Lafayette HA350). The $1000 list, which includes a Hallicrafters HT37 and the new Drake R4 receiver, was the only one which catered for s.s.b. operation.

Probably no two amateurs would compile exactly the same lists but the operation might well prove an interesting exercise in priorities. How much of a limited budget should go on the receiver (which is most likely to be carried up to the next grade and on which operating pleasure largely depends) and how much on the transmitter? How do kits compare pricewise and problemwise with surplus or ready assembled units for the newcomer? How to rate transceivers against separate units? Which bands are the best to cut ones teeth on? And exactly what is the minimum cost of a workable station to someone starting out completely from scratch in home-construction, kit, surplus or factory-built categories?

OF HOGS, HAMLETS, AND HAMS

Many an Amateur Radio "ham" has recognized the sad fact that, if he is going to ride his hobby, he is going to be universally referred to as a "ham." Sometimes the term is so accepted that the subject doesn't even wonder how or why he has turned out to be a fried second cousin to a pig.

Actually, there is no relation between a radio ham to either a living hamlette or dead Hamlet. The English are to blame, not the farmers or the Danes.

When Amateur Radio was in its infancy, the English were quite active in it. As is the Henglish custom they hinvariably put an "H" in front of every vowel without one and, to even matters up, they always add an H to words hordinarily spelled without them.

So when the English radio experimenters referred to themselves, or others like them, they called them "hamateurs." This was eventually shortened to "ham"—at least that's what we are told by the National Geographic Society.

—Ed Kushner, W3HKZ, in *Pack Rats Cheese Bits*, quoted in the *Ragchew* of the Greater Pontiac V.H.F. Society.

Enquiries Regarding Bulletin Articles

Members who write to the authors of BULLETIN articles are asked to enclose stamped addressed envelopes if they require replies.

CODAR A.T.5 TRANSMITTER

By D. V. NEWPORT, G3CHW*

THE first advertisement in the BULLETIN for the AT5 caught the writer's eye and it was resolved to investigate this device further. Subsequent inspection at last year's RSGB Exhibition led to the breaking of a long standing rule, never to buy anything, much less a transmitter; but it still remained to be seen if the spending was justified and that the transmitter lived up to its eye appeal or suffered on account of small size and low cost.

Clearly, having spent money, the writer is biased in favour, if only to prove that he was right, but having said that, facts only will be presented from here on.

The AT5 is a remarkably compact transmitter, complete with anode and screen modulation, covering 160 and 80m, and is small enough to escape the wrath of an XYL and disappear into any car; in fact an enthusiast could fit it to a bicycle, if he had a chain driven generator!

A Vackar derived v.f.o. with an EF80 valve is used followed by an EF80 buffer which is switched as a doubler for 80m. The p.a. is a 6BW6 with pi-section output, the constants of which have been chosen to cover both bands. This latter feature is an inevitable compromise and more will be said about it later. The modulator consists of a 12AX7 driving a 6BW6 which is auto-transformer coupled to the p.a.

V.f.o. control is by an epicyclic drive and although very slight mechanical backlash exists in the one reviewed it is low enough to be ignored. In fact, tuning is unusually smooth and is very pleasant. P.a. tuning and loading is by direct drive and no useful purpose would be served by reduction gears.

A 100 mA meter is fitted for tuning purposes and the legend PLATE CURRENT appears above it. In fact, the meter measures cathode current of the p.a.† and reference to the circuit diagram is necessary before this becomes clear. The writer would prefer the meter to read what it purports and the wiring will accordingly be changed.

Either c.w. or a.m. can be selected and on c.w. the modulator is disconnected by means of a c.w./a.m. switch located on the chassis rear apron. No netting position is fitted although such a device is included in the companion power supply and can, of course, be incorporated in any power supply by breaking the main h.t. line, but allowing through the required 150 volts for the v.f.o. On c.w. the key can be lifted.

External finish and appearance is excellent and is equalled by the internal wiring which is of a high standard.

The only complaint is the inability to get at the wiring without removing front panel controls. This is due to mechanical problems associated with the metal work used and it could be argued that a strong rigid assembly is the result. Nevertheless, a " cut out plate " in the base would be advantageous.‡

Performance Tests

A number of exacting tests were carried out with the aid of highly sophisticated test equipment and the results are tabulated below. These were designed to provide information on questions that usually go unanswered but in the absence of a reference some discretion should be observed. Remember the Chinese proverb about glass houses; under similar tests your transmitter might prove to be only tissue paper, and certainly the modulation test carried out on the writer's well loved and aged " Mighty Wurlitzer Longleat Rally Special " resulted in a complete rebuild, and this after many years of satisfaction with apparent potency.

With a nominal ten watts input a high purity sine wave of 1000 c/s was injected and a modulation depth of 70 per cent was achieved before visible distortion became apparent. This was monitored on a wideband oscilloscope at 1·9 Mc/s. An inexpensive Duvedal crystal microphone produced 100 per cent peaks before distortion crept in and from observations on all bands up to 144 Mc/s, it is better than can be said in a great many cases. A neon modulation indicator is fitted to the AT5 and this appeared to strike at about 80 per cent modulation on speech peaks.

Gain is entirely adequate and with the microphone in use nothing is to be got by using full amplification except distortion through overmodulation. The gain control can be backed off quite a long way. On the other hand, amplification is entirely inadequate for the station " ball and biscuit " moving coil microphone, but this has an embarrassingly low output.

Two r.f. loads were used: a very wide band slab line

Codar AT5 Evaluation Table

Plate Current Meter Correction		V.F.O. Calibration		Harmonic Output Fundamental = 0 db			
Indicated	Actual	Indicated	Actual				
55	48	1800	1798	F	1900	F	3650
52	45	1900	1898	2	−30	2	−26
49	41	2000	2000	3	−24	3	−27
42	35	3500	3499	4	−33	4	−24
30	18	3650	3644	5	−30	5	−40
25	15·5	3800	3797	6	−45	6	−46
20	8·4			7	−42		
		Provision exists for re-setting		8	−45		−db
Cathode	Anode						—
Drift from cold start: 1900 kc/s at 64°F				**Power output,** 75 ohms			
After 5 minutes for *5 minutes 25 c/s After 80 minutes for 5 minutes 52 c/s After 94 minutes for 15 minutes 180 c/s				52% 2 watts input 64% 5 watts input 62% 10 watts input			
Unstabilized mains. *H.t. on for timed periods.				250 V nominal h.t.			
Modulator response relative to 1 kc/s: 420 c/s to > 20 kc/s ± 3 db. (A 0·01μF capacitor across the secondary of the modulation transformer will reduce the a.f. response to 4·2 kc/s.)							

* The meter correction figures apply to older models only.

* 38 Huckford Road, Winterbourne, Bristol.

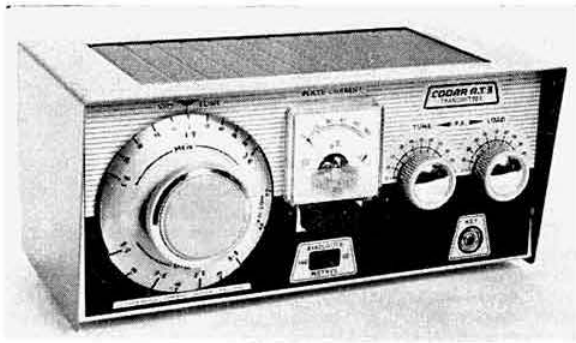
† On the point of cathode current it is stated by the manufacturer that this was done for added safety reasons. It was felt that due to space considerations the meter terminals were closer than normally desirable to the modulation transformer stack (about ½ in.).

Since the article was written Codar have rewired the meter circuit to read true plate current, and have fitted an insulating strip across the transformer stack to ensure that no danger of h.t. short-circuit exists. All AT5 transmitters produced in the future will be so wired and therefore the remarks about cathode current apply only to transmitters supplied before March, 1965.

A further modification has been introduced to improve the strength of NET signal. The switch wiring has been arranged to connect a 22 pF capacitor from the appropriate receiving tag to h.t. + wiring. The added stray pick up is said to result in a stronger NET signal than the modification devised by the writer.

These changes well illustrate the fact that reputable manufacturers are always prepared to act on criticism, provided that it is well founded and presented in a proper fashion, and this, of course, is one of the objects of BULLETIN reviews such as this.

‡ The suggestion regarding a cut out plate to gain ready access to underchassis wiring had already been considered by Codar, but had to be rejected on grounds of high tooling costs. This would have meant that the selling price could not be kept down to it's present level, which, it must be agreed, is a perfectly sound reason.



The Codar AT5 1·8 and 3·5 Mc/s 12 watt miniature transmitter.

75 ohm power meter, and an end fed 270 ft. wire of unknown impedance but expected to be high. These disclosed loading difficulties brought about by using one pi-section to cover both bands.

It was not possible to reduce input from about 12 watts on 160m and the loading was too great for full modulation. This was on the 75 ohm load, whilst on 80m it was not possible to load the transmitter above about 6 watts. No such difficulty occurred on the high impedance aerial but instead it was noted that the p.a. tuning capacitor had to be fully meshed on 1·8 Mc/s and full loading could not be realized. In the instructions accompanying the AT5, reference is made that low impedance aerials on 160m may require some external capacitance for effective loading.

At this time it was noted that on 80m with it feeding into the power meter, r.f. feedback through the modulator took place with minimum loading. The feedback disappeared immediately loading was increased. No attempt was made to establish where the r.f. got in and in fact, the transmitter was tested throughout exactly as received through the post, except that the p.a. anode h.t. lead was broken to measure the true input power.

Could you send your transmitter through the post?

R.f. feedback also took place on 160m feeding the high impedance aerial directly into the transmitter. Under such conditions quite high r.f. voltages exist in the shack and are likely to produce feedback troubles. A simple parallel tuned, link fed aerial coupler completely cleared the feedback problems and the AT5 could then be loaded with ease on both bands. This is further proof that it is advisable to use some sort of aerial coupler whether existing transmitter arrangements will load directly into the aerial or not. It also indicates that the AT5 produces a respectable quantity of r.f. and efficiency figures are included in the table.

Frequency calibration and stability were checked using a 10 Mc/s counter, from cold up to 90 minutes later. Curiously, the transmitter was most stable when cold. Results are tabulated.

Attempts were made to measure harmonic output and the figures are offered as a guide only. An AR88LF with a calibrated S meter was used with a tiny pickup loop thought to offer a fairly equal mismatch on all frequencies, and the S meter was checked at each point by a standard signal generator. Nevertheless, the writer would not like to be quoted to closer than about 6 db, although results were considered to be satisfactory. They represent carrier distortion of about 1·5 per cent which is very reasonable, and an aerial tuning unit will further reduce this figure.

Harmonic output will vary with grid drive and since this is fixed, a variation between models is bound to be expected; yours in fact, might be better—if you prefer less drive.

Before progressing to the power supply, it is felt that further comment on the cathode meter system is needed.

With high voltage supplies or triode amplifiers a good case can be made for such a system, but in the writer's opinion, the disadvantages are numerous with low power and pentode or tetrode amplifiers. Screen current will vary with drive and loading and will therefore mask any change in anode current. The difference between cathode and plate current cannot be linear and only an approximate correction can be made. Since a strict 10 watts input limit exists on 160m it would be too easy to overstep the mark, inadvertently of course, due to such an approximation.

A correction is given in the tables to convert cathode to plate current although this is certain to vary slightly from model to model. Correction approximates subtraction of screen current from the reading and this at 20 mA exceeds anode current, thus giving rise to the apparently large error.

Power Supplies

Power requirements are modest; 250 to 280 volts, 100 mA h.t.+, plus 150 volts stabilized, and the heaters are wired for either 6·3 or 12 volts. Changeover of the latter is automatic by plugging in the appropriate power supply cable.

A companion mains power supply unit, type 250/s, is already available, and a transistor d.c.-d.c. converter for use in mobile installations should be available by the time this article is published. The 250/s power unit is styled to match the transmitter in both size and style and is of attractive appearance.

In addition to providing h.t. and l.t., which, of course, could be utilized for other station equipment, it is fitted with a neon warning lamp and also aerial change-over switching which is combined with NET, STAND BY and TRANSMIT

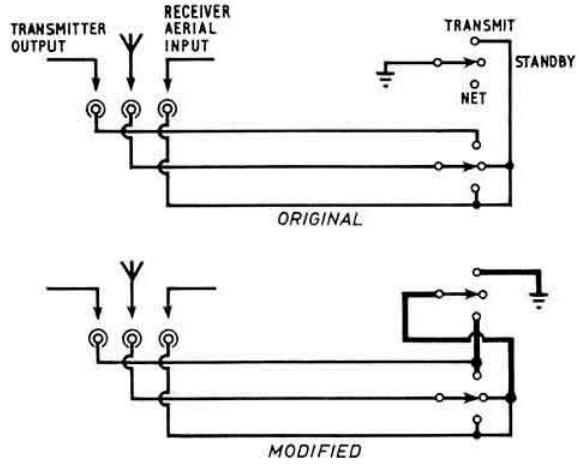


Fig. 1. A useful improvement to the wiring of early production models to increase the net signal.

positions: a most useful arrangement. On NET, 150 volts is switched to the v.f.o. with the aerial left connected to the receiver, but of course, the aerial is switched to the transmitter on TRANSMIT, and the receiver terminals shorted.

The NET position might be too weak for some receiver arrangements and in such cases a simple change in the wiring of the function switch will overcome the problem and result in a hefty NET signal. This could be advantageous for high speed contest operating and the writer has incorporated the wiring change. Details are shown in Fig. 1.

The neon warning lamp is arranged to give a steady glow on both NET and TRANSMIT, but continuous flashing on STANDBY. Some might consider the latter to be distracting whilst others would be glad of the indication. All the writer will venture to say is that on numerous occasions

(Continued on page 300)

Notes on the

70 Mc/s Low Noise Converter

By PAUL HARRIS, G3GFN*

THE writer has been gratified to learn that a number of operators—and listeners—have duplicated the 70 Mc/s Low Noise Converter [1] without difficulty, but at the same time has been very perturbed to come across two cases where, despite strict adherence to the information given, the completed device was next to useless.

In each of the cases where the converter failed to meet the performance specification, the cause was the same: incorrect neutralization of the r.f. amplifier V1 due, apparently, to wrong values having been specified for the neutralizing circuit. In defence of the values given in the original article,

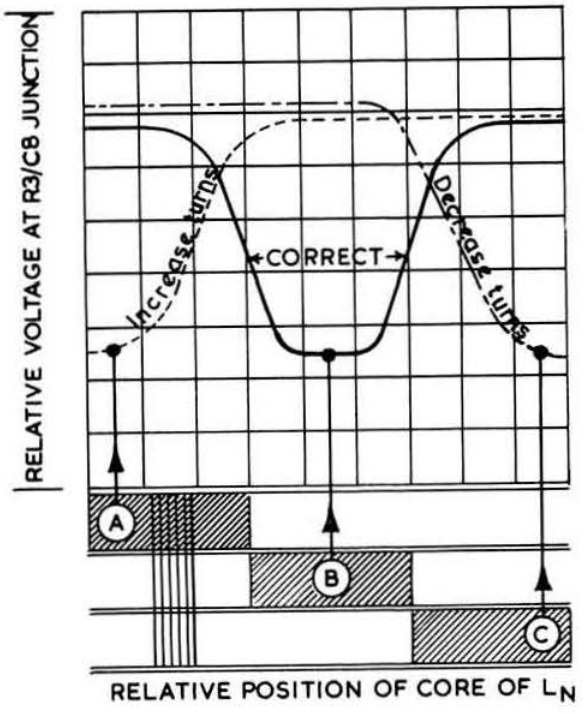


Fig. 1. Chart for determining adjustments to the number of turns of L_N. See text.

which obviously hold good for the majority of cases, it must be said that four 6CW4 Nuvistor triodes were checked in both the experimental lash-up and in the final converter design. All neutralized without difficulty.

Despite the care taken in verifying the values for the neutralizing circuit of the r.f. amplifier, it now seems that in some isolated instances, correct neutralizing cannot be achieved. Whether this is due to the C_{a-g} of some 6CW4s being outside limits, or whether it is due to a cumulative tolerance effect in C5 and C6, or a combination of both, is not known.

The purpose of these notes is fourfold:

(i) To detail a method by which any adjustments needed to L_N can be accurately ascertained.

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(ii) To give revised alignment details to provide broadband coverage over the new allocation 70·1 Mc/s—70·7 Mc/s.

(iii) To review the function of the i.f. head amplifier.

(iv) To show a possible modification to the i.f. amplifier to allow main receiver a.g.c. to be applied to the converter.

Neutralizing

As the small signal performance of the converter is absolutely dependent on the correct functioning of the r.f. stage, this stage must be *precisely* neutralized. *This cannot be over-emphasized.*

An accurate check on the neutralizing of the r.f. stage can be made by disconnecting R3 from the h.t. supply, but leaving the other stages functioning. All signals should completely disappear, including that of any mobile parked outside. If they do not, remove the aerial plug to determine whether the signals are coming *through* the converter—which they should not—or whether they are being picked up by the mixer wiring, which could happen if a mobile really was outside. If signals are coming through the converter, then the neutralization is not set with sufficient accuracy, and the next paragraph should be followed.

A final adjustment for a C5, L_N, C6 arrangement, which appears to function satisfactorily, is as follows. A strong local signal is required, and then with R3 disconnected from the h.t. supply, the core of L_N is adjusted to the point where either the signal completely disappears, or is at its very lowest level.

Now to the more difficult cases.

When a valve is oscillating, the current through it will depend, to a large extent, on how " hard " it is oscillating. Use is made of this fact to determine how the r.f. stage is " taking off," and by relating the behaviour of the current through the valve to the position of the core of L_N, what adjustments are required to the winding of L_N.

As it is not particularly convenient to measure the current of V1 directly, an indirect method is used. Since V1 receives its supply via a fairly large resistor, R3 (15K ohms) the vol-

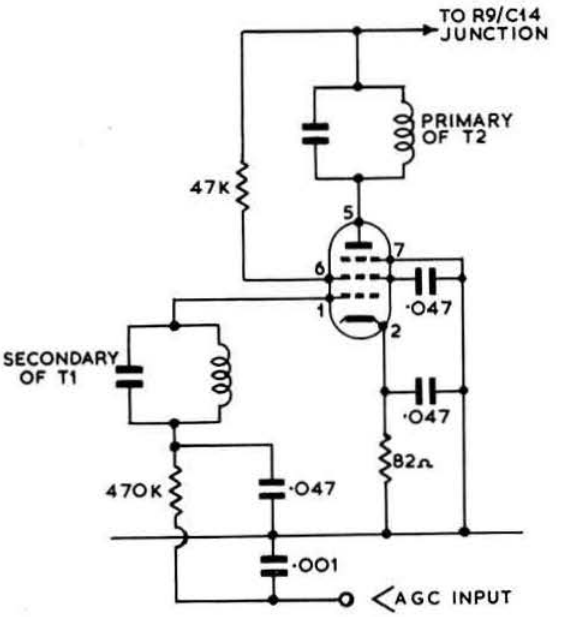

Fig. 2. Revised i.f. amplifier which allows the main receiver a.g.c. voltage to be used to control the gain. The valve is a 6BJ6.

tage drop across this resistor will change quite handsomely for small changes in current through it. In this case, we monitor the current of V1 by measuring the voltage between the junction of R3C8 (positive) and chassis.

Reference should now be made to Fig. 1.

The horizontal axis of this diagram represents the total length of the former upon which L_N is wound. For the sake of clarity three formers are shown stacked so that the relative position of the core is quite clearly indicated. The vertical lines at the left hand end represent the winding. An iron dust core is shown in each former. Core A is central to the winding, core B central to the former, and core C wound down to the foot end of the former.

The vertical axis represents, in a purely arbitrary manner, the voltage at the junction of R3C8.

First take core B. As this is moved along the former from foot to winding, the graph illustrates the voltage excursion at the R3C8 junction. It starts high, drops, and then rises.

Consider now core A being moved in the same direction, that is from right to left. The voltage starts high and remains so until the core is well in, and then it starts to drop and reaches a minimum when the winding is centrally placed about the core.

Core C does precisely the reverse of core A.

In the case of core A, there are *insufficient* turns on L_N, core B is absolutely correct, while in the case of core C there are *too many* turns on L_N.

With the aid of this diagram, watching the voltage at R3C8, and noting the position of the core in your own neutralizing coil, you will quickly be able to tell what alterations you have to make to the turns on your particular L_N to get it spot on.

Make a final check using the method where R3 is disconnected, and a strong local signal.

New Allocation Alignment

The revised alignment procedure for the new allocation is as follows:—

70·2 Mc/s—L1. 70·6 Mc/s—L2. 70·4 Mc/s—L3. 70·4 Mc/s—L4. 70·3 Mc/s—T1 primary. 70·5 Mc/s—T1 secondary. 70·1 Mc/s—T2 primary. 70·7 Mc/s—T2 secondary.

Make all adjustments for maximum signal.

I.F. Head Amplifier

One point which was not noted in the original article is that while the purpose of the i.f. head amplifier is to " lift " the rather low output from the triode mixer to a level suitable for the main receiver, if the main receiver is itself a highly sensitive device, excessive gain in the i.f. head amplifier may make the converter sound noisy—which it certainly is not. Furthermore, under certain conditions, very high gain in the head amplifier could produce cross modulation effects. Particularly may these undesirable features be found when using a " hot " AR88 as the main receiver.

If you suspect that your converter is noisier than it should be, pick on a weak station and then find out by how much the cathode resistor of the i.f. head amplifier, R8, can be increased before the readability of the station starts to decrease. If you do have too much gain on board in the head amplifier, the noise will go down far more rapidly than the signal. Do be sure to use a *really weak signal* when checking out this point.

Strong Signal Reception

If you live in one of the many areas where mobile activity is high, you may well find that your whole receiving system " blocks solid " if a mobile really does park outside your door.

Two solutions are possible. Either a 10K ohms potentiometer can be fitted in the cathode of the converter i.f. head amplifier, and used as an r.f. gain control, or alternatively, the EF91 head amplifier can be changed for a 6BJ6 or W77. This latter course is only really advised if it is possible to bring out the a.g.c. line of the receiver and so automatically control the head amplifier gain of the converter.

In practice this system works well, and even a 50 watt transmitter less than half a mile away will not block out the receiver.

The circuit of a modified head amplifier is shown in Fig. 2.

Reference

[1] RSGB BULLETIN, April, 1964.

NEW BOOKS

UNDERSTANDING TELEVISION. By J. R. Davies. Published by Data Publications Ltd., 57 Maida Vale, London, W.9. Price 37s. 6d. net. 500 pages with numerous line diagrams.

This is undoubtedly one of the best books that aims to explain television in simple language, and has been a pleasure to read. Mr Davies proves beyond question that it is possible, with the aid of good, clear diagrams and most readable prose, to explain even the most complex circuitry without the prime aid of mathematics or a spate of Greek letters, and the publishers are to be congratulated for arranging, in almost all cases, for the diagrams to appear on the same page as, or facing the corresponding text. A small point perhaps, but one most helpful for easy reference.

For those readers desirous of studying television circuits for 405 or 625 lines, colour, or brushing up what they have already learnt, this is certainly the book. W. H. A.

ELECTRONS IN PICTURE TUBES. Booklet issued free of charge by Thorn-AEI Radio Valves and Tubes Ltd., 155 Charing Cross Road, London, W.C.2.

This booklet is another in the range *Electrons in. . . .* series. It describes the evolution and development of cathode ray tubes for television use, and is well illustrated. The company points out that they produced the first magnetically focused tubes used in this country. The other booklets in this series are also very useful, and deal with valve operation.

K. L. S.

Review of the Codar AT5 (continued from page 298)

over the years he has called others only to find that it was necessary to switch on the transmitter to be successful.

If you do not want the facility then you can disconnect or mask off, or perhaps use it to amuse Junior.

Connection of the power supply to the transmitter is with B9A plugs and sockets. The plugs are wired to automatically adjust heater wiring for 6·3 volts and a separate cable, suitably identified, is available as an accessory for patching to 12 volts for mobile use.

No mobile tests have been carried out by the writer but as the AT5 is not particularly prone to mechanical shock, first class results are expected.

Conclusion

Reports over the air confirm that speech quality is excellent with no trace of spurious f.m. or hum and the note is T9. C.w. is good and free of chirps and clicks, with an available r.f. output in excess of 10 watts.

In conclusion, and this is an opinion, not a measurement, it is expected that the AT5 and power supply will give long and satisfactory service and should appeal especially to mobile operators. That was why it was bought, but it is beginning to look as though it is going to stay in the shack (anybody want to buy a large home constructed 160m transmitter?—Adv.).

Focus on the RSGB Call Book

By JOHN CLARRICOATS, O.B.E., G6CL *

THE Foreword to each edition of the RSGB *Amateur Radio Call Book* summarizes briefly the changes that have taken place since the previous edition appeared a year earlier.

The 1965 edition, for example, recorded 3200 additions and amendments to the 1964 edition. More than 800 new calls were issued during the year, about 120 were re-issued and about 370 cancelled which meant a net increase of about 550 in the number of licences, requiring four additional pages of type for the Call-sign Register. The Mobile Register recorded about 500 amendments thereby adding a further half page. Then, for the first time, space had to be found for a list of phone-only calls in the new G8 three-letter series

TABLE 1

The number of pre-war full call-sign holders—as distinct from holders of A.A. call signs—who were still licensed 25 years later. The G4 series had not been completed at the outbreak of war, hence the lower aggregate.

Call-sign Series	G	GC	GD	GI	GM	GW	Total
2	259	4		2	7	7	279
3	279	1	1	8	14	16	319
4	195	1	1	2	12	6	217
5	287	1	1	7	13	12	321
6	277	1	2	5	21	9	315
8	241	3		4	12	16	276
Totals	1538	11	5	28	79	66	1727

(totalling 73) and for the beginning of a new G6 three-letter series of Amateur Television calls (totalling 37), adding together another half page.

In addition to all this the 1965 Edition recorded 1300 changes of address which had taken place since the previous edition appeared.

Post Office Records

Amendments made to the RSGB *Call Book* are based on information received from the Radio Services Department of the Post Office. Known as Weekly Correction Lists, these record changes of address, cancellations and mobile licence details. Additions to the Call-sign Register are contained in the Call-sign Record, which comprises stencilled sheets giving information primarily intended for the use of Post Office officials, especially Regional officers. The sheets give the call, name, address of station and address for correspondence if different to that of the station, and the Post Office Region in which each station is located. Occasionally —very occasionally—an amateur exercises his right not to have his address published and this request is conveyed to all concerned in an amendment to the appropriate Call-sign Record sheet. Scattered throughout the *Call Book* will be found the words " Particulars withheld at licensee's request " against certain call-signs.

One of the most interesting points to be noticed from a perusal of the *Call Book* is that old timers seem very loath to give up their call-signs. Many holders of such calls have not been heard on the air since 1939, yet they continue to renew their licence each year without fail.

Pre-War Call Signs

Newer amateurs may have wondered which call-signs were in use prior to the 1939-45 war. They were in the series:

TABLE 2

The number of pre-war A.A. licence holders—fully licensed since the war—in each prefix area of the British Isles. September 1964.

Call-sign Series	G	GC	GD	GI	GM	GW	Total
G2AAA-G2HPF	705	5	1	12	36	34	793

G2AA-G2ZZ, G3AA-G3ZZ, G4AA-G4ZZ, G5AA-G5ZZ, G6AA-G6ZZ, G8AA-G8ZZ.

G2, G5 and G6 calls were issued during the first few years after World War I, but it does not follow that *all* current holders of G2, G5 and G6 calls are original holders. Many amateurs gave up their licences in the early 1920's and their call-signs were re-issued—some as far back as 40 years. The number of original holders of G2, G5 and G6 calls is now quite small.

Calls in the series G8 were first issued in 1936, those in the series G3 in 1937 and those in the series G4 in 1939.

Artificial Aerial Licences

Prior to the 1939-45 war, Artificial Aerial licences were issued almost for the asking and the holders of such licences received a three-letter 2 call-sign *without* the G (or other appropriate) prefix.

When the war ended pre-war holders of a full licence were able to renew it upon application, retaining their pre-war call-sign. Holders of a pre-war Artificial Aerial licence were able to obtain a full licence upon passing the Post Office Morse Test if they could not claim exemption by virtue of the work they had been doing during the war while serving in the Royal Navy, the Army, the Royal Air Force or the Merchant Navy. Those who qualified for a full licence were granted permission to use their pre-war call-sign with the addition of the country prefix, e.g., G2AAA.

The Pre-War Calls

An analysis of the 1965 *Call Book* reveals some interesting facts and figures.

Table 1 shows the number of holders of pre-war call-signs who were still licensed in September, 1964. Bearing in mind that the total number of United Kingdom full licences current at the outbreak of World War II was less than 3000,

TABLE 3

The number of post-war G3 three-letter call-sign holders with the numbers in each main group and in each prefix area of the British Isles. September 1964. The G3AAA series commenced in 1946, the G3IAA series in 1951, the G3LAA series in 1956, and the G3PAA series in 1961. The G3TAA series commenced in 1964.

Call-sign Series	G	GC	GD	GI	GM	GW	Total
G3AAA-AZZ	290	1		6	21	10	328
G3BAA-BZZ	251	1		4	29	9	294
G3CAA-CZZ	224	1		6	19	15	265
G3DAA-DZZ	242			2	25	12	281
G3EAA-EZZ	296	3	3	2	20	13	337
G3FAA-FZZ	273	2	3	5	35	13	331
G3GAA-GZZ	313		3	10	34	8	368
G3HAA-HZZ	360	2	1	12	33	20	428
G3IAA-IZZ	358		2	13	25	20	418
G3JAA-JZZ	405		1	14	34	10	464
G3KAA-KZZ	421	3	1	11	35	18	489
G3LAA-LZZ	446	4	1	8	45	21	525
G3MAA-MZZ	477	2	1	6	35	19	540
G3NAA-NZZ	502	3		20	42	24	591
G3OAA-OZZ	540	4		19	44	19	626
G3PAA-PZZ	547	1	1	13	42	27	631
G3RAA-RZZ	567		1	11	26	34	639
G3SAA-SZZ	590	1		14	33	22	660
G3TAA-G3TLU	257		1	8	17	9	292
Totals	7359	28	19	184	594	323	8507

* Compiler of the RSGB Amateur Radio Call Book and Honorary Historian to the Society.

TABLE 4

The number of stations licensed to operate Mobile. September 1964.

Call-sign Series	G	GC	GD	GI	GM	GW	Total	
2AA-ZZ	27	1				2	30	
3AA-ZZ	41			2	3	2	48	
4AA-ZZ	34			1	2	1	38	
5AA-ZZ	30			1		1	32	
6AA-ZZ	37				1	1	39	
8AA-ZZ	27				1	1	29	216
2AAA	136	1		3	1	7		148
3AAA	1226	2	3	26	46	40		1343
Totals	1558	4	3	33	54	55		1707

it would seem that almost the last thing an old-timer will give up is his Amateur (Sound) Licence!

Table 2 shows the number of holders of pre-war A.A. call-signs who were still licensed in September, 1964. The fact that 1727 holders of pre-war full calls and 793 holders of pre-war A.A. calls are still licensed, to give a total of 2520, is evidence, if such be needed, of the long-standing devotion to Amateur Radio shown by those whose interest in the hobby began upwards of 25 years ago.

The Post-War Story

The post-war story is equally interesting. Table 3 reveals, for example, that in the 18 years that have elapsed since the first G3 three-letter call was issued there are now more than 8500 such calls in existence.

Remembering that there are 676 call-signs available in each G3 three-letter group, the " wastage " has not been as high as many old-timers expected. For example, in the first ten groups (from G3AAA to G3JZZ) 3514 licences are still current—an average of 351 per group or roughly 62 per cent. This means that more than 3500 of those to whom post-war calls were issued between ten and 18 years ago are still licensed—indicating sustained interest in Amateur Radio.

The Mobile Register

Table 4 shows the number of current holders of Amateur (Mobile) Sound Licences. An interesting fact revealed by an examination of the Mobile Register is that the percentage of pre-war licensees holding a Mobile licence is not very different to that of the post-war groups although the numbers are, of course, much smaller. The percentages are given in Table 5.

Conclusions

It seems certain that future editions of the RSGB *Call Book* will show even more marked changes than those that have occurred in recent years. When the first post-war edition was published, during the autumn of 1951, the Register occupied 41 pages. In the 1965 edition it occupies more than 75 pages in addition to the four-page Mobile Register.

By focusing a spotlight on the RSGB *Amateur Radio Call Book*, members will be able to appreciate some of the problems which face both the Post Office and the Society in maintaining accurate records.

Within 12 weeks of the date the 1965 edition closed for press (mid-September 1964) the Society had received notification from the Post Office of 900 further amendments and additions!

TABLE 5

Summary showing the percentage of mobile licence holders to total number of licences. September 1964.

	Mobiles	Total	Per cent
Pre-war Full Calls	216	1727	12·5
Pre-war A.A. Calls	148	793	18·6
Post-war Calls	1343	8507	15·8
Totals	1707	11,027	15·6

Book Reviews

THE RADIO AMATEUR'S HANDBOOK (42nd Edition, 1965). By the HQ Staff of the ARRL. 640 pages, profusely illustrated. Price 42s. 6d., post paid, from RSGB Publications (Dept B), 28 Little Russell Street, London, W.C.1.

Since 1926 this *Handbook* has been a standard manual of amateur construction and design, and almost four million copies have been sold. Its value is well-known far outside amateur circles, and one finds it difficult to imagine a keen amateur without an up-to-date copy. So the reviewer will limit his remarks to mentioning new features in the present edition.

An extensive re-grouping of material has been made in many sections, and the new arrangements seem better and more convenient. The DCS500 double-conversion superhet receiver design has been replaced by the "HB-65 Five-band Receiver ": this is really a receiver and a crystal-controlled converter on the same chassis. The first i.f. is 1700 kc/s where a crystal-controlled oscillator changes the signal to 100 kc/s for two amplication stages and eight tuned circuits. Although there are no r.f. stages ahead of the mixers, to simplify construction, the sensitivity is said to be adequate with all but the poorest aerials. The design should be very attractive to any amateur who wishes to construct his receiver.

The two-band v.f.o. has become the three-band v.f.o. which gives output on 3·5, 7 and 14 Mc/s, sufficient to be a " crystal replacement," and the 75W 6DQ5 transmitter design is replaced with a " 75 to 120W 6146B Transmitter." The higher power level is obtained from this Novice-type transmitter by a change of voltage-regulator tubes. The new designs in the QRO section are of limited interest to us.

Many amendments and re-arrangements occur in the Power Supply chapter, and the eye is arrested by a " quad-helix " aerial amongst the v.h.f. types. The data on valves and semi-conductors has been brought up-to-date, and is one of the most useful collections of this sort to be found anywhere: it has long been greatly appreciated.

The gold lettering on the maroon cover is surely the gilt on a very fine bit of gingerbread.

T.P.A.

TRANSISTOR CIRCUITS IN ELECTRONICS. By S. S. Making, Ph.D., B.Sc., and R. Barrett, B.Sc. Published by Iliffe Books Ltd., Dorset House, Stamford Street, London, S.E.1. Price 63s.

For students taking degree, Dip. Tech. or HNC courses in Electronics this book could hardly be bettered.

In coverage and detail it is extremely comprehensive, and the inclusion of a chapter on Boolean Algebra should help to demonstrate to the student the purpose and application of this valuable mathematical tool.

The examples chosen at the end of each chapter do not always do justice to the detailed coverage given to the subject matter, which is perhaps an inversion of the more usual situation.

A valuable book to students and engineers alike.

A. D. P.

Mobile Column

By E. ARNOLD MATTHEWS, G3FZW*

THE RSGB Mobile Rally at Texas Instruments Ltd. which opened the mobile season was graced with good weather, and attendance built up steadily throughout the day until the factory car parks at Texas Instruments Ltd, of Bedford, were full. A surprisingly high proportion of cars was equipped with mobile gear, and during the morning and early afternoon members of Shefford and District ARS and Bedford ARS were kept busy operating talk-in stations on 1·8, 3·5, 70 and 144 Mc/s directing incoming cars through Bedford's difficult street system with fine efficiency. The 1·8 Mc/s team located the writer, who was lost in a back street, and set him on the right course in just about the time it took to turn the car round!

A full programme had been arranged by the Mobile Committee, including innovations such as a cheese-tasting contest, a Tupperware party, a Beauty Councillor demonstration and a Good Food quiz which attracted well over 100 entries. The Grand Raffle did good business and situated nearby was a lucky dip for the children. Bedfordshire Police supported the rally well with exhibits concentrated on road safety and crime prevention (did you find a blue sticker on the unlocked door of your car?). Bedford Road Safety Committee's reaction time tester was in steady use throughout the day. Trade exhibitors included Labgear Ltd., J-Beam Aerials Ltd., CT-W and Green and Davis Ltd.

A conducted tour round the factory in parties of 10 was well worth waiting for, giving an insight into the manufacture of transistors and miniature solid state circuits. At the conclusion of the tour one well understood the reasons for the high catalogue prices of transistors in relation to the amount of material employed. The degree of control, the capital cost of the equipment employed and the amount of research and development were fascinating features of this all-too-short trip around the factory.

At the conclusion of the rally, the RSGB President, E. W. Yeomanson, G3IIR, presented prizes to winners of the cheese tasting competition, G3EHR, and the good food quiz, G3NAZ. Certificates for the mobile equipment competition were presented as follows: best v.h.f. equipment, and the safest in all classes: G3MCG; best commercial rig: G3IES, and the best h.f., home constructed: G2DQ.

The Society wishes to thank the directors of Texas Instruments Ltd. for their kindness and generous hospitality on this occasion. Thanks are also due to Fred Parker, G3FUR (Chairman of the Mobile Committee) and his small but very hard-working team.

North Midlands Mobile Rally

Despite the bad weather one now associates with this annual event there was a good attendance for the Midlands' premier mobile rally, which is organized jointly by *Midland ARS* and *Stoke-on-Trent ARS*. When the writer arrived in the afternoon, three of the car parks at Trentham Gardens were full, and there was a higher percentage of mobile-equipped cars than other years. It is pleasing to record that the unsightly aerials seen before have disappeared. A team of judges provided by *Stoke-on-Trent ARS* judged the equipment and made the following awards: 2m commercial rig, G3AMM; home-constructed, G3BA; 160m commercial rig, G3JFH; home constructed, G3GMN. The prize for the best overall equipment was awarded to BRS25937.

Owing to the sudden illness of their organizer, the contingent from Royal Signals, Catterick, was unable to attend, but RAF Sealand had a mouth-watering display of test equipment and transmitters. Most of the latter employed frequency synthesizers. Unfortunately, generator hash upset the RAF (Sealand) ARS's demonstration of the latest Collins airborne transmitter/receiver, but the progress of the sideband contest was being followed on this society's Racal receiver. A pleasing feature of this rally is the regular attendance of various Midlands radio societies which from year to year exhibit members' equipment and electronic novelties. Dudley ARS, for instance, had an electronic reaction-time tester. Lichfield were showing a closed circuit TV display of a drop of pond water seen through a microscope. English Electric Company Apprentices Association had on show a magnificently constructed h.f. bands transmitter.

Other hobbies were represented by Meir Camera Club's display of colour slides and pictorial prints in monochrome; the local branch of the Cactus and Succulent Society of Great Britain had an excellent display of these intriguing plants; The N. Staffordshire Model Society's collection of radio controlled models grows ever larger, and this year they had on display a radio controlled submarine. This was fully submersible, with automatic depth control and an impressive array of safety devices including a marker buoy which is released in the event of the vessel sinking! Pleasing background music was supplied by the British Amateur Tape Recording Club.

Radio trade support was good: C. H. Young, Jack Tweedy, North Western Electronics, S.S.B. Products, Daystrom Ltd. and Taurus Electrical Services all showed their well-known ranges. It was possible to buy anything from a hank of hook-up wire to National's latest HRO receiver. In addition there was a varied and interesting programme of stereo records arranged by Daystrom Ltd. to demonstrate Heathkit hi-fi equipment, and we must not forget G5PP's stand displaying mobile test gear and where he dispensed much sound advice on /M problems.

No rally is complete without its "swindles". This one had three, the prize for one being a "Joystick" aerial kit presented by Partridge Electronics, and the proceeds of this went to the Radio Amateur Invalid and Bedfast Club.

RSGB Bookstall, manned by Fred Parker, G3FUR, did a brisk trade next door to Stoke Civil Defence display of ambulance equipment. The Red Cross Society and St. John Ambulance Brigade were on hand in case their services were required.

Saltash & DARS Mobile Rally

This will be held at Calstock Playing Fields on Whit Monday, June 7. The site (NGR SX437685) is on the banks of the R. Tamar 1½ miles south of the A390 road. Admission is free. Ample covered accommodation is available if the weather is bad, and a café and an inn are nearby. Talk-in station GB3SAL will operate on 160, 80, 4 and 2m. A full programme of events including a treasure hunt for children and a demonstration of DX TV reception (conditions permitting) has been arranged. Further particulars may be obtained from BRS26760, 95 Grenfell Avenue, Saltash, Cornwall.

Four Metre Band Aerial Polarization

A series of tests has been conducted by P. Balestrini, G3BPT, to evaluate the effect of cross polarization on mobiles operating in the 4m band.

These tests were programmed to cover two runs outwards from Shooters Hill (51° 28′ 24″ N 00° 02′ 06″ E) to Tilbury and Central London. Commercial equipment was used at Shooters Hill having an r.f. output of 25 watts fed via UR67 cable to a 6 element wide-spaced Yagi at a height of 500 ft. above m.s.l. The array was mounted so that the plane of polarization could be physically changed. The

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mobiles were equipped with g.s.v. $\frac{5}{8}\lambda$ vertical aerials, roof-mounted.

The tests were carried out to a range of approximately 20 miles from Shooters Hill, during which time reliable communication was maintained with the mobile station. Changing the plane of polarization at Shooters Hill from the vertical to horizontal and vice versa produced a negligible variation in signal strength. It was, in fact, found that while the mobile station was in Central London the horizontal plane at the fixed station was to be preferred, no doubt due to the plane of polarization being altered by the obstructed path.

Tests between fixed stations, especially over an open path, showed a measurable gain in favour of the horizontal mode at both points, attenuation due to cross polarization being more severe under these conditions.

A report submitted by J. G. Whitney, G3MFB, on tests independently carried out in Surrey over a long period gave similar results.

In conclusion it can be said:

(a) Vertical polarization is without doubt best from both mechanical considerations and electrical efficiency for mobile aerial systems.

(b) The effect of cross polarization, i.e., horizontal at fixed station and vertical at mobile station is negligible.

Maps

Many mobile operators who are planning details of holidays and other summer outings now may find the Ordnance Survey "Quarter Inch" series of maps of much assistance. Although generally more expensive than some of the petrol companies' road maps they contain a wealth of detail not found in cheaper varieties, including contours. Major roads and the more used secondary roads are shown in towns (whose built-up areas are well defined), but in the country the road detail is such that virtually every lane passable by a car is shown. The National Grid 10 km squares are shown, so that something fairly close to a six figure reference would be possible by using a " roamer." These maps are supplied on paper or linen, mounted and folded or flat, at prices from 4s. 6d. and each one covers an area of approximately 120 × 100 miles. Ten cover England and Wales and a further seven cover Scotland including Orkney, Shetland, and the Western Isles.

Lectures on Mobile Operation

That very well-known mobile operator, Bob Palmer, G5PP, seems well booked up for a series of lectures this summer, and if you are fortunate enough to belong to a club which includes him in its programme this talk is a " must." The writer recently attended a meeting of Cannock Chase ARS when Bob entertainingly imparted a great deal of practical advice, profusely illustrated with diagrams, actual gear in use, and live demonstrations. He covered the design of transmitters and receivers, h.t. units, suppression and design and matching of h.f. aerials. Particularly interesting was his comparison of 160 and 2m, with his conclusion that by and large there is not much to choose between the two bands if one makes the best of conditions and facilities.

The aerial matching and impedance measurement demonstrations were very convincing. Home-made test equipment as described in his booklet " Hints for Mobile Operators " was used, and everyone was given the firm impression that the time spent building the g.d.o. and impedance bridge would more than outweigh that lost by " cut-and-try " aerial construction! G5PP has disposed of nearly 500 copies of the booklet. Also on view was a three-band transmitter for 160, 4, and 2m in course of construction by G3OVQ. This rig measures about 9 × 6 × 9 in. deep.

MOBILE RALLIES 1965

May 23..... **ARMS Mobile Rally**

RAF Station, Barford St. John, near Banbury, Oxfordshire.

As May 22 is the US Air Force Open Day, many thousands of visitors are expected. There will be a large trade show, a tombola, and all the usual " Barford " attractions.

Organized by the Amateur Radio Mobile Society

May 30..... **RNARS Mobile Rally**

RN Signal School, HMS *Mercury*

Organized by the Royal Naval Amateur Radio Society

June 7.....**Saltash and District ARC Mobile Rally**

See page 303

Organized by the Saltash and District Amateur Radio Club

June 20.....**Hunstanton Bucket and Spade Party**

G3JEC Station Refreshment Rooms Car Park

Further information may be obtained from C. E. Wegg, Cobgate, Moulton, Spalding, Lincs.

G3ANM/A————1980 kc/s: talk-in station

June 20..... **Saundersfoot Bucket and Spade Party**

Regency Hall, Saundersfoot.

An informal gathering for all mobile operators. YLs, XYLs, Jnr Ops and SWLs. A prize of £5 will be awarded to the mobile op. who travels the furthest distance to the rally that day.

Organized by the Pembrokeshire and District Radio and Electronic Club

June 26, 27..... **Bodensee-Treffen, International Radio Amateur Meeting**

Constance, Lake Constance, Germany

Events will include an " Amateurs' Fair," several Fox-Hunts (D/F events) and mobile competitions. Bookings for accommodation should be sent to Verkehrsverein, Konstanz-Amateur Radio Meeting 1965, Konstanz, German Federal Republic

June 27..... **Longleat Mobile Rally**

Longleat Park, on the Frome-Warminster Road, A362

Organized by the Bristol RSGB Group

July 11..... **Tenth Anniversary Mobile Rally**

Organized in conjunction with the RSGB by the Oxford and District Amateur Radio Society

July 11..... **Torbay Mobile Rally**

Junior Leaders Regt., Royal Signals, Rawlinson Barracks, Denbury, Newton Abbot, South Devon

Organized by the Torbay Amateur Radio Society

July 11.....**South Shields Mobile Rally**

Organized by the South Shields and District Amateur Radio Club

July 25..... **Cornish Mobile Rally**

Newquay

Organized by the Cornish Radio Amateur Club

BRIDGE MODULATORS

By E. CHICKEN, AMIERE, G3BIK*

THE bridge modulator, in one form or another, is extensively used in the production of single sideband signals. It is the purpose of this article to discuss certain types, and to show how such modulators work.

It is perhaps unfortunate that the explanation of any system of modulation which portends to be accurate must, of necessity, involve mathematics. Do not, however, be deterred by this for the mathematics to be given here have

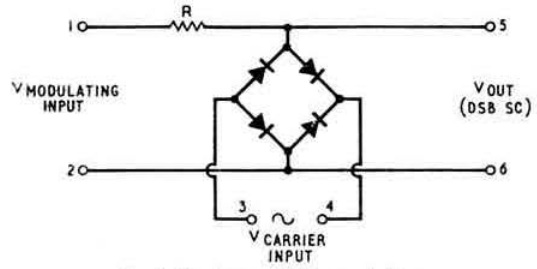

Fig. 1. The Cowan bridge modulator.

been kept to the minimum and are presented more in the form of statements rather than involved proofs. It is hoped that this expedient will allow the mechanics to be readily understood.

Basically, there are three types of bridge modulator in common use. These are the Cowan bridge modulator, the full-wave bridge ring modulator, and the half-wave bridge ring modulator, the circuits of which are shown in Figs. 1, 9 and 15 respectively.

The Cowan Bridge Modulator

The heart of this circuit is the bridge network consisting of four matched small signal diodes. The diodes may be of

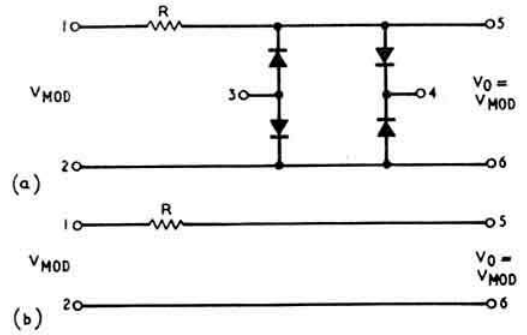

Fig. 2. (a) The Cowan bridge modulator as seen by the modulating signal in the absence of carrier. (b) The equivalent circuit of (a).

almost any type, but they should possess a very low forward resistance and a high back-to-front ratio. The principle of operation is as follows.

A low frequency modulating voltage is applied to the input terminals 1 and 2, and hence appears across the bridge network terminals. If the output terminals are open-circuit, then no current will flow. Similarly, assume at this stage that no r.f. carrier voltage is being applied to input terminals 3 and 4. It will be seen from Fig. 2(a) that no current can flow through the bridge network due to the modulating voltage

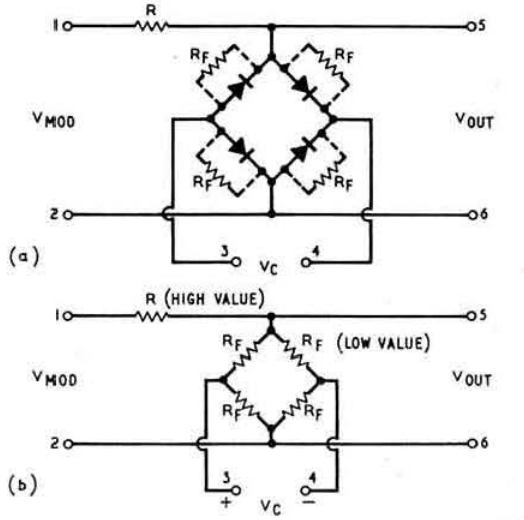

Fig. 3. (a) The Cowan bridge modulator with the diodes fully conducting. (b) The equivalent circuit of (a).

since the diodes are back to back. This applies irrespective of the instantaneous polarity of the modulating voltage.

Since no current is flowing through the resistance R, there will be no voltage drop across it, and the full modulating voltage will appear across the output terminals just as though the diodes were not in circuit. See Fig. 2(b).

When an r.f. carrier voltage is applied across terminals 3 and 4, if the polarity and magnitude of this voltage are such as to cause the diodes to conduct fully, then the forward resistances of the diodes form a balanced Wheatstone bridge with arms typically of 1 K ohms or less. This is illustrated in Fig. 3.

Reference to the diode characteristic shown in Fig. 4 will

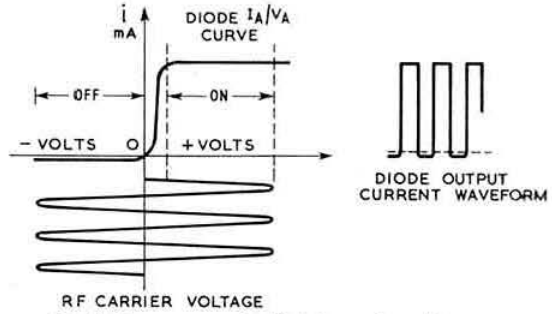

Fig. 4. The response of a diode to carrier voltage.

* 52 Marlborough Avenue, Grange Park, Gosforth, Newcastle-on-Tyne, 3.

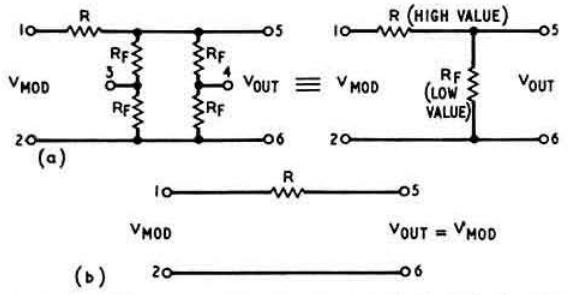

Fig. 5. (a) The Cowan bridge modulator—equivalent circuits with the diodes conducting (a) and cut-off (b).

indicate that, as far as the diodes are concerned, provided the magnitude of the r.f. carrier voltage is made large enough, then they are effectively being alternately switched fully on and fully off during each cycle of the carrier voltage. The diode conduction pulses will form a square wave train of the same frequency as the r.f. carrier, and, from the point of view of the modulating signal, it is as though a 1 K ohms resistance is being switched in and out of circuit across the output terminals. This is shown clearly in Fig. 5 from which it will be seen that the four 1 K ohms resistors —equivalent to the diodes—appear in a series-parallel combination, the resultant of which is 1 K ohms across terminals 5 and 6.

In the condition where the diode conducts, the series resistance R, and the resultant diode forward resistance R_f form a potential divider. The magnitude of the output voltage, V_{out} is the ratio of the resistance R_f to the resistance $R + R_f$. That is, $V_{out} = V_{mod} \times \frac{R_f}{R + R_f}$

If the series resistance is made much higher than the diode resistance R_f, then with the diodes in the fully conducting condition, the output voltage will be nearly zero. This is obvious since R then becomes substantially the only denominator in the output equation.

In the diode cut-off condition, the magnitude of the output voltage is equal to the magnitude of the modulating voltage V_{mod}. Thus, in effect, the voltage appearing across the output terminals is the low frequency modulating voltage being switched on and off at the carrier frequency rate. Since the carrier frequency is much higher than the modulating frequency, the resultant output looks like that shown in Fig. 6(b). This low frequency signal modulated by a high frequency is precisely the opposite to that normally produced in an a.m. transmission.

The output contains a component at the l.f. modulating frequency, and in addition, components at " carrier frequency plus modulating frequency " and " carrier frequency minus modulating frequency," these being the upper and lower sidebands, plus a series, progressively reducing in magnitude, of upper and lower sidebands of the odd order harmonics of the carrier frequency.

The carrier frequency itself does not appear in the output since the diodes in their conducting state form a balanced bridge, and assuming that this is perfectly balanced, there would be no potential across points A and B (Fig. 7) corresponding to the output terminals. The foregoing indicates quite clearly the need for the diodes to be accurately matched, and why the carrier is eliminated.

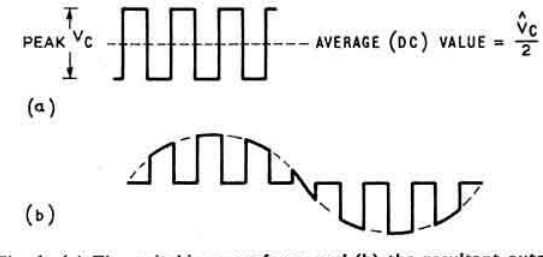

Fig. 6. (a) The switching waveform, and (b) the resultant output waveform from the Cowan bridge modulator: a low frequency signal chopped at carrier frequency rate.

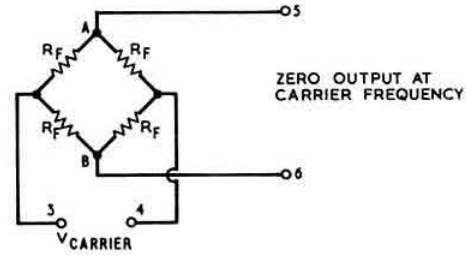

Fig. 7. The balanced Wheatstone bridge seen by the carrier voltage in a Cowan bridge modulator. It is clear that the arms of the bridge, i.e. the diodes, must be accurately matched in order to avoid any output at the carrier frequency.

The magnitude of the output components are all directly related to, and controlled by, the magnitude of the l.f. modulating signal applied across the input terminals 1 and 2. The output component at the modulating frequency is approximately $\frac{1}{2} \times V_{mod}$ and the fundamental double sidebands are approximately $1/\pi \times V_{mod}$. The third and fifth order sidebands are approximately $1/3\pi \times V_{mod}$ and $1/5\pi \times V_{mod}$ respectively. These output magnitudes can only be given approximately since, among other things, they are dependent to some extent on the forward resistance of the diodes.

From the foregoing it will be appreciated that the level of the output signal is only influenced by the level of the modulating signal, and is independent of the r.f. carrier voltage when the modulator is functioning correctly.

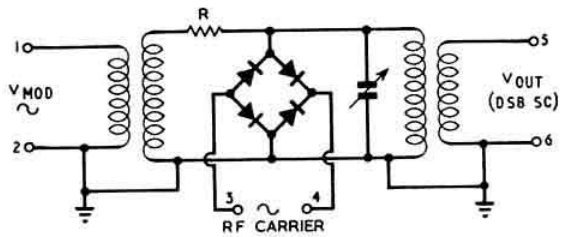

Fig. 8. The basic arrangement of a Cowan modulator when used in practice for r.f.

The expression $\frac{R_f}{R + R_f}$ given earlier defines the shape of the switching waveform, and is known as the " switching function," denoted S. The switching function operates most effectively when the series resistance R has a value which is high compared to the forward resistance of the diodes. Unfortunately, the very act of increasing the value of R lowers the overall efficiency of the modulator by making it necessary to increase the level of the modulating signal to maintain the same output level, but in practice this is no particular hardship.

Another term applying to this type of modulator is switching efficiency and this is defined as:—

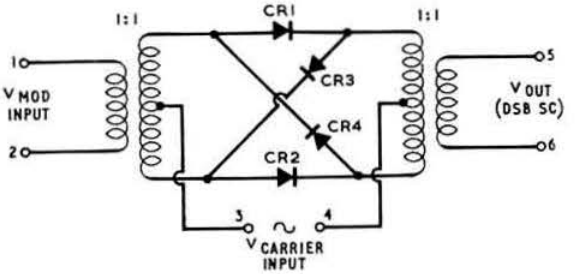

Fig. 9. The full-wave bridge ring modulator.

$$\frac{\textit{Amplitude of desired sideband}}{\textit{Amplitude of modulating signal}}\ \%$$

For the fundamental sideband the switching efficiency is:— $\frac{V_{mod} \times 1/\pi}{V_{mod}}\%$. By cancellation we arrive at $\frac{1}{\pi} \times \frac{100}{1}$ which gives us 32 per cent approximately. From this it will be appreciated that the efficiency at the third harmonic is $\frac{1}{3\pi} \times \frac{100}{1}$ or 10·6 per cent.

It is not generally appreciated that odd order harmonic sidebands can be obtained from the output of a bridge modulator, it being usual practice to use the fundamental sidebands only. There is no reason why the higher order sidebands should not be extracted in a similar manner.

The fact that the sidebands appear at only *one* times the modulating frequency above and below the carrier and the odd harmonics of the carrier frequency, is proof of the absence of harmonic distortion of the modulation, this being one of the outstanding virtues of the bridge modulator. The fact that the modulating frequency is present in the output is unimportant since this is easily removed by the action of the tuned circuits following the modulator.

The double sideband output may be easily converted into single sideband by selective filtering following the bridge modulator in the manner which is now common practice.

Full-wave Bridge Ring Modulator

Reference should be made to Fig. 9 for the circuit of this arrangement.

This modulator differs from the Cowan modulator in that it is fully balanced, with the input and output circuits transformer coupled. Since equal and opposite currents will flow through adjacent halves of the transformer windings, magnetization of the transformer cores is avoided. For correct operation, it is desirable to have the carrier at least eight times as large as the modulating signal, and this point must not be overlooked.

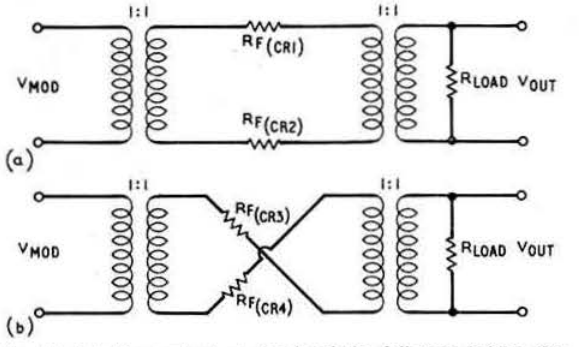

Fig. 10. (a) The equivalent circuit of the full-wave bridge ring modulator during a positive half-cycle of carrier. (b) The equivalent circuit during a negative half-cycle of carrier.

Unlike the Cowan circuit, the two input signals may be transposed, the circuit automatically treating the signal having the largest amplitude as the "carrier."

The circuit of Fig. 9 can be simplified if the diodes are again considered as being resistances equal in value to the diode forward resistance when conducting, and as open circuits when the diodes are not conducting.

Assuming the carrier level V_c to be large enough to cause effective instantaneous switching fully on, and fully off, of the respective diodes, as was indicated in the Cowan modulator previously considered, then reference to Fig. 9 will show that when the r.f. carrier voltage is positive going, diodes CR1 and CR2 become fully conducting, in which state they are no more than small resistors. This is illustrated in Fig. 10(a). Diodes CR3 and CR4, on the other hand, are fully cut off, and so are effectively open circuits.

During the succeeding negative going half-cycle of the carrier voltage, the situation is reversed, CR1 and CR2 being cut off, and CR3, CR4, fully conducting. This is illustrated in Fig. 10(b).

Now considering Figs. 10(a) and 10(b) together, it will be seen that, as far as the modulating signal is concerned, there

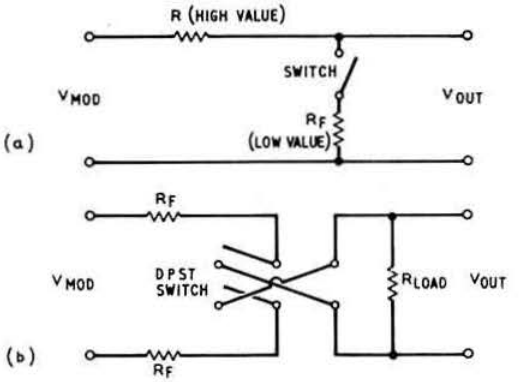

Fig. 11. (a) The Cowan bridge modulator equivalent circuit. (b) The full-wave bridge ring modulator equivalent circuit.

are two low value resistors in circuit all the time, and the current flowing through the primary winding of the output transformer due to the modulating voltage is having its direction of flow repetitively reversed by the switching action of the diodes, the repetition rate being equal to the carrier frequency. The r.f. carrier acts solely as a switching voltage, and does not appear across the output terminals. This is because the oppposing currents at the carrier frequency in each half of the output transformer cancel.

When no r.f. carrier is applied to the circuit, the modulating voltage can cause currents to flow through diodes CR1 and CR3 or CR2 and CR4, depending upon the polarity. This produces almost a short circuit across the secondary winding of the input transformer, and thus no modulating signal can appear at the output.

Fig. 11 shows the final equivalent circuit of both the Cowan and the full-wave bridge ring modulators, and upon the basis that the switches are completely free from inertia, these circuits are truly representative of the action of these modulators.

The effect of applying the modulating signal is shown in Fig. 12. The resultant output voltage appearing across the load resistor R_L takes the form of a signal at carrier frequency amplitude modulated by the low frequency modulating signal. This is similar in appearance to a 100 per cent amplitude modulated carrier, but with one very important difference.

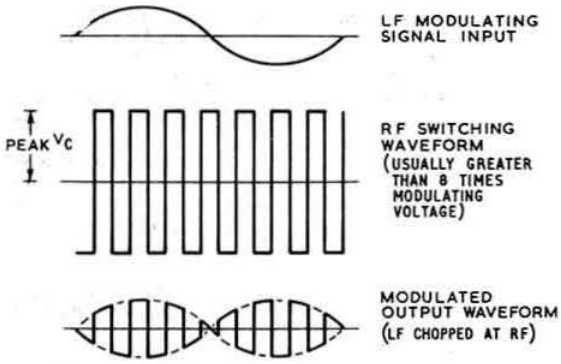

Fig. 12. The effect of the switching waveform on a modulating signal in a full-wave bridge ring modulator.

If the " waist " region of the modulation envelope was expanded, it would be found that the r.f. signal undergoes a 180° phase change at this point (Fig. 13(a)). This, of course, does not happen under the standard a.m. conditions (Fig. 13(b)) referred to in the previous paragraph. It is this phase change which accounts for the r.f. carrier suppression in the bridge ring modulator output, or, more correctly, the absence of the carrier accounts for this phase change. This may

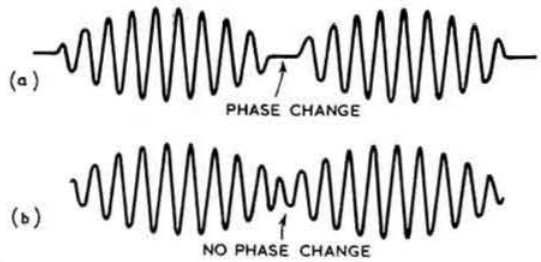

Fig. 13. (a) The output of a full-wave bridge ring modulator showing the phase change of the r.f. carrier at the " waist " of the modulation (b) A normal a.m. envelope with no phase change at the " waist."

explain to readers why two waveforms which look identical in text-books behave so very differently

The switching waveform is still a square wave train as in the Cowan modulator, but differs in that it swings equally above and below zero. The average value of such a waveform is zero, and it can be shown that the absence of an average (d.c.) value for this waveform is the reason why no component of the modulating frequency is present in the output of this type of modulator.

The output voltage due to the modulating signal is effectively switched in magnitude from *plus* $V_m \times \left(\frac{R_L}{R_L + 2R_f}\right)$ to *minus* $V_m \times \left(\frac{R_L}{R_L + 2R_f}\right)$ due to the switched current reversals, and the potential dividing action of the two diode

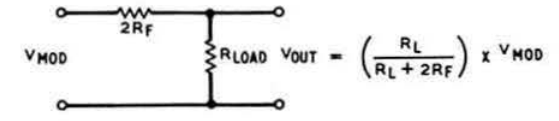

Fig. 14. The potential divider action of a full-wave bridge ring modulator.

forward resistances in series with the load resistor R_L (Fig. 14).

From this it will be appreciated that by making the load resistor R_L large compared to the diode forward resistance the overall efficiency is increased. In fact, if R_L is made large enough, the switching action formula $\frac{R_L}{R_L + 2R_f}$ approaches unity, and the overall efficiency can be of the order of 60 per cent, which is very high.

When the circuit is functioning correctly, the magnitude of the output voltage is directly related to that of the modulating signal, and independent of the carrier level. Ideally, the output signal contains no components at either the modulating or the carrier frequency. The output is the upper and lower sidebands of the fundamental carrier, plus a series of pairs of sidebands of the odd order harmonics of the carrier frequency, the amplitude of which are related to the order of the harmonic and the amplitude of the original modulating signal.

Provided that R_L is made large enough, the magnitude of the fundamental sidebands will be $2/\pi$ times that of the modulating signal V_m; the third harmonic sidebands $\frac{2}{3\pi}$ times V_m, etc.

Half-Wave Bridge Ring Modulator

This particular form of bridge modulator has found much favour amongst radio amateurs in recent years, and is

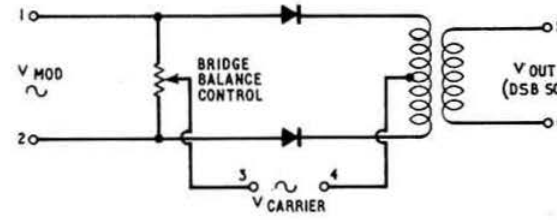

Fig. 15. The half-wave bridge ring modulator.

shown in Fig. 15. Its popularity is probably accounted for by the fact that it uses only two diodes.

Applying similar consideration as for the other two types shows that this modulator would, ideally, give the same outputs as the Cowan bridge modulator, including the component at the modulating frequency, and similar levels for the same level of modulating signal.

Conclusion

The full-wave bridge modulator excels the Cowan and half-wave ring modulators in three ways: (i) the efficiency is twice as high—put another way, for a given level of modulating signal, the output components are twice as large; (ii) no modulating signal appears at the output; (iii) the signals are transposable.

If there is a moral to this tale, then it must be that if you have ample modulation and r.f. signals, and are not concerned about the presence of modulating signals in the output—which applies when using r.f. carrier and l.f. modulation—then by all means use the half-wave bridge modulator. However, if you do want a pure signal, your choice will be the full-wave bridge ring modulator—despite its additional complications.

Incidentally, there is yet another modulating system using the physical phenomenon known as the " Hall Effect." This system is simple and provides double sideband suppressed carrier *without* the harmonic sidebands, but these devices are expensive. Anyway, this is quite another story. . . .

Single Sideband

By G. R. B. THORNLEY, G2DAF*

TWO very interesting items of amateur equipment have recently been released by the American Heathkit Company and are now available in the UK from Daystrom Ltd., Gloucester. These are the SB-400 single sideband transmitter and the SB-300 amateur band receiver. Without any doubt, these are the most elaborate amateur kits that have ever been offered, are up-to-date sophisticated designs, include many circuit developments now accepted as the best in s.s.b. engineering practice, and are available at a relatively modest cost.

The Heathkit SB-400 transmitter

The SB-400 is a 180 watt p.e.p. input sideband, or 170 watt c.w. input, transmitter covering the five amateur bands from 80 to 10m, complete with all the necessary crystals and a built-in power supply. All this is contained in a very compact table cabinet, with similar styling to the well known Collins "S" Line equipment, 14⅞ in. wide, 13⅜ in. deep and 6⅝ in. high, with a total weight of 26½ lb.

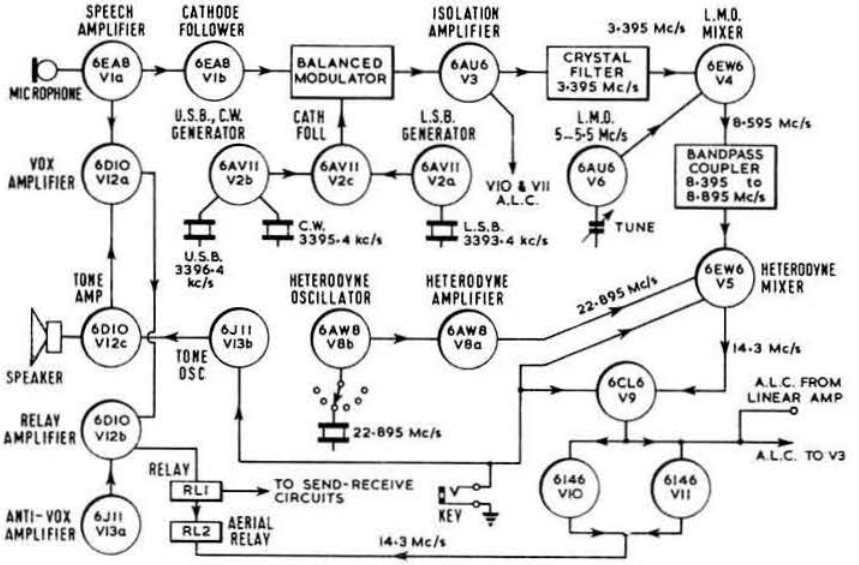

Fig. 1. Block diagram of the SB-400 transmitter.

A block diagram of the transmitter is shown in Fig. 1. Input from the microphone is fed into the audio amplifier V1a and the output from this stage is coupled into the cathode follower V1b. Two types of operation are provided for in the s.s.b. position; either push-to-talk, or VOX (voice-operated control). Part of the microphone input is fed to V12a, the VOX amplifier, and its output is fed to V12b, the relay amplifier.

A triple-triode, V2, with two of its sections serving as crystal-controlled oscillator, is used to produce the upper and lower sideband carriers or the c.w. carrier. The remaining section of the valve is used as a cathode follower and its output is fed to the diode balanced modulator. Output from the balanced modulator at approximately 3395 kc/s goes through the balanced modulator transformer to an isolation amplifier, V3, which serves to isolate the balanced modulator from the crystal filter and also provides correct impedance matching to the filter. This valve is also used to provide a.l.c. action for the transmitter.

The filter is a 2·1 kc/s wide crystal lattice designed to pass the upper sideband signal at 3396·4 kc/s, the lower sideband at 3394·4 kc/s, and the c.w. carrier at 3395·4 kc/s. Output from the filter and the linear master oscillator (l.m.o.), which can be considered the heart of the SB-400, is fed to V4. This master oscillator operates over a frequency range of 5 to 5·5 Mc/s, and one revolution of the l.m.o. dial covers 100 kc/s. With a knob reduction drive ratio of 4 to 1, this represents a bandspread of approximately 10 ft. per megacycle. The 500 kc/s coverage applies to each band with one setting of the band-switch, with the exception of 10m where the band 28·0 to 30·0 Mc/s is covered in four steps.

Output from V4, the l.m.o. mixer, provides a coverage from 8·395 to 8·895 Mc/s. V8 is the heterodyne oscillator and oscillator amplifier. The oscillator is crystal controlled using a total of eight crystals to cover the frequency range of the transmitter. Output from this oscillator is fed to the heterodyne mixer, V5, together with the output from the l.m.o. mixer V4. These two signals mix to produce the desired output signal which is fed to the driver stage, a 6CL6 valve. This in turn drives the pair of 6146 valves in the final-amplifier stage, operating in class AB1 with a fixed bias supply of 50 volts which limits the zero-signal anode current to 50mA. The peak driving voltage on c.w. is continuously variable, controlled by a level control. This is also used to adjust the level in either of the sidebands modes. The anode circuit of the 6146s is a conventional pi-tank network designed to work into a 50 ohm load with a range up to 150 ohms.

When operating on single sideband the a.l.c. circuit is connected to the isolation amplifier V3. Whenever the grids of the final amplifier start to draw grid current, a rectified d.c. voltage is fed back to the grid of the isolation amplifier reducing the output of the stage. This limiting prevents the 6146s from being overdriven.

The power supply of 750 volts for the 6146s, 250 volts for the low-voltage stages, and negative 150 volts for biasing uses silicon rectifiers. The l.m.o. and the heterodyne oscillator are operated with a regulated supply of 150 volts to their anodes and screens. A switched panel meter is arranged to read the amplifier anode voltage, grid and anode current, in addition to a.l.c. voltage and the relative r.f. output.

For c.w. operation one of the features of the SB-400 is a side-tone oscillator. V13B is the tone oscillator with V12c as the side-tone amplifier. The tone oscillator generates an audio tone of 1000 cycles, which performs two functions. It is used to key the VOX amplifier, permitting break-in operation, and the tone is also fed to the receiver speaker to enable the operator to monitor his sending.

For those amateurs who own the SB-300 receiver, the receiver and SB-400 can be used together as a transceiver. In this arrangement the receiver l.m.o. is used as the frequency determining element.

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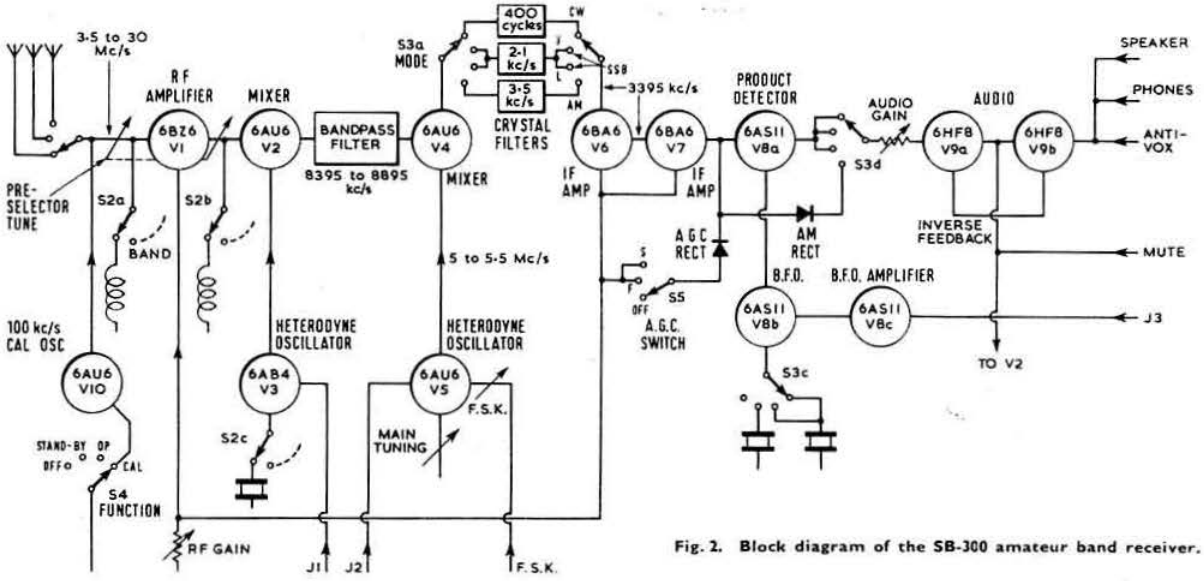


Fig. 2. Block diagram of the SB-300 amateur band receiver.

The Heathkit SB-300 Receiver

Following a trend that has become established within the last few years, Heath provide a crystal-controlled front-end and also a crystal-controlled b.f.o. The receiver is styled to match the SB-400, the cabinet size being 14⅞ in. wide, 13⅜ in. deep, 6¾ in. high, and the total weight is 17 lb.

A block diagram of the SB-300 is shown in Fig. 2, and it will be seen that V1, V2 and V3 form a band-switched crystal-controlled converter which translates signals in the amateur bands to a broad first i.f. centered on 8645 kc/s. Both the r.f. amplifier V1 and the mixer V2 have tunable input circuits, the tuning capacitors being ganged to a panel control and used in much the same way as the conventional aerial trimmer. The bandswitch selects the correct coil and conversion-oscillator crystals for the band in use.

S1 is an internal switch connected to three jacks on the rear chassis apron. This switch permits feeding to the r.f. amplifier a choice of three aerials, or three external converters covering frequencies outside the range of the receiver. Not shown in the diagram are two additional sections of this switch which feed the anode and heater voltages to an auxiliary outlet for external converter use. A.g.c. voltage is also available at one terminal of this outlet; this enables two external converters to be plugged permanently into the jacks provided, and switched into operation as required. This leaves one position of the switch for returning to the aerial for normal reception.

The first mixer feeds into an anode circuit in the form of a bandpass filter which accepts all frequencies in the range 8395 kc/s to 8895 kc/s and sharply attenuates all frequencies outside this range. The tuning range of the receiver on each band is therefore 500 kc/s, and this is adequate to cover all bands other than 10m. This band is divided into four segments to give a total coverage of 28 to 30 Mc/s.

The output of the bandpass filter feeds into the second mixer, V4, whose heterodyning input is provided by the tunable oscillator, V5, covering a range of 5 to 5·5 Mc/s. Thus tunable oscillator is controlled by the calibrated tuning dial and to ensure that this unit will operate as designed it is supplied as a pre-assembled unit in a sealed box.

Output from the second mixer is fed into a two-stage 3395 kc/s amplifier V6 and V7. The required single sideband selectivity is obtained by switched crystal filters at the input of the i.f. amplifier. Three filters are available from the mode switch but only the 2·1 kc/s wide filter is supplied with the kit. The other two filters, 3·5 kc/s wide at 6db down and 400 cycles wide at 6db down are available as accessories for additional a.m. or c.w. reception.

The i.f. amplifier is fed into a crystal diode detector, a product detector V8a and a crystal diode circuit for the a.g.c. voltage. The mode switch feeds the output of the diode detector to the audio amplifier in the a.m. position and the product detector into the audio channel for s.s.b. or c.w. positions. A 6AS11 (dual triode and pentode in a single Compactron envelope) performs the functions of product detector V8a, b.f.o. V8b, and b.f.o. amplifier V8c. The b.f.o. is crystal controlled and the mode switch selects the correct crystal for upper or lower sideband, or disables the b.f.o. for a.m. reception.

A.g.c. is applied to the two i.f. stages and the r.f. stage with short or long release characteristics selected by the panel control. There is also a manual r.f. gain control.

The audio amplifier consists of a 6HF8 valve V9a, with the triode section driving the pentode section, V9b, with inverse feedback and the audio output power is rated at 1 watt. There are windings for both speaker and headphones on the audio output transformer and there is provision to mute the speaker when headphones are plugged into the headphone jack on the front panel.

The power supply comprises full-wave silicon rectifiers and a resistance-capacitance filter providing 150 volts for anodes and screens. A half-wave silicon rectifier operating from the common mains transformer provides up to 60 volts of negative bias for r.f. gain control and for receiver muting.

There is also provision for transceiver operation with a compatible transmitter by feeding signals from the heterodyne oscillator of the first converter, the variable oscillator of the second converter and an amplified signal from the b.f.o. to output jacks at the rear of the chassis. Provision is also made for frequency shift keying of the v.f.o. during this application. The frequency is shifted by keying a biasing voltage to a diode switch built into the oscillator unit, and the amount of shift is adjustable by a pre-set control.

(*Continued on page 326*)

Valve Equivalents

Receiving Types

Valve Type	Equivalents	CV No.
B36	12SN7GT	925
B65	6SN7GT, 13D2	1988
B109	UCC85, 10LI4	—
B152	ECC81, B309, 12AT7	455
B309	ECC81, B152, 12AT7	455
B319	PCC84, 7AN7, 30LI	5192
B329	ECC82, 12AU7	491
B339	ECC83, 12AX7, 6LI3	492
B719	ECC85, 6AQ8, 6LI2	—
D77	EB91, DD6, 6D2, 6AL5, D152	283
D152	EB91, D77, DD6, 6D2, 6AL5	283
DD6	EB91, D77, D152, 6D2, 6AL5	283
DH77	EBC90, 6AT6	452
DH109	UABC80, 10LD12	—
DH719	EABC80, 6LD12, 6AK8, 6T8	—
DP61	EF95, 6AK5	850
EA50	SD61, 6D1	375/1092
EABC80	DH719, 6AK8, 6LD12, 6T8	—
EBC33	DH63, DH147, OM4	1055
EBC41	DH150, 6CV7, 6LD3, 62DDT	3882
EBC81	6BD7A, 6LD13	—
EBC90	6AT6, DH77	452
EBC91	6AV6	—
EBF80	ZD152, 6N8, WD709	—
EC90	6C4, L77	133
EC91	6L34, 6AQ4	417
ECC35	6SL7GT	569
ECC81	B309, 12AT7, B152	455
ECC82	B329, 12AU7	491
ECC83	B339, 6L13, 12AX7	492
ECC84	6CW7, 6L16	—
ECC85	B719, 6AQ8, 6LI2	—
ECC88	6DJ8	—
ECC91	6J6	858
ECF80	6BL8, 6CI6	5215
ECF82	6U8	5065
ECH81	X719, 6AJ8, 6CI2	2128
ECH83	6DS8	—
ECL80	LN152, 6AB8, 63TP	—
ECL82	6BM8	—
EF80	Z719, 6BX6, 64SPT, Z152	1376
EF85	W719, 6BY7, 6F19	1375
EF86	Z729, 6F22, 6267	2901
EF89	6DA6	5156
EF91	SP6, Z77, 6AM6, 8D3, 6F12	138
EF92	VP6, W77, 6CQ6, 9D6, 6F21	131
EF93	6BA6, W727	454
EF94	6AU6	—
EF95	6AK5, DP61	850
EF97	6ES6	—
EF183	6EH7	—
EF184	6EJ7	—
EK90	X77, X727, 6BE6	453
EL34	6CA7	1741
EL37	KT66	586
EL84	N709, 6BQ5, 6F15	2975
EL90	N727, 6AQ5	1862
EL91	N77, 6AM5, NI44	136
EL95	6DL5	—
EL821	6CH6, ZD10	2127
EM80	6BR5, 65ME	1352
EY51	R12, SU61, U43, 6X2, U151	427
EZ40	6BT4, U150, UU9, 66KU, U718	3891
EZ80	6V4	1535
EZ81	U709, 6CA4, UU12	5072

Valve Type	Equivalents	CV No.
EZ90	U78, 6X4	493
GZ30	R52, 5Z4GT	2748
GZ32	54KU	593
GZ37	53KU, U54	378
HBC90	12AT6	—
HBC91	12AV6	—
KT63	6F6G	1911
KT66	EL37	586
L63	6J5G	—
L77	EC90, 6C4	133
LN119	UCL82, 10PL12, 50BM8	—
LN152	ECL80, 6AB8, 63TP	—
LN309	PCL83	5144
LN319	30PLI, 13GC8	—
LZ319	PCF80, 9A8, 30C1, LZ329, 8A8	—
LZ329	PCF80, 9A8, 30C1, LZ319, 8A8	—
N77	EL91, 6AM5, N144, 6P17, 7D9	136
N119	UL84, 10P18, 45B5	—
N144	EL91, 6AM5, N77, 6P17, 7D9	136
N145	10P13, N118	—
N147	EL33, OM9, 6AG6G	2938
N152	PL81, N359, 21A6	5077
N153	PL83, N309, 15A6	—
N154	PL82, N329, 16A5, 30P16	—
N309	N153, PL83, 15A6	—
N329	N154, PL82, 16A5, 30P16	—
N359	N152, PL81, 21A6	5077
PCF80	9A8, LZ319, 30C1, LZ329, 8A8	—
PCF82	9U8	—
PCL83	LN309	5144
PCL84	15DQ8	—
PCL85	18GV8	—
PL36	25E5	—
PL81	N152, N359, 21A6	5077
PL82	N154, N329, 16A5, 30P16	—
PL83	N153, N309, 15A6	—
PL84	N379, 30P18, 15CW5	—
PY32	U291	—
PY80	U152, 19X3	—
PY82	U154, U192, U319, 19SU, 19Y3	—
R12	SU61, U43, 6X2, U151	426
R20	U26, 2JZ, U49	—
R52	GZ30, 5Z4GT	2748
SP6	EF91, 6AM6, 8D3, 6F12, Z77	138
SU61	EY51, R12, 6X2, U151, U43	426
U26	R20, 2JZ, U49	—
U43	SU61, EY51, 6X2, U151, R12	426
U49	U26, R20, 2JZ	—
U54	GZ37, 53KU	378
U78	EZ90, 6X4	493
U151	U43, EY51, R12, U43, 6X2	426
U154	PY82, 19SU, 19Y3, U319, U192	—
U192	PY82, 19SU, 19Y3, U319, U154	—
U709	EZ81, UU12, 6CA4	5072
U718	UU9, 66KU, U150, 6BT4	3891
UBF89	WD119, 19FL8, 10FD12	—
UCC85	B109, 10LI4	—
V2M70	6X4, EZ90, U78	493
VP6	EF92, W77, 9D6, 6F21, 6CQ6	131
W77	EF92, VP6, 9D6, 6F21, 6CQ6	131
W719	EF85, 6BY7, 6F19	1375
W727	6BA6, EF93	454
WD709	EBF80, ZD152, 6N8	—
X77	X727, 6BE6, EK90	453
X719	ECH81, 6AJ8, 6CI2	—

Valve Type	Equivalents	CV No.
X727	EK90, 6BE6	453
Z77	EF91, SP6, 6AM6, 6F12, 8D3	138
Z152	EF80, Z719, 6BX6, 64SPT	1376
Z719	EF80, Z152, 6BX6, 64SPT	1376
Z729	EF86, 6F22, 6267	2901
ZD152	EBF80, 6N8, WD709	—
2JZ	U26, R20, U49	—
5U4G	U52, GZ31	575
5Y3GT	U50	1854
5Z4GT	GZ30, R52	2748
6AB8	ECL80, LN152, 63TP	—
6AJ8	ECH81, X719, 6C12	2128
6AK5	EF95, DP61, E95F	850
6AK8	EABC80, DH719, 6LD12, 6T8	—
6AL5	EB91, DD6, D77, D152, 6D2	283
6AM5	EL91, N77, N144, 7D9	136
6AM6	EF91, SP6, Z77, 6F12, 8D3	138
6AQ5	EL90, N727, PM04	1862
6AQ8	ECC85, B719, 6LI2	—
6AT6	EBC90, DH77	452
6AU6	EF94	2524
6AV6	EBC91	2526
6BA6	EF93, W727	454
6BE6	EK90, X727	453
6BD7A	EBC81, 6LD13	—
6BL8	ECF80, 6C18	—
6BM8	ECL82, 6PL12	—
6BN5	EL85	3526
6BQ5	EL84, N709, 6P15	2975
6BR5	EM80, 65ME	1352
6BT4	EZ40, UU9, 66KU, U150	3891
6BY7	EF85, 6F19, W719, 6F26	1375
6BZ6	6F22, EF92*	131
6C4	EC90, L77	133
6C12	6AJ8, X719, ECH81	2128
6C18	6BL8, ECF80	—
6CA4	EZ81, UU12, U709	5072
6CA7	EL34	1741
6CQ6	EF92, W77, 6F21, 9D6	131
6CW7	ECC84, 6L16	—
6D2	EB91, DD6, 6AL5, D152, D77	140
6EH7	EF183	—
6EJ7	EF184	—
6F6G	KT63	1911
6F12	EF91, Z77, 6AM6, SP6, 8D3	138
6F19	EF85, W719, 6BY7	1375
6F21	W77, VP6, EF92, 6CQ6, 9D6	131
6F22	EF86, Z729, 6267	2901
6J6	ECC91, T2M05	858
6L6G	EL37, KT66, PP60	1741
6LI2	B719, ECC85, 6AQ8	—
6LI3	ECC83, B339, 12AX7	492
6L16	ECC84	—
6L34	EC91	417
6LD12	EABC80, DH719, 6AK8, 6T8	—
6LD13	EBC81, 6BD7A	—
6N8	EBF80, ZD152, WD709	—
6P15	EL84, 6BQ5, N709	2975
6T8	EABC80, 6AK8, DH719, 6LD12	—
6U8	ECF82	5065
6V4	EZ80	1535
6X2	R12, SU61, EY51, U43	426
6X4	U78, EZ90, 6Z31, V2M70	427
6X5G/GT	EZ35, U70	574
7AN7	B319, PCC84, 30LI	—
7D9	6AM5, N77, EL91, N144	136
8A8	LZ319, LZ329, PCF80, 9A8, 30C1	—
8D3	SP6, Z77, EF91, 6F12, 6AM6	138

* Near equivalent

Valve Type	Equivalents	CV No.
9A8	8A8, LZ319, LZ329, PCF80, 30C1	—
9AQ8	PCC85	—
9D6	W77, EF92, VP6, 6CQ6, 6F21	131
9U8	PCF82	—
10FD12	UBF89, WD119, 19FL8	—
10L14	UCC85, B109	—
10P13	N145	1977
10P18	N119, UL84, 45B5	—
12AT6	HBC90	—
12AT7	ECC81, B152, B309, E81CC	455
12AU7	ECC82, B329, E82CC	491
12AV6	HBC91	—
12AX7	ECC83, B339, 6L13, E283CC	492
12BA6	HF93	1928
12BE6	HK90	—
12BH7	6463 (Mullard)	—
12BY7	EL822	2882
15A6	N309, PL83, N153	—
15AQ8	PCL84	—
15CW5	PL84, 30P18, N379	—
16A5	30P16, N329, N152, PL82	—
18GV8	PCL85	—
19FL8	UBF89, 10FD12, WD119	—
19SU	19Y3, PY82, U154, U319	—
19X3	PY80, U152	—
19Y3	PY82, U154, U319, 19SU	—
21A6	PL81, N339, N152	5077
25E5	PL36	—
30C1	PCF80, LZ319, 8A8, 9A8, LZ329	—
30L1	PCC84, 7AN7, B319	5192
30P16	N154, N329, PL82, 16A5	—
30P18	PL84, 15CW5, N379	—
45B5	UL84, N119, 10P18	—
50BM8	LN119, UCL82, 10PL12	—
53KU	GZ37, U54	378
62DDT	EBC41, DH150, 6CV7, 6LD3	3882
63TP	ECL80, 6AB8	—
64SPT	EF80, Z719, 6BX6, Z152	—
66KU	EZ40, N150, U718, 6BT4	—

Transmitting and Special Types

A1834	6AS7G*	—
AH201	866A, GU12, RG3-250A, ESU866	32
AX224	GXU1, 3B28, RR3-250A, ESU103	1835
AX9903	QQV06-40A, TT25, QQE06-40A, C178, 5894	2797
AX9910	QQU03-20A, TT20, QQE03-20	2799
C143	813, QY2-100	26
C144	829B, P2-40B, QQV07-40	2666
C178	QQV06-40A, TT25, QQE06-40A, AX9903, 6850	2797
C180	QQV04-15, 832	788
DA41	TZ40	1076
DET12	4304, 834, TY1-50	315
DET18	35T	419/668
DET19	RK34	18
DET22	TD03-10, EC55, R243, 5861	273
DET23	TD03-5	354
DET24	TD04-20	397
E88CC	6922	2492
E95F	6AK5, EF95, DP61, 731A, 403A/B	850
E180F	5A/170K, 6688	3998
E283CC	—	4004
ESU103	3B28, GXU1, RR3-250A, AX224	1835
ESU866	GU12, 866A, AH201, RG3-250A	32
G105/1D	QS1206, OC3, KD24, VR105/30, 150C3	686
G108/1K	QS1208, OB2, HD52, 108C1	1833
G150/4K	QS1207, OA2, GD150M/S, 150C4	1832
GD100A/S	QS92/10, 7475	188

Valve Type	Equivalents	CV No.
GD150M/S	G150/4K, QS1207, OA2, 150C4	1832
GD150A/S	OD3, QS150/40, VR150/30, KD25, 150C3	216
GTR95M/S	QS95/10, 95A1	286
GTR120A	S130P	45
GTR75M	QS75/20, 75B1	284
GU12	866A, AH201, ESU866, RG3-250A	32
GXU1	3B28, AX224, ESU103, RR3-250A	1835
HD52	QS1208, G108/1K, OB2, 108C1	1833
KD21	OA3, 75CP, QS75/40, VR75/30	3798
KD24	QS1206, OC3, G105/1D, VR105/30, 150C3	686
KD25	OD3, QS150/40, VR150/30, 150C3, GD150A/S	216
M8223	OA2WA, QS1210	4020
M8224	OB2WA, QS1211	4028
ML381	2C39A, 3X100A11, TD1-100A	2516
P2-40B	829B, C144, QQV07-40	2666
QE06-50	807, 5B/250A, QV05-25	124
QE05-40	6146, QV06-20	3523
QQE03-12	6360, QQV03-10, TT24, 11E13	2798
QQE02-5	6939, QQV02-6, TT23	2466
QQE03-20	6850, QQV03-20A, TT20, AX9910	2799
QQV04-20	815	2663
QQV07-40	829B, C144, P2-40B	2666
QQV04-15	832A, C180	788
QQV03-10	6360, QQE03-12, TT24, 11E13	2798
QQV03-20A	6360, QQE03-20, TT20	2799
QQV02-6	6939, QQE02-6, TT23	2466
QS75/20	75B1, GTR75M	284
QS75/40	OA3, 75C1, VR75/30, KD21	3798
QS83/3	85A2, QS1209	449
QS92/10	7475, GD100A/S	188
QS95/10	95A1, GTR95M/S	286
QS150/40	OD3, 150C3, VR150/30, KD25, GD150A/S	216
QS1206	OC3, VR105/30, KD24, G105/1D	686
QS1207	OA2, 150C4, G150/4K, GD150M/S	1832
QS1208	OB2, 108C1, G108/1K, HD52	1833
QS1209	85A2, QS83/3	449
QS1210	OA2WA, M8223	4020
QS1211	OB2WA, M8224	4028
QV05-10	2E26	3990
QV05-25	807, 5B/250A, QE06-50	124
QV06-20	6146, QE05/40	3523
QV1-150A	4X150A, 7034	2519
QV1-150D	4X150D, 7035	3991
QV2-250B	4X250B	2487
QY2-100	813, C143	26
QY3-65	4-65A	2130
QY3-125	4-125A, RS685	1905
R243	DET22, EC55, TD03-10, 5861	273
RG3-250A	866A, GU12, AH201, ESU866	32
RK34	DET19	18
RR3-250A	3B28, GXU1, AX224, ESU103	1835
S130P	GTR120A	45
TT20	6850, QQV03-20A, QQE03-20, AX9910	2799
TT21	7623	—
TT22	7624	—
TT23	6939, QQE02-5, QQV02-6	2466
TT24	6360, QQE03-12, QQV03-10, 11E13	2798
TT25	5894, QQE06-40, QQV06-40A, AX9903, C178	2797
TD03-5	DET23, TD03-5	354
TD03-10	DET22, TD03-10, EC55, R243	273
TD04-20	DET24, TD04-20	397
TD1-100A	2C39A	2516
TY1-50	DET12, 4304, 834	315
TZ40	DA41	1076
VR75/30	OA3, 75C1, QS75/40, KD21	3798
VR105/30	OC3, QS1206, KD24, G105/1D	686
VR150/30	OD3, 150C3, QS150/40, KD25, GD150A/S	216

Valve Type	Equivalents	CV No.
OA2	150C4, QS1207, G150/4K, GD150M/S	1832
OA2WA	M8223, QS1210	4020
OA3	75C1, QS75/40, VR75/30, KD21	3798
OB2	108C1, QS1208, G108/1K, HD52	1833
OB2WA	M8224, QS1211	4028
OC3	QS126, VR105/30, KD24, G105/1D	686
OD3	QS150/40, VR150/30, KD25, 150C3, GD150A/S	216
2C39A	TD1-100A, 3X100A11, 3H/150J, ML381	2516
2D21	PL21, 20A3, EN91, 4G/280K	797
2E26	QV05-10	3990
3B28	GXU1, ESU103, AX224, RR3-250A	1835
3H/150J	2C39A, TD1-100A, 3X100A11, ML381	2516
3X100A11	2C39A, TD1-100A, 3H/150J, ML381	2516
4-65A	QY3-65	1905
4-125A	QY3-125, RS685, TT16D	2130
4G/280K	2D21, PL21, 20A3, EN91	797
4X150A	QV1-150A, 7034	2519
4X150D	QV1-150D, 7035	3991
4X250B	QV2-250B	2487
5A/170K	E180F, 6688	3998
5B/250A	807, QV05-25, QE06-50	124
6AS7G	A1834*	—
11E13	6360, TT24, QQE03-12, QQVO3-10	2798
35T	DET18	419-668
75B1	QS75/20, GTR75M	284
75C1	OA3, QS75/40, VR75/30, KD21	3798
85A2	QS83/3, QS1209	449
95A1	QS95/10, GTR95M/S	286
108C1	OB2, QS1208, G108/1K, HD52	1833
150C3	OD3, QS150/40, VR150/30, KD25, GD150A/S	216
150C4	OA2, QS1207, G150/4K, GD150M/S	1832
403A/B	6AK5, EF95, DP61, 731A, E95F	850
417A	5842	—
731A	6AK5, EF95, DP61, 403A/B, E95F	850
807	QV05-25, 5B/250A, QE06-50	124
813	QY2-100, C143	26
829B	QQV07-40, C144, P2-40B	2666
832A	QQV04-15, C180	788
834	DET12, 4304, TY1-50	315
866A	GU12, AH201, ESU866, RG3-250A	32
4304	DET12, 834, TY1-50	315
5763	QV03-12	2129
5842	417A	3789
5861	DET22, EC55, TD03-10, R243	273
5894	QQV06-40A, TT25, AX9903, C178, QQE06-40	2797
6080	ECC230	2984
6146	QV06-20, QE05/40	3523
6267	EF86, Z729, 6F22	2901
6360	QQV03-10, TT24, 11E13, QQE03-12	2798
6688	E180F, 5A/170K	3998
6850	QQV03-20A, TT20, AX9910, QQE03-20	2799
6922	E88CC	2492
6939	QQV02-6, TT23	2466
7034	4X150A, QV1-150A	2519
7035	4X150D, QV1-150D	3991
7475	QS92/10, GD100A/S	188
7623	TT21	—
7624	TT22	—

Miniature Equivalents of Metal Octal Types

6SA7	6BE6	6H6	6AL5		
6SG7	6BA6	6SJ7	6AU6		
6X5	6X4	6SK7	6BD6		
6V6	6AQ5	6SR7	6BF6		
6Q7	6AQ6				

* Near equivalent.

Maldivian Memories of BERU

By BOB MILTON, VS9MG (9M4LX, 9M6LX, VS5LX, ZC5AJ, VS1LX, GM3OEV, ZB2N)

AT 4.45 a.m. local time a large Service Policeman shone a searchlight into my weary eyes and requested a signature for the early call which was to get me away to a good start, but first I had to ride about one and half miles down to the other end of the Island to the shack where for the past few days I had been frantically trimming the aerial systems to give me a low s.w.r. on the low end of each band. Previous conversations with 9M4LP had informed me that I was going to get some stiff opposition from that direction but despite my belief that the QTH was worth a few points to me I had made sure that every drop of r.f. from my KWM2 was going to be radiated where I wanted it. As it proved the effort was well worth while. So then on with the fray. A quick look at 20 and 15, not so good, so down to 40; Ah! that's better! Looks real good. Fired up the rig on 7007 by which time the early CQ BERUs were already well into their stride. A quick word with 9M2TS in Ipoh and G5RI was on to me like greased lightning for No. 2. So they kept coming VEs, Gs, 5N2, 9M2s and ZLs and for a moment I imagined I was up on 20. Kept this up at a leisurely pace until 00.50 and then decided to try 20 again, looking for a sigh dividend of VKs.

One quick VK and then 9M4LP was hammering at my ears. Noted with satisfaction I was 12 QSO's up already.

CR9AH decided he would like a report so got rid of him with a 569 and dived into a welter of DX-hungry VK's keeping up a good pace until Gus, AC5H, blasted me at 02.05 for a quickie. Back into the VK storm with the occasional VU and ZL to make up the number.

At about 03.00 the skip was shortening fast so started searching for a few bonus QSO's, but could only find VS9PGM, so at 03.30 went back to 40 and found more VUs than I ever dreamed existed with 9J2DT sticking out like a sore thumb. Whatever happened to 9M4LP?

Battled with requests for QSL information with the VUs until 04.30 but after taking another look at 20 decided that I'd forgo that cup of coffee and move up to 14,050 with the beam on VK land as the pickings looked good there, but business slackened quite soon until at 05.40 a look at 21 told me where 9M4LP was hiding.

A quick exchange told me that I'd increased my lead to 75 and VKs were coming at me fast and furious—wonderful! At 06.30 tried a bit of band hopping and at 07.12 found 9M4LP on 10m after a quick QSY from 15m in company with VK4LT. The lead had moved up to 90 and I downed a couple of quick coffee's to celebrate the flying start. Then came what was for me the best part of the contest—a QSY to 15m found Europe right in my lap with the Gs in numbers unthought of. Four hours solid work brought my total up to 201 and a wave of sympathy for Arthur Milne passed me by!

Back to 20 as I seemed to have worked all I could on 15 for the moment, and immediately got VQ8AI and ZD5R in quick succession. Wondered if the ZD5 was still in BERU but didn't argue. At 12.00 I took a breather from the Contest and moved up to 14,320 to Net Control the SEANET and had my usual natter with the gang until 12.20. Then back into the hunt for bonus QSO's until 13.00 when my stomach told me that it was time for grub stakes. A meal and one hour later the hunt was on again with Gs getting stronger all the time and an odd VE poking through the QRM. Six hours later still at it with score showing 305 decided that 40 might offer some more bonus QSO's but apart from the occasional Gs found the VKs in firm possession with 9JZW sharing the feast at 185. A close look uncovered the odd VK9 and VK0 and a lone VS6 who didn't seem to be doing much business. Just as I was wondering where 9M4LP had got to my receiver erupted and I was delighted to find the lead up to 159. Left him there polishing off the VKs and was rewarded on 20 with VU2NRA who, although looking for DX obliged with a quick exchange, with JT1AD getting in on the act. Some VKs debating whether to chase the DX or carry on with the contest. Didn't stop to find out their intentions but cleared up a few new VKs and an AP5 who wanted to ragchew. I bet he is still wondering what it was all about. A quick look at 40 but only found four VUs in a round table and managed to get quick reports from them. Back to 20 and was immediately called by FB8WW—a new one for me and boy, that note!

Dozing a bit now but picked up a few strays who were not in the contest but only too happy to oblige with a contest number. Up to 15 and found it good but too many familiar calls. Took a short break for sleep and then back into the search for new ones. At 09.55 checked 20 and was horrified at the WSM Chirp Test QRM so scuttled back to 15 which was just as well as several new Gs were around, although European non-Contest stations were giving me a hard time. Did a quick QSY to 10 with VK6SM to put the score to 393. Back to 20 which was starting to get interesting as the odd Caribbean was heard through the QRM. At 17.50 decided that I'd run out on 20 so had a look at 80 to find 9M4LP again. Lead now 174 (426–252) but took time out for a chat with Bob and some refreshment.

Back to 20 as 80 didn't seem to hold much promise. Not much there either so 40 seemed a good bet: 2½ hours and 24 QSO's later I was groggy with the QRM and the slow progress, but 10, 15 and 20 had nothing to offer so decided on a final fling on 80. Progress was slow and the Ws seemed to be copying me well but they honoured my request to wait until after 00.01. At 23.55 VE1RB was the final QSO but there were a few loose Gs still audible.

Polished off the stateside DX and pulled the big switch happy with a trouble free contest. Bed, bath, etc., and a well earned sleep with my ears still ringing.

Comments

Operating:	Standard very good
QRM:	Passable, except for WSM
Propagation:	Perfect for me
Equipment:	Trouble free
Strongest G:	G3FPQ
Strongest African:	9J2DT
Strongest VK	VK6SM
Strongest Station:	Who else! 9M4LP

Finally, a wonderful BERU for me with everything going just right. Roll on 1966 (from ZB2N, I hope).

Claims for RSGB Certificates

Members are reminded that claims for RSGB Certificates should be sent direct to Headquarters. Claims are acknowledged on arrival and passed to the Honorary Certificates Manager for attention.

THE MONTH ON THE AIR

A CHRONICLE OF EVENTS ON THE HF AMATEUR BANDS

By M. E. BAZLEY, G3HDA*

BEFORE commencing this *Month on The Air*, I should like to pay tribute to Steve, **G2BVN** for the excellent coverage he has given to DX happenings in this column over the past five years. It is not the intention of G3HDA to alter or change *MOTA* but to try to reach the same high standard that G2BVN has set, and to achieve this end any DX news or information will be gratefully received.

News from Overseas

Ron Skelton, G3IHP and ex-VS4RS, expects to be active from Sarawak signing **9M8RS** at the end of April with activity mainly on 14 Mc/s s.s.b. and c.w. around 13.00. Ron's new address is listed in *QTH Corner*.

9J2RO, who is ex-G3EJS, is particularly anxious to make contact with stations in Devon and Surrey. John is active on 14 Mc/s c.w. around 18.00 using 90 watts to a Vee beam.

Ascension Island has been taken off a number of wanted lists, due to the large increase in the amateur population there. The island now boasts 17 licensed amateurs and the club station, **ZD8AR**, is capable of working on all bands from 2 to 80 metres.

The eighth **Jamboree-on-the-Air** will be held over the weekend of October 16-17, 1965. This year other youth organizations are invited to take part and a participation certificate will be issued to all who send in a report of activities. Further information may be had from The Boys Scouts World Bureau, 77 Metcalfe Street, Ottawa, Ontario, Canada.

G3ATH who has been signing /9M4 recently has been issued with the call **9M4MT** and will be on all bands, c.w. and s.s.b. using a KW2000 into an 8KW trap dipole. It is hoped to have a 14 Mc/s quad up in the near future.

MP4TBM, who is active on 14 Mc/s s.s.b. most days between 13.00 and 17.00, uses a NCX3 transceiver coupled with a Lafayette 600 watt p.e.p. linear. Aerials in use are dipoles for 20, 40 and 80 and also a ground plane for 20m. MP4TBM hopes to have some DXpedition activity in MP4M (**Muscat**) in the near future but is awaiting the necessary visa. Any one requiring a QSL will find the present address in *QTH Corner*.

Top Band News

The highlight this month is undoubtedly the contact that took place on March 22 at 06.30 between **G3PU** and **ZL3RB**. To contact a ZL on this band is no mean achievement but to make a QSO on a.m. is one of the best achievements in Top Band DX. The signals were RS35 from G3PU and RS36 from ZL3RB. Our congratulations to both operators on this fine achievement.

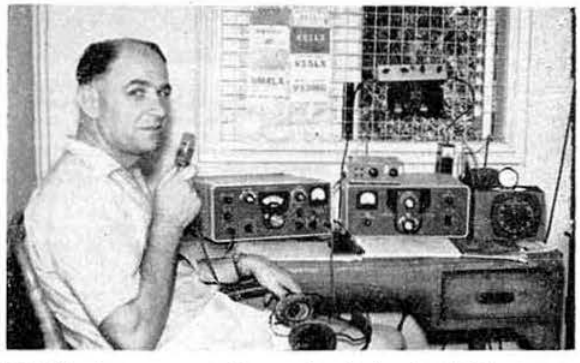
In a letter from **W1BB**, Stew once again asks that all stations who can possibly get on this band during the IQSY period should make every effort to do so. Special schedules for summer DX will be arranged and anyone who wishes to have further information may write to W1BB at 36 Pleasant Street, Winthrop, Mass.

Also from W1BB comes the following comments with reference to G participation in the *CQ* Top Band Contest. " G participation was good this year but not up to the level of 1964 and the reason being that in awakening Top Band DX interest we have been too successful. Up to three years ago only two or three stations were getting out well and once they had worked a W/VE then the second and third layer stations with the poorer antennas had a chance. Now there are at least 24 stations with good antennas and the boys with little space do not stand a chance. A lot have realized this and have lost interest in 160 DX chasing. It is suggested that next winter two well publicized ' First Time across moorings ' will be arranged when the ' big guns ' will be asked to stay off the band and the W stations will listen for new European contacts only."

Comments from readers would be appreciated and if sent to G3HDA will be forwarded to W1BB.

From **VO1FB** at St. John's, Newfoundland comes the following report on the First RSGB 1·8 Mc/s Contest: " Conditions were excellent with a low static level and G stations were heard from 21.00 onwards and worked from midnight until 05.30 the following morning. The following weekend during the second leg of the ARRL Contest G6BQ and G6VC were the only UK stations contacted. Just before conditions declined VO1FB was able to work two new countries in the shape of HI8XAL and VP2VL."

The Central Radio Club of Czechoslovakia in a letter to the RSGB gives the following information regarding stations using an OL prefix. Call-signs in the OL series are assigned to novice stations who up to now have only been allowed to contact other stations in their own country. In future OL stations who have held a licence for more than one year will



9M4LX, whose account of operation during the BERU Contest appears on page 314.

* Please send all reports and news items to RSGB Headquarters to arrive not later than **May 12** for the **June** issue, and **June 17** for the **July** issue.

be allowed to have contacts with stations in other countries. The only way to find out if a station has been licensed more than one year is to get a successful reply to your call!

DXpeditions

Gus, **W4BPD**, continues to be active from Bhutan using various prefixes, though not putting such a good signal into Europe as he had done on his previous travels there last year. Gus was signing AC8H and AC9H until April 11 when he was due to start operations from AC6H. Gus hopes to operate AC0H before moving on to AC3PT in the middle of May. Usual frequencies are being used: 14035, 065 and 110 kc/s. All QSL's should go via Hammarlund, Box 7388, New York, USA.

The International Amateur Radio Club will celebrate the 100th anniversary of the International Telecommunications Union on May 16 and 17 by having six stations operating simultaneously around the clock. The call-signs will be: 4U1, 4U2, 4U3, 4U4, 4U5 and 4U6ITU. Frequencies will be as follows: 1810 and 1830 kc/s, 3503 and 3797 kc/s, 7003 and 7045 kc/s, 14113 and 14292 kc/s, 21050 and 21400 kc/s and 28050 and 28625 kc.s.

In a letter to G3HDA, **ZL2GX** affirms that ZL3 operation from Chatham Island is a distinct possibility in the near future. All the gear is assembled and an experienced operator is willing to go as soon as transport is available. All QSL's will be handled by ZL2GX.

The rumour department is still circulating information regarding the possible trip by **XE1CY** to Clipperton Island. If this does take place it will be during the last week of April and the first two weeks of May.

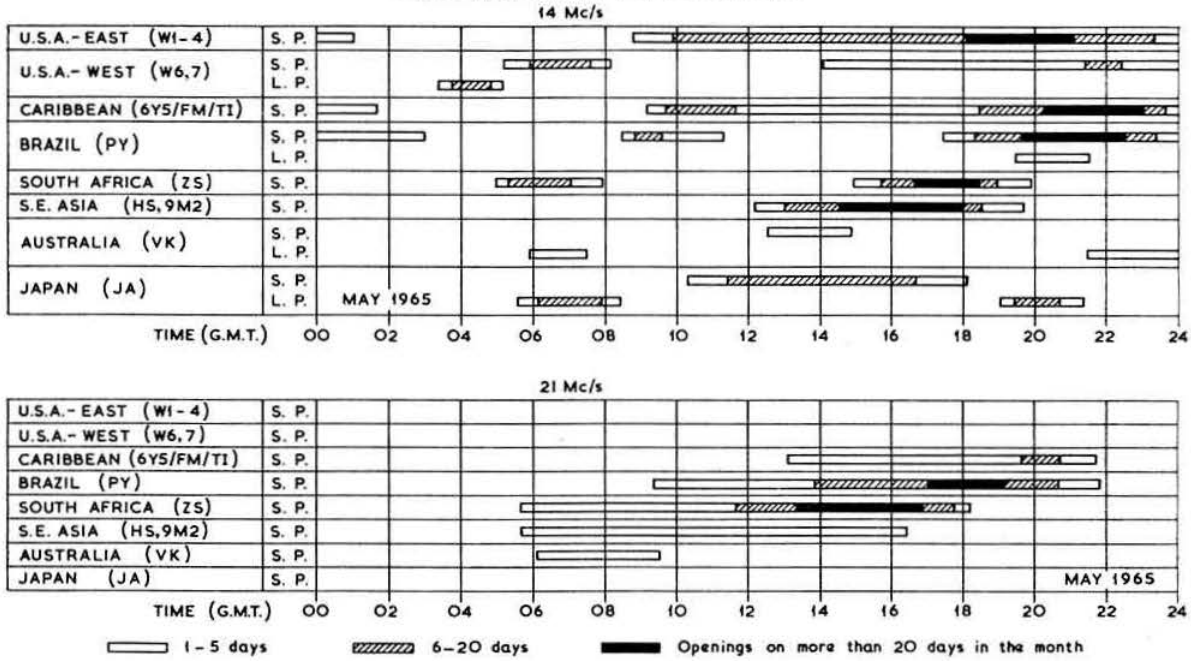
VK3AHO, Bill Hempel, ex-FW8BH, VK9BH and VR1N, is rumoured to be dxpediting FU8—land for Hammarlund in the near future.

A complete sideband station with a three element tri-band beam has been shipped to **CR5SP** who should now be active on 15 and 20m s.s.b. It is intended that this equipment will be used for DXpeditions in other adjacent areas later in the year.

Harvey Brain, **VQ9HB**, may possibly be on Agelega Island with 90 watts of c.w. at the beginning of May. Harvey has said that he would be willing to dxpedite to any island in the Indian Ocean provided transport and equipment were forthcoming.

Finally, to prove that a DXpeditioner's troubles are not over even when he returns home, George, ex-**CE0AG**, says

PROPAGATION PREDICTIONS



In the ionosphere summer conditions begin during May. The nights are relatively short, so that the night time F2 m.u.f's are relatively high compared to those of the winter. This leads mainly to an improvement in DX conditions on 14 Mc/s during the hours of darkness. The small increase in solar activity in recent months will not yet produce any noticeable improvement in propagation on the h.f. bands. Therefore 28 Mc/s will still be of little use for DX traffic, though short skip conditions will produce contacts over distances of 450 to 1100 miles on this band as well as on 21 Mc/s. On 21 Mc/s North America and Japan will no longer be heard. In exceptional cases, however, it may be possible for isolated contacts to be made with North America via sporadic E and the most favourable time for this will be from 17.00 to 20.00 GMT. On 14 Mc/s the summer conditions will lead to a marked improvement in DX conditions, especially in the late evening and during the night. The summer short skip conditions can, on the one hand, liven up the almost dead h.f. bands (21 and 28 Mc/s) and on the other hand interrupt DX traffic on 14 Mc/s, especially in the afternoon and early evening, by causing strong European QRM. As 14 Mc/s is much lower in frequency than 21 or 28 Mc/s, the dead zone is correspondingly smaller. There will, therefore, be many more European stations audible on 14 Mc/s during short conditions than on 21 or even 28 Mc/s Furthermore, the summer conditions make additional DX contacts possible on 14 Mc/s via the long path, lying on the great circle through both stations. This is especially applicable to Japan and Western North America. Traffic to Western USA usually begins in the early morning from about the middle of the month, and will continue to with some interruptions until August. The increase in the summer noise level will lead to some worsening of conditions on 7 Mc/s. The noise level is usually at a minimum during the latter half of the night and in the early morning, so that these are the best times for DX on 7 Mc/s, provided that the greater part of the transmission path lies in darkness. There will be little change in conditions on 3.5 Mc/s compared with the previous month, though local traffic beyond the ground wave will still be interrupted by the dead zone during the latter half of the night.

The provisional sunspot number for March 1965 was 11·3 with solar activity fairly evenly distributed throughout the month. The predicted numbers for July, August and September are 20, 22 and 24 respectively.

QTH Corner

HI8JOV	Box 1157, Santo Domingo, Dominican Republic.
HL9KX	Signals Officer, APO, San Francisco, 96301.
HL9TL	via W3WXY.
HP1JC	Box 26, Panama City, Republic of Panama.
KC4USB	via K1TWK.
KC4USV	via KH6EDJ.
KG4AE	USN, NCB 7, FPO New York.
KL7FBA	via WA8AYL.
KS6BN	Box 8, Pago Pago, American Samoa.
KS6BO	via W4WYK.
KS6BQ	Box 26, Pago Pago, American Samoa.
KW6EI	Box 247, Wake Island.
KWSEJ	via W2CTN.
W8TNC/KW6	Box 505, Wake Island.
KX6BQ	APO, San Francisco, Calif. 96333.
MP4TBM	Box 8, Sharjah, Persian Gulf.
PJ2AA	via Hammarlund.
PZ1CE	via K5YCP.
VK9CR	via VK6RU.
VK9JK	via W2CTN.
VP1WH	via W6SHC.
VP2GTA	via W2CQA.
VP2KR	via G3IJS.
VP3JR	via W3HQO.
VR2EK	c/o Beachcomber Hotel, Deuba, Fiji Islands, or via W6AL.
YS1RF	via K7UCH.
YV5BIG/7	via K3SLP.
ZD8HL	via W2CTN.
ZD8TM	via K3SLP.
4W1G	via HB9NL.
7X3CT	via W2CTN.
9M4MT	Flt./Lt. H. Pain, JATCC (RAF), Singapore Airport, Singapore 19, Malaysia.
9M6BM	c/o RAF TAWAU, BFPO 663.
9M8KZ	via G3KZM.
9M8RS	R. Skelton, Posts and Telecomms. HQ, Kuching, Sarawak, East Malaysia.
9Q5TJ	via DJ4OB.
9X5CE	Box 99, Kidgali, Rwanda.

* * *

RSGB QSL Bureau: G2MI, Bromley, Kent.

that some QSL's for CE0AG contacts may be a bit slow in coming due to postal regulations which state that only 10 IRC's may be exchanged at any one time. As George has over 1000 of these he is trying to get the Post Office to turn a blind eye on this occasion! He does say that all QSL's will be answered eventually.

Contests

The results of the 1964 VK/ZL Oceania DX contest show that the leading UK station in the C.W. Section was **G4CP** with 1344 points, with **G8PO** occupying the same position in the phone section with a score of 1462 points. Both stations are the top scorers in Europe in their sections. Other UK scores were as follows: *C.W. Section*—**G3FKM** 888, **G2DC** 583 and **G6XN** 329 points; *Phone Section*—**G6XN** 670, **G3OOB** 95 and **GI4RY** 48 points.

The following are some *claimed* scores for this year's BERU contest: ZB1RM 1925, G3OHH 2004, G2DC 2105, G3FPQ 2645, G5RI 2255, 9J2DT 2570, VS9MG 4455, VO1FB 2290, VK4LT 1300, VE3KE 2375, VE2ATU 1855, 9J2W 2510, 9M4LP 3135, 6Y5XG 1880, VS6FO 1965 and VE2NV 3000.

Awards

EA6AR sends details of an award in connection with the Balearic Islands " Town's Fair and Festival " for which the top award is a plane ticket for two and one week's stay in a first class hotel during next year's fair. QSOs count only from 12.00 on June 20 until 23.59 on July 5, 1965 and during this time a special station signing **EA6URE** will be active. EA6URE may be contacted several times per band providing it is a different EA6 operator using the station. They will identify themselves by the report sent, e.g., EA6AR operating would give the letters AR after the report. Contacts with EA6URE count two points and contacts with EA6 stations operating from their home QTH's count three points. Total score is arrived by multiplying points obtained with bands used. All stations submitting a log and scoring more than 10 points will receive a special diploma. Logs to be sent by **August 31, 1965,** enclosing QSLs for all stations worked to Box 34, Palma de Mallorca, Spain. Active EA6 stations are EA6AF, AI, AM, AR, AS, AU, AY, AZ, BC.

The Calgary Amateur Radio Club offers a certificate for contacting 10 different stations in **Calgary**. A list giving dates, time, call and report to Box 592, Calgary, Canada. No IRC's or return postage required for this award.

For those stations applying for WAP (Phone) ZL2GX confirms that they will now allow R5, S1 signal reports on QSLs. Previously R3, S3 was the minimum allowed.

An interesting " DX Award " is offered by the Central Radio Club of Czechoslovakia called " **P 75 P.**" This award is based upon contacts with 50, 60 or 70 of the 75 broadcasting zones. Contacts count only after January 1, 1960 and an IRC to Box 69, Prague 1, Czechoslovakia will bring a map showing the various zones and also a list of countries in these zones. It is understood that only two certificates for having worked 70 zones have so far been issued.

Information on current certificates and awards will be found in the *Directory of Certificates and Awards* which deals with between 600 and 700 awards, both for the transmitting amateur and the s.w.l. This volume is produced in loose leaf form, suitable for a three ring binder, by C. Evans, K6BX, and publication is quarterly from January 1 in each year. Each issue is self-contained and amendments are not issued. Stocks of this book are not held to ensure that only current volumes are distributed, but orders for direct delivery from K6BX may be placed with **G2BVN**. The non-profit cost per issue is 18s. 6d. post paid, with a binder costing a further 7s. 6d. if required.

Band Activities

Last month has been an excellent one on the h.f. bands and the star attractions were the openings into the Pacific on most mornings. In connection with these openings no apologies are made for bringing up the familiar request to operators who are fortunate in having better equipment and locations than most. It would be appreciated, therefore, if repeat contacts were not made with the rarer Pacific stations so that as many operators as possible may have the pleasure of a rare QSO.

The absence of reports on the l.f. bands will, it is hoped, be rectified next month as the S.S.B. Contest was in progress while this was being written, and a good contest always brings activity to these bands.

Grateful thanks for this month's lists to G2BOZ, G2RO, G3APZ, G3FKM, G3HCT, G3PGC, G3SML, G4MJ, G8JM, A3699, A3902, A4048, A4124, A4201, A4311, A4337, A4431 and A4574.

3·5 Mc/s S.S.B.: OH0NC (07.35), TI2JIC (06.05), ZL2AAG (06.13), ZL4LM (07.11).

7 Mc/s S.S.B.: EP3HS (19.45), MP4TBO (20.16), VK2AVA (07.15), ZL1AGO (07.15).

14 Mc/s A.M.: CR6GV (21.57), OD5BU (08.45), TU2AP (08.00), VQ8BY (16.55), VP3YG (21.44), ZB2AK (15.06), ZL1KN (08.58).

14 Mc/s C.W.: AC8H (13.05), AC9H (14.00), AP2AR (13.50), AP5HQ (07.18), CM1AR (22.05), CO2KG (22.25), CO6AH (20.58), CP1EA (21.30), CR4AE (08.40), CR6EI (22.04), CT3AQ (21.25), DU1OR (08.10), EP2RV (05.32), ET3USA (14.20), FG7XS (18.00), FG7XX (09.30), FL8RA (18.38), FR7ZI (19.00), FU8AG (08.15), HP1IE (21.13), JT1KAA (08.42), JT1KAE (08.40), KC4USN (07.15), KH6EPW (17.34), KS6BN (06.30-09.30), KW6EI (07.45), KZ5BC (22.05), OD5ED (07.50), PJ2CZ (22.05), PZ1CL (21.25), TA2BK (08.05), TL8SW (18.00), TU2XX (05.52),

MP4TBM operating from his shack. He plans to go on a DXpedition to Muscat as soon as a visa can be obtained (see page 315).

UA1KED (Franz Joseph Land 07.20), UPOL12 (20.55), UW0IN (08.14), VK9BW (10.25), VP1WH (19.55), K9LMG/VP4 (14.00), VP5RH (Turks 19.30), VP6PK (21.02), VP8HJ (22.07), VP8IB (19.10), VR2EK (07.25), VR4CR (11.00), VR4ED (09.15), VS6FO (14.40), VU2NRA (17.55), YA3TNC (14.55), YN1SL (21.30), YS1RF (19.17), YS1RFE (23.10), ZA1KBU (19.55), ZD7WR (19.20), ZD8BB (08.30), ZD8HL (07.10), ZL4JF (Campbell Island 08.50), ZP5LS (00.40), 5W1AZ ('015, 08.12), 6W8CQ (18.10), 6Y5MJ (22.06), 7Q7EX (21.35), 7X3CT (21.05), 9A1FZ (09.17), 9G1EY (18.26), 9J2W (18.42), G3ATH/9M4 (15.35), 9M4MN (17.20), 9M6JW (16.30), 9U5BB (17.00).

14 Mc/s S.S.B.: AC8H (13.45), AP2AD (14.00), AP5KR (07.00), BV1US (07.57), BV1USG (08.25), CO8MN (13.40), CO8NW (20.36), CP1CK (20.40), CP2AN (21.05), CP5AD (20.15), CR4AJ (10.30), CR7CI (17.46), CR9AH (14.00), CR9AK (14.50), DU1AA (14.36), DU1IM (14.45), DU1MR (13.55), DU7GB (13.30), DU9FB (16.02), EL1H (17.35), EL3C (09.07), EL7B (08.42), EP2RW (13.10), ET3FW (09.08), ET3USA (19.50), FG7XL (21.55), FG7XT (19.26), FK8AU (08.25), FO8BN (07.37), FY7YL (10.00), HI3XRD (13.06), HI8BRG (20.43), HI8XAL (22.25), HK0QA (15.54), HC8FN (21.40), HL9KT (08.50), HM1AB (08.00), HM2BD (09.20), HP1AA (17.46), HR1SO (19.23), HR2SC (18.38), HS1HS (09.35), HS3RP (14.40), KA5DG (08.58), KA9AB (08.49), KB6EPN (09.20), KC4USB (08.22), KC4USV (07.40), KG4AA (17.00), KG6SB (10.36), KH6EDY ('240, Kure Island 07.55), W0BES/KH6, (19.30), KM6BI (07.40), KS6BA (07.20), KS6BO (07.30), KS6BQ (08.12), KW6EB (08.29), KW6EI (08.07), KW6EJ (07.40), KW6FI (08.10), W8TNC/KW6 (08.13), KX6AO, BI, BR, BU, DB, DQ, DR, (08.00-10.00), KZ5AG (21.43), KZ5WE (22.16), LU3AAT (18.19), MP4MAH (13.40), MP4TBM (16.00), OD5AI (08.40), OD5AX (19.19), OD5BZ (11.47), PJ2AA (18.44), PJ3CD (18.05), PJ2MI (10.45), VE3CVL/SU (07.00), TG9EP (12.15), TG9GZ (22.47), TJ1AC (09.17), TL8SW (20.20), UA0EH (09.38), VK9JK (12.30), VK9NT (11.30), VK9TG (13.00), VK0GW (08.37), VP1WH (13.10), VP2KD (19.20), VP2KR (19.58), VP2GTA (21.30, 22.50), VP2LS (21.00), VP3BF (12.00), VP3HAG (19.27), VP4VP (21.45), VP5RH (Turks 21.20), VP6WR (21.50), VQ9HB (16.50), VR1B ('107, 05.30, '240, 08.30-09.30), VR2EK (08.25), VS6AJ (13.30), VS9MB (15.15), VS9MG (16.24), VU2CK (14.15), VU2ED (15.10), VU2NRA (14.00-16.00), XE1NNN (21.10), XE1YO (13.33), XE2CW (15.56), XE3MF (14.05), YA2FMH (14.18), YA3TNC (12.27), YA4A (10.23), YS1IGM (12.46), ZD5R (17.23), ZD5V (16.57), ZD8HL, JC, LT, TM, TV, WR (07.45 to 21.45), ZL4JF (08.10), ZP5KT (21.03), 4U1SU (09.30), 4W1I (12.10), 5U7AC (18.15), 5X5IU (16.43), 6W8AG (18.15), 6W8DQ (18.55), 6Y5RD (20.50), 7Q7GS (18.30), 7Q7LA (18.50), 9G1JS (17.40), 9K2AN (14.18), 9M2AE (13.42), 9M4JY (14.35), 9M6BM (14.00), 9M6LX (13.30 to 18.30), 9M8KZ (13.57), 9U5ID (17.00), 9U5RG (21.18), 9X5CE (17.30).

21 Mc/s C.W.: CR6HG (12.29), CX1AC (18.12), FG7XX (18.05), HM1BV (10.50), JA1, JA3, JA4, JA5, JA9 (08.35 to 10.31), KG6IG (Iwo Jima 10.43), OD5LX (12.20), VP6AF (18.40), VP9FT (19.45), VS6EY (11.30), VU2GG (11.29), 9L1TL (19.00).

21 Mc/s S.S.B.: CE3CT (20.11), CE6EZ (17.55), CR4AJ (18.31), CR6DA (17.22), HC1SM (15.43), HC8FN (15.30), HI8BRG (11.21), HI8JZT (18.06), KR6MB (09.20), KV4CX (13.07), KZ5TC (16.49), OD5AX (14.50), OD5CM (13.05), TI2HK (15.40), TI2SLM (19.00), TL8SW (14.06), VS9AWR (11.58), VS9MB (09.58), W6GNP (19.07), XE1KKV (17.30), XE1OE (14.30), YA4A (12.30), ZD8BB (17.55), 8HL (19.05), 8JL (12.43), 8JC (11.28), 8WR (17.42), ZP5IT (17.42), 5H3JR (18.58), 5U7AC (09.53), 5X5IU (16.10), 5Z4AA (15.07), 7Q7PM (17.52), 9G1CC (16.53), 9G1FI (12.32), 9J2WR (13.05), 9Q5AA (17.07).

21 Mc/s A.M.: CE3YU (16.10), CR5SP (18.12), CR7CI (17.36), CR7FR (16.45), CR8AF (12.00), CT3AM (11.45), CT3AQ (15.11), CX1BY (18.45), EA8EG (13.50), EA9AY (14.53), EL2Y (12.15), EP3RO (10.25), ET3USA (13.45), HI8NRH (19.58), HP1AC (14.59), JA1NSJ (08.10), JA5BDZ (09.20), JA5UD (09.00), JA6AL (09.30), KV4BI (20.04), KZ5EJ (19.45), KZ5TD (17.55), MP4DAA (13.50), MP4TBA (13.16), OD5BU (14.05), OD5CY (13.17), PZ1BE (18.50), PZ1CM (19.20), TN8AD (18.05), TU2AE (18.20), VE8BZ (16.30), VK6QL (08.08), VP2LS (18.20), VP4LE (18.40), VP7DD (17.17), VS9AWR (11.40), YA1AW (12.40), ZD8PDR (15.17), ZS8C (18.20), ZS8G (15.24), 6W8CZ (19.25), 6W8DQ (19.55), 7X2WW (12.26), 9G1FL (12.45), 9G1FS (11.55), 9G1RH (17.54), 9J2DT (09.45), 9L1WN (11.46), 9Q5DL (18.00), 9Q5PM (15.00), 9Q5RB (18.45), 9U5BB (15.33), 9U5IB (18.45).

28 Mc/s S.S.B.: 5A3CT (10.31), 9J2DT (13.22).

28 Mc/s A.M.: CR6DU (10.52), CR6JF (14.50), OD5CY (10.35), ZC4KW (10.30), ZE1BP (10.43), ZS1DM (14.45), 9J2DT (10.00-15.00).

Commonwealth Call Areas Table

	1·8	3·5	7	14	21	28 Mc/s	Total
G3KSH	—	17	20	46	25	—	108
G3DYY	—	9	24	32	13	1	79
VO1FB	11	15	13	31	8	1	79
G8JM	4	—	—	62	7	1	74
G3AAE	—	—	7	40	22	—	69
G3LHJ	3	3	5	29	26	2	68
5N2AAF	—	—	5	19	4	—	28
DL2CT	3	6	3	7	2	—	21
A2498	2	8	8	69	28	4	119
A4038	3	8	5	60	25	4	105
A2340	5	12	21	50	13	1	102
A4048	5	12	5	55	15	2	94
A4201	4	9	4	51	11	1	80
A4311	1	8	—	54	9	2	74
A4038	3	5	5	40	16	2	71
A4431	3	8	3	29	22	1	66
A3699	5	11	3	31	16	—	66
A3902	—	12	—	33	18	1	64
A3942	3	9	13	21	5	—	51
A3766	1	6	1	26	11	—	45
A4391	4	5	1	8	3	1	22

DX Briefs

OY7ML gives the following calls for new licences issued in Faeroe Islands, all c.w. only for the time being. They are OY2J, 3B, 3M, 3SL, 4KL, 4M, 7M, and 7X. QSL's can be sent via Box 184, Torshavn, Faeroe Islands.

FU8AG is now active again on 20 m and those stations still requiring a contact with the New Hebrides would be advised

to check 14040kc/s around 08.00 as Jean can often be found on this frequency at this time.

Don Miller of HL9KH, KG6ID, W9WNV/XU and K7LMU/3W8 fame will be signing **XW8BD** from about mid-May. Don expects to be in this part of the world for the next two years. QSL's will be handled by K2HLB.

Burma, which has become one of the rarer countries in Asia, is supposed to be activated by **XZ2LA** at 16.00 on 14 Mc/s. **VR4ED** promises to be very active at weekends and he favours frequencies around 14,015 kc/s. Jock has been heard/worked in the UK from 09.30 until 10.30 GMT. QSL's are requested to be sent via the RSGB.

VK9CR, Bob, is now active from the Cocos-Keeling Islands with an NCX3 transceiver to a dipole. Bob hopes to be able to put up a better aerial soon and no doubt will then be in the thick of some monster pile-ups. QSL's should go to VK6RU.

Peter Courtney Price, **GW3LXI**, left for St. Helena about a month ago equipped with a KW2000. He plans to stay for about another two months, and contacts will be welcome over the period. His QSL Manager is GW3TSH, 33 Treowan Road, Pembroke Dock, Pembs.

VP1WH is a new station now active from British Honduras and has been worked on c.w. and s.s.b. being mainly active after 20.30. QSLs should go to W6SHC.

There are now five active stations on from American Samoa, KS6BA, 6BK, 6BN, 6BO and 6BQ. It would appear that the best chance of a contact with one of these stations is with **KS6BN** who is a keen c.w. man and is on daily from 06.30-09.30 around 14,015 kc/s.

Cards for the **6Y5LK/VP5** Hammarlund DXpedition of a few months ago are still waiting to go out as the ARRL is not satisfied about the licence for this operation.

WPX hunters will be pleased to note that **OR5RK** has taken the place of OR4VN who has now returned to Belgium.

AP2MI QSL's may be secured through W6RKP by sending ing him date—time—freq.—report along with one dollar! No further comment!

VU2NR expects another VU station will be active from the Andaman Islands in the near future so those who were unlucky when Raju was there will now have a second chance.

The new prefixes for **Indonesia** are: 8F1—West Java, 8F2—Central Java, 8F3—East Java, 8F4—Sumatra, 8F5—Borneo, 8F6—Celebes, Timor, Moluccas and West New Guinea.

* * *

Correspondents are thanked for their co-operation and acknowledgment is made to the *West Gulf DX Club Bulletin* (W5IGJ) and the *LIDXA Bulletin* (W2GFD/W2MES). Please send all items to arrive not later than May 12, 1965 for the **June** issue and June 17 for the **July** issue.

Can You Help?

- J. Degrey, 15 Bath Road, Bedford Park, London, W.4, and A. G. Coker, 48 Charlock Way, Burpham, Guildford, Surrey, who both wish to obtain manuals for the Canadian Marconi 52 transmitter?
- W. T. Stephenson, 8 Grove Street, Birkdale, Southport, who wishes to obtain further information on converting the R220 Mark II receiver for use on 2m?
- G. J. Stracey, 27 Ashley Gardens, Palmers Green, London, N.13, who requires a handbook on a Canadian receiver marked " M.F.D. by V.R.L.," serial 687?
- I. G. Mant, 28 Welbourne Road, Childwall, Liverpool 16, who is trying to obtain a manual for the R4-ARR-2 (part of AN/ARR2) receiver?
- A. N. Slocombe, GW3TJZ, 19 Westbourne Road, Penarth, Glamorgan, who wishes to borrow the instruction manual for the Wireless Set 36?
- R. Wilson, G3TBS, 52 West Mead, Windsor, Berks., who wishes to know the connections to the i.f. unit of the R308 receiver?

RSGB QSL Bureau Sub-Managers

The following is a list of the RSGB QSL Bureau Sub-Managers showing the call-sign groups for which they are responsible:

G2:	J. W. Russell, G2ZR, 45 Shakespeare Avenue, Bath.
G3, 4 and 5 two-letter calls & GC:	E. G. Allen, G3DRN, 65A Melbury Gardens, London, S.W.20.
G6 and G8:	A. J. Mathews, G6QM, 62 Ashlands Road, Hesters Way Estate, Cheltenham.
G3AAA-BZZ:	C. C. Olley, G3AIZ, 157 Wanstead Park Road, Ilford, Essex.
G3CAA-DZZ:	C. A. Bradbury, BRS1066, 13 Salisbury Avenue, Cheltenham.
G3EAA-HZZ:	W. J. Green, G3FBA, " Meadway," Links Avenue, Brundall, Norfolk, NOR86Z.
G3IAA-KZZ, BRS and A numbers:	G. L. V. Butler, G2BUL, 995 London Road, Thornton Heath, Surrey.
G3LAA-MZZ:	C. Harrington, BRS2292, 91 Brabazon Road, Hounslow, Middlesex.
G3NAA-NZZ:	C. R. Emary, G5GH, 133 Fairlands Road, Thornton Heath, Surrey.
G3OAA-PZZ:	J. H. Brazzill, G3WP, 43 Forest Drive, Chelmsford, Essex.
G3RAA-RZZ:	K. Walden, G3OLN, 250 Gloucester Road, Cheltenham, Gloucestershire.
G3SAA-TZZ:	E. G. Allen, G3DRN, 65A Melbury Gardens, London, S.W.20.
G3UAA-WZZ:	P. R. Cox, 9 Byrneside, Hildenborough, Tonbridge, Kent.
GD:	T. R. Moore, GD3ENK, " Glyn Moar," St. John's, Isle of Man.
GI:	R. R. Parsons, GI3HXV, 45 Erinvale Avenue, Finaghy, Belfast.
GM:	D. Macadie, GM6MD, 154 Kingsacre Road, Glasgow, S.4.
GW:	J. L. Reid, GW3ANU, 28 Waterston Road, Gabalfa, Cardiff.
DL2:	4027469 C/T Griffiths, DL2OX, 212 Hohenzollern Str., Munchen Gladbach, Germany.

Cards must be sent to G2MI but envelopes may be sent to the appropriate Sub-Manager or to G2MI. Printed, gummed labels are obtainable from G2MI by sending an s.a.e.

The address of the QSL Bureau Manager (Mr. A. O. Milne, G2MI) is 29 Kechill Gardens, Bromley, Kent.

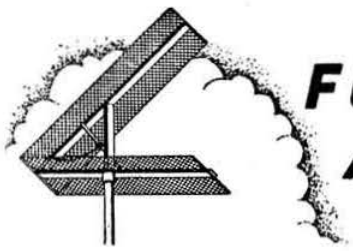
QSL Bureau—Postage Rates

Members sending envelopes to the QSL Bureau Sub-Managers should affix sufficient stamps in accordance with the new letter rates.

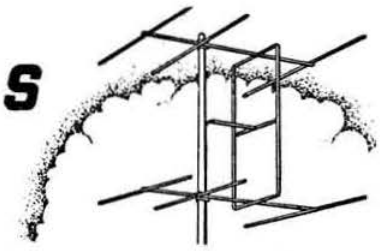
1 oz.—4d., and 2d. for each additional 2 oz.

CHANGES OF ADDRESS

Four weeks' notice is required to effect changes of address. When notifying Headquarters, please give the old as well as the new address. Advise changes promptly so that you receive every issue of the BULLETIN without interruption.



FOUR METRES AND DOWN



By F. G. LAMBETH, G2AIW*

A SHORT time ago the idea of working Spain was very much in the clouds, like the well known castles in that country, but since G2JF did it last summer we have been looking for the next QSOs (MS is not included in this, for the enthusiasts in that mode can do, and have done even more ambitious things). Things are looking promising now for the first GW/EA is reported below, and Spain has been worked " tropo " in Cornwall, so we may say that it is now definitely on the v.h.f. map as far as we are concerned. It only remains now for some lucky operator to reach CT1CO, and it will be particularly interesting to see which gets him first—m.s. or tropo.

Frequency Modulation on Two Metres

G3BA notes with interest that there is increasing activity in this mode and that many transmissions are indeed first class. Several aspirants, however, are endeavouring to deviate a crystal by shunting it with a resistance modulator, and the results are very poor, with considerable splatter, due to crystal oscillator failure at high deviation. The old method of placing an inductance in series with the crystal in the conventional Colpitts oscillator working on either 6 or 8 Mc/s is much to be preferred, as oscillation is maintained with quite high deviations and the quality is excellent for speech applications. The SCR522 is ideal for this, as it employs a Colpitts oscillator.

G3BA is now running a 4CX250B as a linear for s.s.b, which gives a more consistent signal over long distances, and it is hoped that the GB2RS News Service will have improved by " upping " the power 6 db over the QQV06-40.

Frequency Measuring Test

The proposed 145 Mc/s frequency measuring test will take place at 16.00 BST on Sunday, May 23, 1965. Full details are given on page 323 of this issue. We hope that as many people as possible will take part in this event, which should prove a useful check on the accuracy of measurement claimed by many on the band.

Two Metre News and Views

GW3MFY (Bridgend) achieved what is believed to be the first GW/EA QSO with EA1AB (Santander) on Saturday March 27, at 20.00 GMT. The reports were: EA1AB RST599, and GW3MFY RST589, c.w., RS57 phone. The QSO was heard by G3JGJ. No signals were heard from EA1AB after 20.35 GMT by GW3MFY, but **GW5BI** (Cardiff) worked F9NL (in the Pyrenees) on the same night. This opening was very evident in Cornwall too, and **G3XC** (Indian Queens) noted the outstanding signal from EA1AB for over an hour, during which he completed QSOs with GW3MFY (above) and **G3JGJ**, (Moretonhampstead). G3XC, however, after much finger-wearing brass pounding, experienced the bad luck of " the one that went away " rather than got away! The GCs were very strong during the following week at G3XC (550 ft. a.s.l.). The ground rises immediately to 800 ft. in the direction of the Channel Islands and normally signals are non-existent, but during this period three GCs were worked, the loudest being GC2TR on April 2. GI3GXP was a tremendous signal on March 28 and a new one heard was GI3LOB. G3SPS/MM, s.s.w. of the Scilly Isles, was worked on 80m. Other Cornish stations enjoying the openings were G3AET, G2BHW, G3EKM, G3IGV, G3NVJ and G3OCB. The listeners had a field day too.

A warm welcome is extended to all v.h.f. enthusiasts visiting Cornwall. A well supported v.h.f. group (affiliated to the Cornish Radio Amateur Club) now exists and meetings are held on the third Thursday in each month at 7.30 p.m. at the " Coach and Horses " Pyder Street, Truro. The group is building new portable gear and has adopted the following call-signs for the various v.h.f. activities: 4m—G2BHW, 2m—G3XC, 70cm—G3OCB. It is felt that by using the same calls each time, other users of the band will immediately connect them with Cornwall.

G3OCB (Truro), who also reports, has been at his new QTH for about six months. The aerial is only about 20 ft. high at present but it is hoped to raise it to 40 or 50 ft. soon. The opening was nearly missed by G3OCB, who was only able to be on for a couple of hours around Sunday lunch-time. A number of French stations were coming in then at excellent strength, however, and four Belgians were also heard, the best being ON4UM, who was a terrific signal. There was no QSO, however, and the first Belgian still eludes G3OCB. During the afternoon the Frenchmen were still there and several were worked. The best one was F9XG/M who was 59+ using only 4 watts to a halo! He received G3OCB's s.s.b. at Q5 with his transistor receiver under his car *without any aerial*! Signals heard included ON4LF,

V.H.F./U.H.F. BEACON STATIONS

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3CTC	Redruth, Cornwall	144·10 Mc/s	A1	North-East
GB3VHF	Wrotham, Kent	144·50 Mc/s	A1	North-West
GB3GEC	Hammersmith, London	431·5 Mc/s	A1	East

RSGB V.H.F. BEACON STATION GB3VHF

The frequency of the Society's v.h.f. beacon transmitter at Wrotham, Kent, when measured by the BBC Frequency Checking Station, was as follows (nominal frequency 144·50 Mc/s):

Date	Time	Error
March 23	15.05 GMT	90 c/s high
March 30	10.40 GMT	100 c/s low
April 6	13.40 GMT	10 c/s high
April 14	09.15 GMT	100 c/s high
April 20	15.15 GMT	140 c/s high

* 21 Bridge Way, Whitton, Twickenham, Middlesex. Please send all reports for the **June** issue to arrive by **May 7**. and for the **July** issue by **June 11**.

ON4TQ, ON4UB and ON4UM who were all called on s.s.b. and a.m. without success. The stations that were worked were F9NJ, F1AU, F2OH, F9XG/M, F1GU, GW3KXA (Anglesey) and G3SPS/M. Very few G stations were heard, probably due to the peculiarities of propagation conditions at the time. Several GCs and a PA were coming in very well.

GW3RUF/P operated in Monmouthshire during the second 144 Mc/s Contest (Open) on March 6-7. G3KXA had to overcome some difficulty to get going, including " nine hours digging our way up to the site." However, they had a good time. Despite starting late, they made 75 QSOs, 20 being over 100 miles and the best being G2JF (180 miles), G5HA (165) and G3TLB (153). The number of stations using c.w. when requested was very pleasing; in fact, many in Surrey, Sussex and Kent could not possibly have been copied otherwise. The weather was good, except for 10 ft. snow drifts near the site, but towards the end of the contest activity was about non-existent.

Another note about the contest comes from **GI3SLI/M**, writing from RAF Bishopscourt, Downpatrick, Co. Down, who worked only five contest stations. The highlight was a last minute attempt by G3OXD/A to get a contact at 02.40 GMT on the Sunday morning. By that time, G3OXD/A had worked 89 stations! The GI3SLI/M effort appeared puny by comparison, but had notched another county, making a total of 17. EI2AG (Co. Louth) was worked and EI4Q (Dublin) put in a rare appearance. On March 25, G3SPS/MM was worked for the first /MM. The vessel was moving up past the Isle of Man towards the Clyde. The QSO was partly worked /M to /MM! On the same evening the /MM was worked /M for G3SPS's first GI and also GI/M. GD3FOC has made an appearance on 145·23 Mc/s from Castletown, and worked GI3SLI for his first ever 2m QSO on March 25. He is using an SCR522 (10 watts). The aerial is an 8-over-8 at 10 ft. a.s.l. It is remarkable that he gives a readable signal (5 + 7 both ways) from the other side of the Isle of Man to Northern Ireland.

G3PBV (Northampton) says that the opening was the first Scandinavian one he was equipped for since moving to the new QTH. SM6PU, OZ2GW, OZ4AU, OZ9PZ and OZ9SW were worked, and another dozen OZs and SM7ZN (QRA Locator HR61G) were heard at good strength. LA8RB was heard at RST559 and called without avail.

G3RDX (nr. Exeter) wonders whether there is some kind of " Iron Curtain " between Devon/Cornwall and the rest of the country, considering the very few contacts made into this region (e.g. during the 2m contest). After three months on 2m with an 8-over-8 slot he can work G5ZT (Plymouth) almost any time and also several other Devon stations, but very rarely even hears a station further east.

The period under review, although dull at first from the propagation point of view, brightened up considerably towards the end. G3SPS/MM created quite a stir while steaming down the North Sea, Thames Estuary and English Channel, eventually up to the Clyde and returning down the west coast *en route* for the Middle East. Perhaps the last contact with him locally was made by F8VQ (Boulogne) when he was off Lands End. The evening of March 27 will be remembered by the West Country stations as one of those days when they had excellent conditions east and west. G3XC (St. Columb), G3EKM (Truro), G3IGV (St. Austell), and one of our " white stick " operators, G3OJY (Penzance) were all up to S9+ around the 300 mile range. The evening of March 28 proved outstanding to the south and west of France when stations in southern UK reported contacts with F9NL and F8CH, both stations being in the Pyrenees. **G2JF** worked the latter station, about 600 miles away, to provide his first G contact. Going back to the evening of Saturday, March 27, mention should be made of the wonderful A3 signal which EA1AB put into the southern part of G. All the occupants of the band responded in startling fashion but unfortunately the lucky ones were very few indeed; however, congratulations to those who were fortunate enough to contact him.

SCOTTISH V.H.F. CONVENTION

City Hotel, Dunfermline, Fife

SATURDAY, MAY 8, 1965

A programme of lectures and an exhibition of commercial and amateur constructed equipment will begin at 2 p.m. A dinner will be held in the evening.

Tickets and further information may be obtained from Mr A. Lawrence, GM3IQL, 40 Blake Street, Dunfermline, Fife.

Convention only 6s. Convention and dinner 25s.

Organized by the Dunfermline Radio Society

The next piece of excitement commenced on March 30 when GI3SLI worked G2JF and was followed on March 31 to April 2 by what appeared to be quite a good extended tropospheric opening to the Scandinavian countries of Norway, Denmark and Sweden. On this occasion the stations in the Midlands appeared to be having their share of contacts. This opening appeared to be in the 600 mile range, although there are one or two reports of hearing OH, but more information would be appreciated. Perhaps the outstanding signal was SM6PU, when for long periods it sounded as though every active station on the band was determined to make contact! This station uses moderate power and a 40 element aerial system. SM6CSO on s.s.b. was a comparable signal and was running 4CX250Bs in a linear amplifier.

G3JGJ (Moretonhampstead) sends his own report of his QSO with EA1AB on March 27. From a portable location 10 miles S.W. of Exeter the Spanish station was heard at S9+ calling CQ at 19.20 GMT. The battery-operated transmitter used only 4 watts to a 6J6, but a fine QSO was made on phone and c.w. The report received was RS57, and there was no fading. The only London district station heard, G3OWA (Coulsdon), was then worked RS56 both ways. On the following day F9LN was heard at 07.32, F1CF at 08.12, F3YY, F3XY, F9XG/M (S9+), GC3KAV (S9+) and GC3OBM (S4). On March 30 GC3KAV was worked at S9+. April 3 brought GC2FMV at S6 both ways at 17.59 GMT, G2BAT S6 both ways, and G3IZP/P heard calling from Portland Bill. For a station which rarely hears anything this is really excellent. G6XD (Teignmouth) also worked EA1AB on c.w.

G5ZT (Plymouth) experienced a good opening on March 28, and worked 23 French and one Belgian stations. F1ES was astounded at the QSO as he was using a fully transistorized transmitter (only 300 mW), 10 km from Paris. F2BY (Paris) used only a dipole to get his first G and F7CR only an airport portable rig for his first G, also from Paris. ON4TQ was S9+ phone. Three French mobile stations were also worked.

Meteor Scatter

G3BA tells us that SV1AB (Athens) is now set up for m.s. on 2m and is looking for skeds with G stations. His frequency is 144·700 Mc/s.

Four Metres

G3JMB (Margate) is looking for contacts on the band, and is usually to be found on 70·425 Mc/s.

G3BA (Sutton Coldfield) thinks that the proposed band plan is sensible and hopes that it will be well supported.

G3HWR reports that the Research GEC ARS will be repeating the series of **frequency standard transmissions** as made last year. The technique is for the club station (G5FK) to contact a local station, to make controlled changes of frequency and to announce the frequency in use. The transmitter is driven from a frequency synthesizer which in turn is driven by the laboratory frequency standard which is accurate to better than 1 part in 10^8. The frequencies will be 70·104, 70·2, 70·3, 70·4, 70·5, 70·6 and 70·696 Mc/s on A3 and *very* brief transmissions on 70·1 and 70·7 Mc/s on A0. The exercise is planned for May 6 and 13, but if changes have to be made they will be announced over GB2RS. G5FK will also measure incoming frequencies although they had great difficulty last time with some ex-WD transmitters which drifted too fast for the measuring equipment which is accurate $\pm$ 5 c/s on incoming signals. A similar service is planned for 2m and 70cm, and details of this will be published later. G3HWR (Hampstead) was very pleased with the opening on April 11 and worked GC3OBM with ease for a new county on this band.

G3BPT has been carrying out some polarization tests and the results are summarized in *Mobile Column* on page 303.

Seventy Centimetres

G3HWR's new 433 Mc/s p.a. (QQV06-40 at 35 watts, later to be 90 watts is working very well and the modulation is much improved, local contacts thereby being much more pleasant! On April 11 there was an incredibly good contact with G3MPS.

G3KEF and **G3NBQ** (Coventry) have sent separate reports but as some of the items are duplicated they are presented as one. The Beam-East Campaign during March showed that Lincolnshire through to Cambs is apparently too far for working under average conditions. Except for the opening at the end of March, only one station, G3IUF (Bourne), was heard, but the signals were too weak even for reports to be exchanged. During the opening, G2XV and G3EDD were worked (March 28) by G3KEF at RS59 each way. G3ADE was a terrific signal on April 1, but was not worked. OZ7SP was worked at RS5-8/9 each way on March 31 by G3KEF and also by G3LHA, who heard G3ILD, ON4HN and PA0GER as well. On this occasion, G3NBQ, still using the indoor aerial, worked G8ABB, G8ADC, G8ADE, G3EDD, G2XV, G6PGF/T and G3GWL, with OZ7SP, G8AGS and G8AL heard.

In view of the opening, G3NBQ and G3KEF went portable into Leicestershire, but although the weather was right the band was dead and they had to be content with QSOs to G2FNW and G8AFY.

The **Coventry Group** (CVHFG) meeting of March 17 was very successful with a larger attendance than expected. There were 25 visitors and the highlight was a tape recording by G2CIW of 23cm DX signals (PA and G), and *OSCAR* signals including K2. The next meeting will be on May 19 at the "Hawthorn Tree," Broad Lane, Coventry, when G3CCA will give a talk on parametric amplifier construction.

G3RYB/T (Coventry) has received the call G8AHR and is planning portable work this summer.

G8ABP (Birmingham 26) had some good results on the night of April 1 when he worked G8AL (S6), ON4HN (S5) and G3KEQ (S8). PA0GER was also heard S7. The transmitter at G8ABP is an RF105 unit giving less than 1 watt output to an 8-over-8 slot fixed in the s.e. direction.

G8ADH (Burley, Ringwood) worked several firsts (for him) during the opening of April 1/3: ON4HN, G2XV, G8ADC (Beds.), G3FIJ, G8AL, G3KEQ, G3MPS and G3MCS. Also heard were G8ACQ (Lincoln) at RS59, G3LHA, G8ABB, G3LQR, G3ORL and G8AFH/P. The equipment is QQV03-20A at 20 watts to a 16 element stack, with a transistor pre-amp into a g.g. r.f. stage and crystal mixer. The home QTH is about 200 ft. a.s.l.

G3LHA (Coventry) has been consistently active during the period and found conditions excellent from March 28 to April 1. Several G stations were worked at fair distances, but on March 31 OZ7SP was worked at S9+ on 432·08 Mc/s. On April 1, PA0GER, PA0COB and ON4HN were raised, but no DLs were heard. Conditions were not as stable as during the November opening and continental activity appeared very low; PA0GER reported few PA stations on during April 1. G3ILD (Darlington) was about the strongest and most distant G (168 miles) and GW3RBM (433·35 Mc/s) was being worked by London stations. G8AGS (Halesowen), G8AHR (Coventry) and G8AEO (Bridgnorth) have all been worked recently; in fact, G8 + 3 stations appear to be in the majority these days!

G5ZT has been in QSO with G3MPS and G3EGV on c.w., but most of his activity has been concentrated on Amateur TV with G3ARE/T. He is now busy building portable TV gear. Tests are hoped for next month from either Okehampton or Hay Tor.

Twenty-three Centimetres

G3NBQ reports that G3BNL worked G2CIW, and reports of RS56 were exchanged.

G3GWL is now equipped for the band. We have been asked to conduct a 23cm activity campaign to stimulate activity. This of course, largely depends on activity news from those interested, which will be published "pour encourager les autres," so please let us hear from you!

"Four Metres and Down" Certificates

These certificates, intended to mark successful v.h.f. and u.h.f. achievements, are available in eight categories.

	Qualifications	
Four Metre Award Four Metre Listener Award	20 Counties	3 Countries
Two Metre Award Two Metre Listener Award	30 Counties	5 Countries
Two Metre Senior Award Two Metre Senior Listener Award	60 Counties	15 Countries
Seventy Centimetre Award Seventy Centimetre Listener Award	20 Counties	3 Countries

The rules governing the award of the certificates are as follows:

(i) All claims must be fully supported by QSL cards.
(ii) All contacts must have been made on or after January 1, 1961.
(iii) Eligible counties are those of the United Kingdom of Great Britain and Northern Ireland, listed on the claim form available from Headquarters on request.
(iv) Stations are eligible for certificates in the following groups:
  (a) Fixed stations
  (b) Alternative address stations (—/A any address)
  (c) Portable stations (—/P any location)
  (d) Mobile stations (—/M any location)
  Categories cannot be mixed.
(v) All claims must be submitted to the V.H.F. Committee at RSGB Headquarters, 28 Little Russell Street, London, W.C.1.
(vi) All claims must be accompanied by a check list.
(vii) All cards will be returned by recorded delivery service and return envelopes are not required.

The following is an up-to-date list of those who have qualified for these certificates. A leaflet giving details of the

conditions of issue may be obtained from Headquarters on request.

70 Mc/s Transmitting Section

1 G3EHY	6 G3NUE	11 G3NDF
2 G3PJK	7 G3IUD	12 G3IMV
3 G2AIH	8 G6NB	13 GI3HXV/P
4 G3OHH	9 G8PD/A	14 G3SKR
5 G3KEU/P	10 G5FK	15 G3OUF

144 Mc/s Transmitting Section

1 G3HBW	25 G3JDN	49 G3GGK
2 G3BLP	26 G8VZ	50 G3MDH
3 G3MTI	27 G2AXI	51 G3NLR
4 G5YV	28 G3JYT	52 GM3LDU
5 G3BNL	29 G5UM	53 G3CKQ
6 G3MCS	30 G3EJO	54 G5HZ
7 G3LAR	31 G3PBV	55 G3NNK
8 G3CO	32 G3FDG	56 G6GN
9 G3BA	33 G3OSA	57 G5ZT
10 GW3MFY	34 G3JLA	58 G2PL
11 G3DFL	35 GC2FZC	59 G3FZL
12 G3NAQ	36 G3BOC	60 G3SAR
13 G3NNG	37 G3MTI/M	61 G3NUE
14 G3OJY	38 G3OJY (New QTH)	62 PA0EZ
15 G3KPT	39 G3JWQ	63 G3AHB
16 G3JYP	40 G3NOH	64 G3PTM
17 G3KMT	41 G3PSL	65 G3LAS
18 G3OHD	42 G3LBA	66 G3RMJ
19 G3BBR/A	43 G3FUR	67 G2CDX
20 G3HRH	44 G2BJY	68 G3ORL
21 GM3EGW	45 G3MRA	69 G2DHV/P
22 GI3OFT	46 G3AGN	70 G3FIJ
23 G3OBD/P	47 G3MDH/P	71 G3CXM
24 G2HIF	48 G3GMY	72 G3HRH/P

144 Mc/s Receiving Section

1 BRS22550	3 BRS15822	5 NL687
2 BRS22322	4 BRS15744	6 BRS20108

144 Mc/s Senior Transmitting Section

1 G3CCH	4 G3BLP	7 G6NB
2 G3FAN	5 G3CO	8 G3EDD
3 G5MA	6 G3BA	9 G3HRH

420 Mc/s Transmitting Section

1 G3NNG	2 G3KPT	3 G3LHA

Miscellaneous News

G3PXB and G3PXP will be going to Drum Mountain, Caernarvon (N. Wales) during the Whitsun weekend. Operation will be on various frequencies in the 2m band, using the call **GW3PXP/P**, and also on 70·200 Mc/s using the call **GW3PXB/P.** It is hoped to commence operation early on the Saturday afternoon, June 5, and continue through until late on Sunday evening.

We learn from OK1DE that **UB5KDO** is looking for regular skeds via m.s., or other modes. He works on 144·180 Mc/s $\pm$ 2 kc/s and may be contacted at Radio Club UB5KDO, ul. Awiachimowskaya 17, Dniepropetrovsk, Ukraine, SR.

Some interesting Russian records appeared in the February issue of *Radio* as follows: UA1DZ has worked 24 countries, UR2BU 21 and UP2ON 18, all on 2m as 70cm is not used in Russia. UC2AA is now very active on 2m (144·002 Mc/s) and, among others, has QSOd OK1VHF. OK1VR/P has worked 20 countries on 2m, OK2WCG 19 and OK1DE/P 18.

W8OOR, A. T. Lausten, 8284 Allen Road, Clarkston, Michigan, USA is anxious to get in touch with v.h.f./u.h.f. groups in the UK that publish a monthly newsletter. His society, the Greater Pontiac V.H.F. Society, issues *Rag Chew* and he will be pleased to put any local societies on the mailing list on a reciprocal basis.

UBA Convention

ON4UM reports that UBA has organized a convention in Knokke-le-Zoute on September 17-18, 1965. There will be a v.h.f./u.h.f. group to cater for those interested, Knokke is approximately 20 miles from Ostend and is a very pleasant spot located on the coast. (*from G2JF*).

145 Mc/s Frequency Measuring Test

The V.H.F. and Contests Committees of the Society are running a frequency measuring test on Sunday, May 23, 1965. The following simple rules will apply.

1. The test is open to all interested persons.
2. The test will involve a single measurement of the frequency of the beacon station GB3VHF to be carried out at 16.00 BST precisely on Sunday, May 23, 1965.
3. Entries should be sent to the Contests Committee at RSGB Headquarters, to be postmarked not later than 16.00 BST on Monday, May 24, 1965, and should be marked " Frequency Test " on the envelope.
4. Entries must comprise the following information:
   (i) statement of the measured frequency, as accurately as possible;
   (ii) name and address of entrant;
   (iii) block diagram of the equipment used.
5. If the number of entries warrants, and at the discretion of the Council, a certificate of merit will be awarded to the entrant submitting the most accurate measurement. The decision of the Contests Committee will be final.

V.H.F. Band Plans

All v.h.f. operators are reminded of the British Isles Two Metre and Seventy Centimetre Band Plans, which are sponsored by the Society. Observance of these plans will assist in DX working and in avoiding QRM to Service frequencies in the 144-145 Mc/s band.

Zone	2 metres	70 cm.	Area
1	144·0–144·1	432·0–432·1	Cornwall, Devon, Somerset.
2	144·1–144·25	432·1–432·25	Berkshire, Dorset, Hampshire, Wiltshire, Channel Isles.
3	144·25–144·5	432·25–432·5	Brecon, Cardiganshire, Carmarthenshire, Glamorganshire, Gloucestershire, Herefordshire, Monmouthshire, Pembrokeshire, Radnorshire, Worcestershire.
4	144·5–144·7	432·5–432·7	Kent, Surrey, Sussex.
5	144·7–145·1	432·7–433·1	Bedfordshire, Buckinghamshire, Essex, Hertfordshire, London, Middlesex.
6	145·1–145·3	433·1–433·3	Cambridgeshire, Huntingdonshire, Leicestershire, Norfolk, Northamptonshire, Oxfordshire, Rutland, Suffolk, Warwickshire.
7	145·3–145·5	433·3–433·5	Anglesey, Caernarvonshire, Cheshire, Denbighshire, Flintshire, Merionethshire, Montgomeryshire, Shropshire, Staffordshire.
8	145·5–145·8	433·5–433·8	Derbyshire, Lancashire, Lincolnshire, Nottinghamshire, Yorkshire.
9	145·8–146	433·8–434	All Scotland, Northern Ireland, Isle of Man, Cumberland, Co. Durham, Northumberland, Westmorland.

Two Metre Band Guard Channels: The following frequencies in the 144-145 Mc/s portion of the 2-metre band are tabulated on the schedule to the Amateur (Sound) Licence to be avoided as they are allocated to Service use: 144·0, 144·09, 144·18, 144·27, 144·36, 144·45, 144·54, 144·63, 144·72, 144·81 and 144·9 Mc/s. *Remember!* The safety of aircraft and human lives depend upon the interference-free use of the channels.

S.S.B. Operation on 2m

The RSGB V.H.F. Committee hopes that s.s.b. operators on 2m will co-operate by keeping operation between 145·1 and 145·2 Mc/s in accordance with the latest recommendations.

THE OSCAR STORY—PART II

By W. H. ALLEN, M.B.E., G2UJ*

THE translator in *OSCAR III* ceased to function just as last month's report was due at the printers and it was not possible in the circumstances to more than mark the fact. According to the Project Oscar Association the translator became inoperative after orbit 206 on March 24, but it is thought that some translated signals may have been heard in Europe after that time: any information on this point would be welcomed.

Apart from some intermittent operation between orbits 244 and 262, the telemetry beacon has been received regularly and Project Oscar are particularly anxious to have reports on the battery voltage and the two temperature readings so long as this signal continues to be radiated. Full details of how to interpret the telemetry signals were given in *QST* for March 1965.

A very full report covering 35 orbits between numbers 17 and 119 was received from **G3LTF** (nr. Chelmsford). Contacts were made with HB9RG, SM7OSC and SM6CSO and his signals were reported by several G stations, W1BU and by SM7OSC (on orbit 77) when no signals were logged by 'LTF at all.

An analysis of the stations heard by G3LTF shows how comparatively few managed to achieve translation. The figures in brackets after the various calls indicate the number of times each was heard.

DJ3EN(3), DJ3ENA(3), DJ4ZC(1), DJ6AB(1), DJ6EZA(1), DL3YBA(17), DL6TU(1), DL9GU(2), EA4AO(4), G3EDD(1), G6AG(8), G6OX(1), HB9RG(15), HG9WB(1), K2IEJ(2), K4QIF(1), ON4FG(6), ON4TQ(1), OZ9AC(2), SM5OSC(2), SM6CSO(5), SM7OSC(10), SM7ZN(1), W1BU(2), W1HDQ(1), W2AZL(2), W2GUG(2), W3BYF(2).

Only one s.s.b. station was identified by anyone sending in reports—DJ4ZC heard by G3LTF on orbit 101—although a number mention hearing unreadable s.s.b. It seems that this is one field where c.w. still reigns supreme!

Calls heard, other than those already mentioned, include DL6ADR and OH1NL (G2WS, Coventry), SM5BI (G6TS, Bournemouth), SM5AOZ, SP3LQJ, I1EHC, G3OST, DJ3EY (G5ZT, Plymouth), DL4AU, DJ3DI, DL4TX, DL9MF, G3LTF, G5BJ, SM5BSZ, SP3GB and UR2DZ (G3CDK, Wallington). G5ZT was using an 8-over-8 beam at 15 ft. tilted at an angle of 45°.

G6AG (Chalfont St. Peter), worked DL3YBA, HB9RG and SM7OSC but was unsuccessful with W1BU, W2AMJ, K2GUG, K2IEJ and WA2MWA. He has received reports on his signals via the satellite from DL, F, GM, OK, PA, W1, 2, 3, 4.

For results in Czechoslovakia we turn to an interesting report from **OK1DE** (Prague). Using 450 watts input OK2WCG worked HB9RG and SM7OSC: he was unable to effect any contacts with lower power. DL3YBA, G6AG, HB9RG and SM7OSC were all audible to OK1DE together with EA4OU, G3EDD, DJ4AU, OH1NL, OZ9OR and SM5BSZ. No contacts were made despite the use of crossed Yagis in an attempt to beat the problem of constantly changing polarization as *OSCAR III* tumbled in orbit. OK1DE's opinion, which agreed with that of other observers, was that the receiver in the satellite seriously lacked sensitivity.

Regarding our note last month that the *OSCAR III* receiver appeared to favour a narrow band of frequencies between approximately 144·1 and 144·115 Mc/s, G6TS noticed distinct receiver noise radiated by the satellite between 145·88 and 145·92 Mc/s. At the writer's station the hiss was heard only occasionally and not necessarily when the beacon signal was at its strongest, which appears to indicate that conditions within the package may have altered from time to time.

Anticipating *OSCAR IV* (which may be launched later this year), **G3OCB** (Truro) puts forward a tentative idea for combatting Doppler shift by using two separate receivers fed from the mixer in the converter. One would receive the translated signals while the other remained tuned to the tracking beacon (one was provided in *OSCAR III* but for some unknown reason failed to function). By a means not divulged by G3OCB the tracking beacon signal would be processed to provide control of the frequency of a stable oscillator on about 2 Mc/s, which, after being mixed with the output from a crystal oscillator and multiplied to the necessary extent would provide the injection frequency for the main receiver.

G5UH (Bristol) appeared with **G6GN** on a TWW programme on April 4 when they were interviewed on the subject of *OSCAR III*. It is understood that good use was made of the opportunity to provide information on the activities of the Society.

In addition to those already mentioned, reports are acknowledged with thanks from G2DHV, G3BA, G3MTI, G3PBV, G3PTB, G8NF, GM2FHH and GM3SFH.

We feel sure that readers who have participated in the *OSCAR* experiment will not wish the opportunity to pass of paying tribute to Bill Browning, G2AOX, who by dint of an immense amount of work and careful observation made it possible for the great majority of us to know when and where to look for the satellite. His activities did not begin and end with the predictions; well before launch date he was circulating such information as was available and this service he continued, for a large mailing list, throughout the operation. When the first computer-calculated predictions arrived from the States some ten days after launch, it was found that G2AOX's figures agreed exactly as to time and were less than a degree different in longitude: certainly a most creditable result.

SAID LONG AGO

" Over a year ago I expressed the opinion that Television (or Radio-Scopy as I prefer to call it) would never make headway while the present system of moving mechanical parts was persisted in. Since that date several eminent authorities have endorsed my opinion.

" It almost seems as though the whole business ought to be handed over to the radio amateurs, who might be able to put the same sort of jerk into it that they did in the matter of broadcasting in 1922 and in short-wave pioneering during the decade following. Government Departments and commercial interests, hovering over the work of amateurs like vultures, as they have done in the past, could then follow their custom of swooping down and taking all the credit as is their wont, and then Radio-Scopy would take its place on an equal footing with its twin sister—Radio-Phony."

"Free Grid."—Wireless World, May 19, 1933.

J. C.

* Project Oscar Co-ordinator, 24 Arundel Road, Tunbridge Wells, Kent.

VERY HAPPY FIESTA

It was a record "Eleventh Annual" at The Kingsley

THERE'S not much that is traditional about v.h.f. The art is in a state of constant development: something new is always happening. This is what lends it its special fascination: always there are new challenges to be met and mastered.

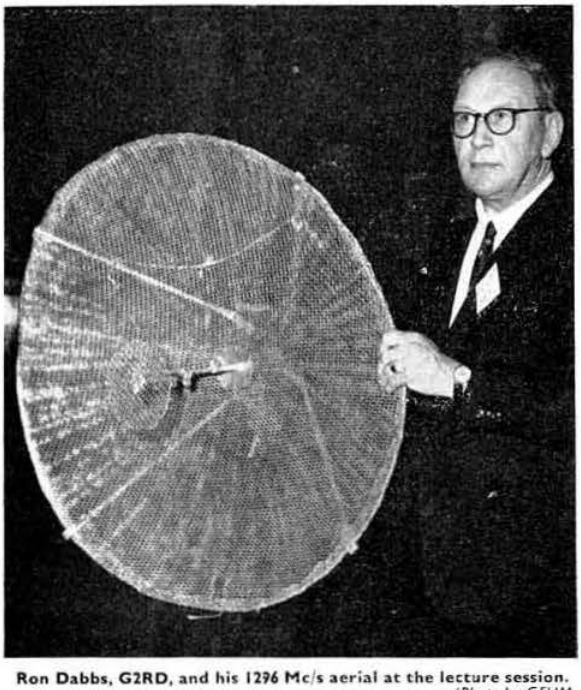
For instance, how would *you* take your first steps on 23cm? Or how would *you* go about organizing a DX-pedition?

Or again, what do you really know about electro-magnetic wave propagation? Or about the vast amount of aircraft radiotelephony traffic that goes on not many megacycles away from your own 2m band (and sometimes in it!)?

These four diverse activities were the subjects for the afternoon lecture session at the Eleventh Annual International V.H.F./U.H.F. Convention held at the Kingsley Hotel, London, on April 10, 1965. When it can be reported that a record number of 190 v.h.f. enthusiasts turned up, and over a hundred stayed on for the dinner that night—many of them joined by their ladies—it will be quite evident that once again the RSGB V.H.F. Committee, with the help of the London U.H.F. Group, had scored a smash hit.

Few of those who went could have failed to learn a good deal about air traffic control from John Graham, G3TR (whose job this is), or about electro-magnetic waves from the Mullard film screened by Peter Balestrini, G3BPT; or, after the tea break, about mastering those slippery megacycles at 1296 Mc/s, thanks to the advice given by Ron Dabbs, G2RD; or about how to organize a v.h.f. portable expedition, ably and entertainingly described by Tom Douglas, G3BA, and Stan Brown, G4LU.

"Where do we go from here?" said V.H.F. Committee Chairman Ray Hills, G3HRH, as he wound up the lecture session at 5.30 p.m. In other words, what would members like to have laid on for them *next* year? Say what you would like to hear: the Committee will endeavour to oblige.



Ron Dabbs, G2RD, and his 1296 Mc/s aerial at the lecture session. *(Photo by G5UM)*

Dr R. L. Smith-Rose replying to the toast to the Visitors and Guests. *(Photo by G5UM)*

Amateur and Professional

In an adjoining room throughout the day visitors could browse over a wealth of intriguing technicalia in the exhibition that included items displayed by a number of well-known BULLETIN advertisers together with a centre-table full of entries in the Constructors' Competition. No mean task faced the panel of Distinguished Guests who had to judge them. Eventually, Robin Greenwood, G3LBA, secured the 1962 V.H.F. Committee Cup for the best exhibit: a tiny s.s.b. rig of marvellous design, itself an incentive to others to try sideband.

The Dinner

The Trophy was handed to G3LBA by RSGB President Eric Yeomanson, G3IIR, during the dinner that evening—and Eric himself was presented with the Grampian microphone which was the dinner raffle prize!

Later, the President acknowledged the toast of "The RSGB," proposed by Mr C. G. Phillips, G5PJ, Chief Telecommunications Engineer of the Ministry of Aviation, and a dyed-in-the-wool DX operator (we hope soon to hear him on v.h.f.).

"The London U.H.F. Group," racily proposed by Austin Forsyth, G6FO, editor of *Short Wave Magazine*, was replied to by Phil Thorogood, G4KD, who is virtually the Group's progenitor; and "The visitors and guests," put by Jack Hum, G5UM, received a drily droll reply from Dr R. L. Smith-Rose, former RSGB President, and one of the leading radio scientists in the land, that won an ovation and cries of "Don't sit down! Tell us some more!"

On this good humoured note the dinner broke up in time for a jam-packed assemblage in the next room for the grand raffle. All that was missing from the prize list was a tin of Zubes for the Ray Hills' larynx that called the numbers and some embrocation for Mrs G5UM's right arm that drew the tickets.

Here's to the Twelfth in '66!

"UNCLE MIKE"

BOOK REVIEWS

A BEGINNER'S GUIDE TO RADIO. George Newnes. 6th Edition. 164 pages.

This book has run to a number of editions and reprints and is well-known. The basic plan and system of illustrations remain the same for this issue but the present editor states that the chapter about transistors has been amplified. As these devices are so common nowadays it is felt that a much greater emphasis could have been made on their use than is, in fact, given in the six pages devoted to them out of the 160 or so in the book.

Published at 8s. 6d., this volume is still a fairly inexpensive " starter " for newcomers to the subject and would make a suitable gift.

K. L. S.

CQ ANTHOLOGY 1945-1952. Published by Cowan Publishing Corp. 160 pages, 6 in. × 9 in. Available from RSGB Publications. Price 16s. post paid.

As the title implies, this book contains a collection of reprinted articles which appeared in *CQ Magazine* between 1945 and 1952. There are some 40 articles in this volume, of which several are undoubtedly of little value, but on the other hand there are a number which are in the nature of classics on the particular subject. Amongst these are two by W. M. Scherer, W2AEF, dealing with grid dip oscillators and the antennascope, whilst amongst the surplus equipment, for which modifications are described, are the SCR-522 BC348 and BC221. There are six articles dealing with aerials and for those interested in propagation research there is a description of an ionospheric storm indicator.

Single Sideband (Continued from page 310)

There is also provision on the rear chassis apron for making muting and anti-VOX connections if these are required.

The manufacturer's performance figures for the SB-300 are as follows:

SENSITIVITY: Less than 1 μV for 15db signal-plus-noise to noise ratio for s.s.b.
IMAGE REJECTION: Better than 50db.
INTERNAL SPURIOUS: Below equivalent aerial input of 1 μV.
DRIFT: 100 cycles per hour after 20 minutes warm up time under normal ambient conditions.
MAINS SUPPLY: Less than 100 cycles for a change of plus or minus 10 per cent.
DUAL VISUAL ACCURACY: 200 cycles on all bands.
DIAL ACCURACY: 400 cycles on all bands after setting against the 100 kc/s calibrator.
BACKLASH: Not more than 50 cycles.

It is clear that the Heathkit company have made a determined effort in both these items of equipment to provide the home constructor with up-to-date communication equipment in no way inferior to the best current designs of completely manufactured transmitters and receivers for amateur use. The prices of 325 dollars for the transmitter and 265 dollars for the receiver compare very favourably with ready built items of comparable performance, and convincingly demonstrate that the time spent in home construction is very well worthwhile.

Two Metre Single Sideband

The writer is at present operating on 2m using equipment designed and constructed by G3HJK. With a modest aerial system comprising a four element Yagi approximately 40 ft. high, excellent reports have been received from all stations called. The G3HJK equipment consists of a transverter unit which accepts the sideband output from the standard G2DAF exciter operating on the 10m range. This is fed into a QQV03-10 mixer where it is heterodyned by a frequency of approximately 117 Mc/s obtained from a 38·9 Mc/s crystal oscillator. The sum frequency output from the mixer is then taken by coaxial cable to a separate p.a. unit using a QQV-06-40 operating as a push-pull class A amplifier. For reception the 2m signal from the aerial feeds into a ECC189 cascode r.f. stage and then to the pentode section of a PCF-801 mixer which receives its heterodyning input at 117 Mc/s from the common oscillator chain. Output from the mixer is taken via a low impedance link winding and coaxial cable to the standard G2DAF receiver which receives the difference frequency (i.e., 145 Mc/s less 117 Mc/s) in the normal 10m band.

In addition the transverter unit is switched to cover the 4m band, using a separate 41·6 Mc/s crystal controlled oscillator. The p.a. unit also has a switched grid input circuit to cover the two bands, the anode tuning for 70 Mc/s and 145 Mc/s being covered by the capacity swing of the tank capacitor. Many a.m. stations not equipped for s.s.b. reception have been successfully worked by turning in a small amount of carrier on the exciter, and all reports of either s.s.b. or single sideband with carrier (a.m. to the receiving stations) about the quality and the strength of the transmissions have been most favourable.

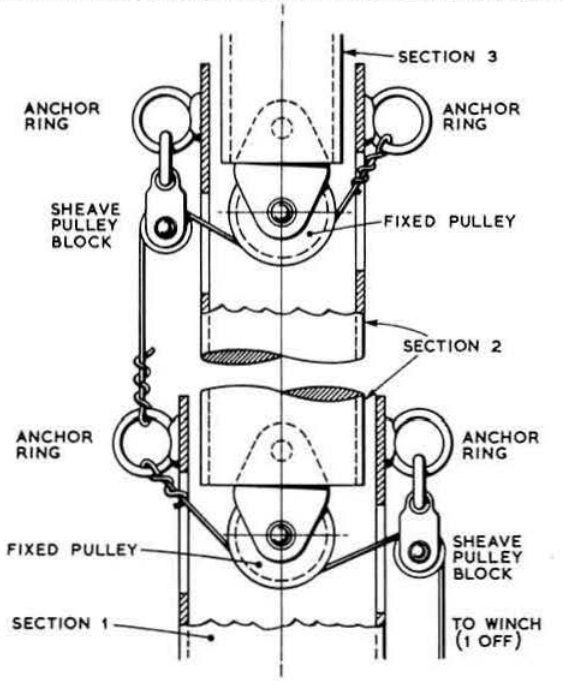
Both units are marvels of compactness, the transverter complete with power supply being in a cabinet 17 in. × 6½ in. × 7 in. high, and the p.a. in a cabinet 14 in. × 8½ in. × 10 in. high. The writer would like to take this opportunity of offering sincere congratulations to G3HJK for a job well done, and is still living in hope that some time in the near future sufficient further circuit details will be forthcoming. It is then intended to publish this information in *Single Sideband* for the benefit of the many sideband operators who also would like to have a go at 2m and 4m transmission.

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. Letters for inclusion in this feature should be concise and preferably not more than 200 words in length.

" Home-brewed Crank-up "

DEAR SIR,—Referring to the article in the January, 1965, BULLETIN by G3LBX on a " Home-brewed Crank-Up," this is an excellent, simple design, but I feel that it could be further simplified as shown in the accompanying diagram. In this arrangement, one winch is dispensed with completely, which is a worthwhile economy.



A modified version of the G3LBX " Home-brewed Crank-up " mast suggested by G3CEU. The guy wires have, of course, been omitted, and both sections are shown fully extended.

Yours faithfully,

Baldock, Herts. N. F. WILSHIRE, G3CEU

GB2RS News Bulletin

DEAR SIR,—Having just listened to the Society's News Bulletin from Derby, I feel I must comment on the operating manners of those amateurs who think that to hold QSOs exactly on 3·6 Mc/s whilst the Bulletin is being read is " clever."

Perhaps it would be of interest to them to learn that not only do they inconvenience the many amateurs who wish to listen to the bulletins, but they also damage their own standing in amateur circles.

The *Oscar III* announcements have been particularly important to those engaged in the experiments, and yet QRM has been particularly bad on the Sundays when the information has been transmitted over GB2RS.

The receiver at A4062 is always crystal calibrated for the bulletin, yet today the transmission was completely spoilt by s.s.b., a.m., and a pirate c.w. station. At least half a dozen calls were recorded as being exactly on 3·6, with many others almost on the frequency. Moreover, some of the calls were of stations that really ought to know better.

Yours faithfully,

Dronfield, Nr. Sheffield. R. CHAPPELL, A4062

QRA Locator System

DEAR SIR,—The QRA Locator system has been slow to find favour among UK operators, complains Mr. R. C. Hills, G3HRH, in his article in the March BULLETIN.

The reason is that the system was ill-conceived from the beginning, and so let us strangle it before it has lived long enough for us to be ashamed of it. The system takes latitude and longitude, which is on every map and which everyone learns at school; it ignores everyone south of 40° N; it then divides degrees longitude by 5 and degrees latitude by 8, and finally counts alphabetically clockwise round the periphery of a square beginning half way across the top edge and finishing in the hole in the centre. What a hotch-potch.

Why convert latitude/longitude to QRA Locator or vice-versa; what is wrong with the international system which has proved quite adequate for location by land, sea or air?

Yours sincerely,

Ramsgate, Kent. R. A. BASTOW, G3BAC

The Multi-Slot

DEAR SIR,—I built up a Multi-Slot the morning that the BULLETIN arrived (1.4.65*). The calculations were made for 160m. The aerial was tested that morning on 160m and 4m—the only bands on which I operate—and the results were really good. On 160m I worked 8E0F, 8E3CC, 8E1CC, 12A7T and finally a 7C5, the latter with only 10 watts input. The results on 4m were even more amazing: 8C1EC, 2T1A/7, and 8F0E once again with QRP, only 3 watts. I must thank a very good friend of mine, a 5Y3, for helping supply the power for all this.

Yours faithfully,

Weybridge, Surrey. C. J. CHENEY, G3RSE

P.S. I have not been able to work anyone except locals after 12.00 on April 1, but I am still fooling around.

* Well, almost—EDITOR.

DEAR SIR,—I read with interest the April 1965 BULLETIN article entitled " The Multi-Slot." I then commenced to calculate the dimensions of this aerial for six-band operation. The equation giving H worked out well, but upon substituting the value of H obtained into the equation giving F_p, the feed point, I realised what a fool I had been to commence calculating anything at all. Let the three given design equations be numbered as follows:

$$H = \frac{\lambda \times 1{\cdot}094 \times 3}{100} \qquad \ldots 1$$

$$F_p = \frac{300{,}000}{f} \times 3{\cdot}282 - (H \times 100) \qquad \ldots 2$$

$$D = H \times 100 - (\lambda \times 3{\cdot}282 + 1) \qquad \ldots 3$$

It is assumed (but not stated in the article) that f is in kc/s and λ in metres.

Equation (1) simplified becomes:

$$H = \frac{\lambda \times 3{\cdot}282}{100} \qquad \ldots 1a$$

Similarly equation (2) becomes:

$$F_p = \lambda \times 3{\cdot}282 - \frac{(\lambda \times 3{\cdot}282 \times 100)}{100}$$

$= 0$ for all values of λ! Why have a design equation at all?

These equations are unnecessarily complicated by the use of $3 \times 1{\cdot}094$ and λ in (1), and 3·282 and $300{,}000/f$ in equation (2).

Continuing with the design equation simplification, the substitution of H obtained from (1a) into equation (3) gives a fascinating result:

$$D = \frac{(\lambda \times 3{\cdot}282)}{100} \times 100 - (\lambda \times 3{\cdot}282\,\lambda + 1)$$

$$= 3{\cdot}282 \times \lambda - 3{\cdot}282 \times \lambda - 1$$

$$= -1 \text{ ft.}$$

Now the writer did not have a rule to measure -1 ft. and so has not constructed a Multi-Slot aerial. The results obtained, however, are easily calculable to five decimal places! (In the original article π was given as 3·14, i.e., to two decimal places—this was obviously done to help readers, not realizing that π should be 3·14159 . . . . to calculate their answers to five decimal places).

Is the conclusion to be, " Ah well, it's April? "

In the simplification of Prof. Vizz's paper it is obvious that the BULLETIN Staff have obtained the opposite of the desired result and have, incidentally left out a vital piece of information: the calculation of the logarithmic spacing of the bars.

Let us see a corrected version of the Multi-Slot design information—this aerial could be a breakthrough in l.f. band aerial design.

Yours sincerely,

Corbridge, Northumberland. G. WATERS, G3OSW

DEAR SIR,—Congratulations on your lucid description of the Multi-Slot. What a pity, though, that this design has been suppressed for so long as it is obvious that a unilateral all-bander for specific frequencies will have enormous appeal to flat dwellers.

In no time at all I had the drill out and made a series of logarithmic slots from solid copper rods but was disappointed to find that the 21st harmonic was pulled some 2 Mc/s off frequency when the Multi-Slot was in the vertical position.

While cogitating on this I decided to re-check your calculations during which time a heavy shower of rain took place. Casually tuning round on Top Band (on my ancient 0-V-1) I was amazed to hear Ws coming in at 40db over 9! After more cogitations I suddenly realized what had happened. Having faithfully copied your faulty design the grid had filled with water and as the waveguide did not seem to be connected to the grids they were unable to drain back into the transmitter and were now resonating (at water-medium wavelengths) as a multiwave Top Band beam.

I am only passing on this experience because I am getting rather tired of being the only 50 mA solid state transmitter operator to work all States.

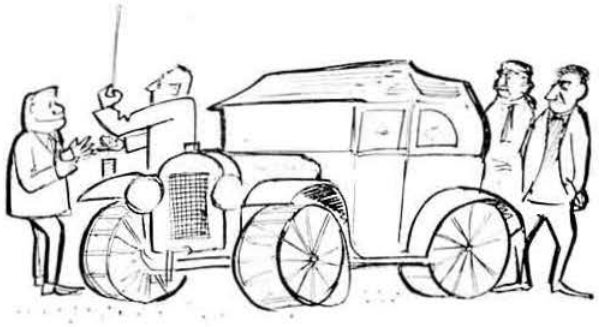
It may not be generally known that a wavelength of 160m is only about 1 ft. in water. As a matter of fact, as I write this, I have two feet in water while experimenting with loading the slot vertically (upside down) in the lily pond so that I shall not have to wait for rain to fill the slots.

Hoping these wrinkles may be of assistance to others with furrowed brows.

Yours faithfully,

Westhoughton, Nr. Bolton, Lancs. J. KNIGHT, G3RYT

DEAR SIR,—The article by Professor Vizz was most timely, coming as it did at the opening of the mobile season. As the accompanying sketch shows, I have adopted the aerial by using it in place of all four road wheels of my car, and to date results



have been nothing short of immense. In fact, as you can see I am actually shown giving away my loaded whip to an SWL.

Yours faithfully,

J. WORTHINGTON, G3COI

Penn, Wolverhampton, Staffs.

Can You Help?

● E. H. Hildreth, G3GEU, 6 Claremont Drive, West Hartlepool, who would like to hear from anyone who uses the Heathkit OS-1 for measuring the output power of an s.s.b. transmitter?

● A. J. Lowndes, secretary of the Radio and Electronics Club, c/o Personnel Dept., English Electric Co. Ltd., Kidsgrove, Stoke-on-Trent, Staffs., who requires the loan of a handbook for the frequency indicator type CRR 74028, model LM13?

ONCE UPON A FIELD DAY

By ALEC D. VANCE

MUST get into NFD lark.
Slight snag.

All gear mounted in five 6 ft. racks bolted to floor interconnected by 627 cables. Built like battleship—real solid to stop xtal osc. being vibrated. Employ latest techniques for freq. stability. Run xtal osc. unit in Baby Belling oven. Spare xtals repose on hot-plate: ready to go temperaturewise. Shack sure cosy in winter. Dicey place in summer if room refrigeration fails. Have to strip off starko.

Can't take this lot.

Have to knock something up quick.

Must be a transceiver.

Don't like transceivers.

Last one blew up.

Four 240μF smoothers exploded like bombs punching great holes in ceiling. Shack vanished in "goo," froth, silver paper, and a thick, sticky, white fog. Couldn't get back in for days. Old '3YYY reckons I must have had oodles of r.f. in h.t. line.

Look through valve books for ideas. Never understood these danged things. Lots of chat about Max volts and Max current. Can't find Max in dictionary. Must be name of guy who made measurements. Gee—this boy's sure been busy.

After many weary hours arrive at tx design. Hot 6J5 Pierce oscillator capacity coupled to 6L6 p.a. Single knob control "P.A. TUNE" for rapid tune-up. No fear of TVI on moors, so leave out a.t.u. Never used one before PO insisted would help stop district wide screen blank-out. Use old faithful method. Hook aerial straight on to p.a. tank coil. Will fit 30 amp meter to measure "go" in aerial. Don't understand cathode keying. Key h.t. to p.a. Put 200μF across key. This'll stop sparking.

Now to rx section. Nothing complicated. l.f. version of 2m receiver. Two tube design with power boosted superregen detector. Real hot stuff on 144 Mc/s. All locals comment on it. Still gives me a thrill to hear my name mentioned on the air. Strange thing. They use some odd words. Guess my dictionary's out of date.

Post brings lots of adverts from Neverwolop Universal Technical Suppliers,—N.U.T.S. for short. Doing a special line in weightless super miniature h.t. batteries. Ad very convincing. Reckon these atomic age units virtually everlasting, unbreakable, waterproof, rot proof, anti-magnetic and incorporate unique method of showing supply available. Go up to 300V. I need 600V.

Phone them. Gen type YL says they'll make a special for me for free if they can use my call in their ads. Size one inch up on 300V type.

Get some info on their silver plated elastic chassis. Real genius type idea this. Punch small hole with pin and stretch it round valve base. End of all drilling es hacking. Ally and steel sure had it in a big way. Sending me free sample. Brother, this sure makes home construction a doddle.

Order all bits and smart S-line cabinet.

Now the impatient wait.

Battery arrives. Obviously a mistake as package 48 in. × 48 in. × 20 in.—hardly miniature. What is more, it seems to float about 18 in. off the deck on a sort of pink/green haze. My BR friend looked real scared as he towed it up front path. All white and shaking he was.

"Cor—don't you ever get nuffink normal mate?" he questioned.

Hastily phone N.U.T.S. Gen YL says not to worry. Quite in order for their batteries to be poised in air. Shows charge well up. When on deck, battery run down. Sorry about mix up over size. Printing error on leaflet. Sizes should read inches not millimetres. Somebody goofed. Quite understands won't fit inside cabinet. Suggest stand cabinet on battery es use long legged chair. Between tears pleads with me to keep battery. All others returned. Factory in danger of taking off. Oh well—I always was a sucker for a sob story.

Day before NFD all bits arrive. Elastic chassis comes in small envelope.

Good job tx/rx simple design. Reckon just time to dash it together. Have to check it out at /P location. Still nothing to go wrong in straightforward circuits.

Ye Gods!! Elastic Chassis must have been a bit short of elastic when they made this one. Have a right old struggle getting last valveholder in place. As fast as I get it in, another one catapults out like a super powered missile. Whole lot looks a bit knotted. Panel bends under strain. Miscalculation somewhere. All dials overlap.

Run into unexpected snag when making earth connections to chassis. Heat of iron evaporates chassis in cloud of dense black evil smelling smoke leaving large hole with sticky edge. Four holes later give up trying. Make earth connections to panel.

Get to bed at 3.30 a.m.

Load up Daisey. Decide to tow h.t. battery. Get some mighty odd looks from Police in car at end of road. They give chase. Oh heck—it's HIM—old tar nose in person. Now I'm for it.

"Hello Officer!"—all nice and cheery "Good to see you again!"

His face turned a peculiar purple colour.

"Where's the wheels for your trailer?"

"What trailer?"

"That trailer," jerking a thumb in the direction of the h.t. battery gently bobbing up and down in its pink/green aurora.

"But it's not a trailer."

"It's being towed—so it needs wheels," he exclaimed.

"Oh no, Officer—if it was a trailer it would have wheels, but it isn't, and it hasn't. It's being towed—yes—but then a barge is towed and that doesn't have wheels does it? A barge floats, and that floats"—pointing to THE battery—"so it doesn't need wheels either."

His eyes went all sort of glazed and dreamy, his mouth sagged open, and his shoulders drooped. Suddenly, he whipped off his helmet, flung it in the road and started a war dance all over it.

Quietly we drove off.

Arrive at site. Fit up tent. Use renown "sock-in-it" whip as pole for one end of long wire. Tie other end of 264 ft. of 7/029 to front tent post. Real curvey radiator. Drops to 6 in. above ground. Soon fix this. S.l.o.w.l.y. drive Daisey away from tent. Aerial sure taut now. Halfway back to tent. Ghastly sound of ripping linen. Tent jumps clear off ground and whips off in the direction of Daisey. Loudest scream ever from XYL. Was changing into slacks. Decidedly overexposed.

Restore order. Two minutes to go. Hand poised above key.

"Time" shouts XYL.

Press key. Aerial current over 30 amps. Wow!!—some bottle this 6L6. Call rapid CQ. Check band. No calls.

Press key again. Distinct sighing noise from h.t. battery. Funny thing, aerial current always 30 amps irrespective of p.a. tuning. Good TX this. Or is it? Sighing of battery now changed into a long low moan when key pressed.

Better check. Switch off. Have BIG think.

Basic principles first. Test for r.f. Hang neon on aerial. Press key. Neon dead. Current 30 amps. Get XYL to hold key. Tear up and down aerial with neon. Him no light. Try

another, then another and yet another. Must all be dud. H.t. battery now shrieks when key pressed. Feel 6L6. Dead cold. Measure h.t. Oh dear! Only 6V.

Examine circuit. Slight error. Have wired key and meter across h.t. supply. Rewire. Press key. Aerial current now nil, but, for some obscure reason, headlights on Daisey come on full blast. What with that and big bangs from battery, its like being in thunderstorm. XYL gets the giggles. Big comfort she is.

Decide to listen to note in rx. Steady T1. Release key. Takes a full two minutes to fade away. Sounds like an express train going into a long tunnel. Clip off 200μF across key. That's better. Much fizzing on key contacts, but keying now real clickerty-click-click sharp.

After an hour decide must have a rest. Din from battery no longer funny. Can hear explosions through ear plugs. It's like being in middle of artillery barrage. XYL seems to have disappeared. Find her crouched up on back floor of car with biscuit tin over head. Says she is waiting for battery to disintegrate. Charming.

Spot large and small van using moorland road like M1. Large van sprouting whips and D/F loops all over. Real technical looking outfit. Cut off road and belt up to us. Six very, very large men tumble out.

"You G3ZZZ/P?"

"Yes."

In a flash the biggest fellah whips out a pair of wire cutters and—snip—down comes my aerial.

"You're closed down."

"Who said?"

"I said."

"Why?"

"'cause (a) on every 1·84 Mc/s step from 1·84 Mc/s up to beyond 180 Mc/s your transmitter radiates equal power, (b) on three of those frequencies you have keyed off defence networks placing NATO in a state of Red Alert, (c) on another frequency you have called out all the lifeboats. . . . Shall I continue?

* * *

Oh, incidentally, if you are up on the moors and come across a 48 in. × 48 in. × 20 in. package floating on a pink/green haze—leave it there.

I did.

NORTHERN IRELAND MOBILE RALLY

Nutts Corner Aerodrome, Co. Antrim
MAY 30, 1965

A full and entertaining programme has been planned, and among the principal events will be Police demonstrations, TA Signals demonstrations, a Civil Defence display, St. John's Ambulance and British Red Cross.

A talk-in station on 70·26 Mc/s will be in operation from 10 a.m. During the event the main rally station will be transmitting on all the h.f. bands using a special call-sign.

A wide variety of events is planned to appeal to operators, XYLs and juniors, and valuable prizes will be offered. Adequate catering facilities will be provided.

Organized by the Belfast and District RSGB Group

ITU Centenary

In commemoration of the ITU Centenary on May 17, 1965, the Society will operate a special station using the call **GB2ITU**. This station will operate continuously during the weekend May 15-16, and also on May 17, using all bands from 3·5 to 432 Mc/s. Transmissions will be on c.w., a.m. and s.s.b. A special QSL card will be issued to confirm contacts and incoming cards should be sent via the RSGB QSL Manager, G2MI.

As announced last month the call **GB3ITU** will be used by the Secretary of IARU Region I at various times during the Centenary year.

On May 16 and 17 the International Amateur Radio Club will also be operating special stations using six calls in the series **4U1ITU-4U6ITU** for stations in the bands between 1·8 and 144 Mc/s. Operation will take place around the following spot frequencies: 1810 and 1830 kc/s; 3503 and 3797 kc/s; 7003 and 7045 kc/s; 14,113 and 14,292 kc/s; 21,050 and 21,400 kc/s; 28,050 and 28,625 kc/s, and 145·1 Mc/s. Commemorative QSL cards will be issued.

It is understood that a special station will also be operating from Paris, but details are not yet available.

Royal Naval ARS Mobile Rally

To mark this Society's fifth year of existence a rally is to be held at HM Signal School, HMS *Mercury*, East Meon (about 10 miles north of Portsmouth) on May 30, 1965. The site is readily accessible from the A3 and A32 roads from which it will be signposted by the AA. Talk-in stations GB3RN will operate on 1880 kc/s, 70·26 Mc/s and 144·2 Mc/s; and G3BZU will operate on 3720 kc/s s.s.b. from 09.00 BST. Entrance to the rally will cost one unopened bottle of anything or 6d in lieu per person. The station band will give two concerts during the afternoon, and a full programme of displays, etc., is being organized. Further details are available from G3JFF, HMS *Mercury*, Leydene, Petersfield, Hants.

RAEN Membership

A number of members of the Radio Amateur Emergency Network have not yet submitted their cards for re-registration during 1965. Those who wish to remain members are requested to forward their cards to the RAEN Registration Secretary, Mr J. G. Denny, 40 Canada Road, Woolston, Southampton, Hants., as soon as possible. The registration cards should normally be received by Mr Denny before December 31 for date stamping as validation for the ensuing year.

Bulletin Contributors

Members who are prepared to contribute articles to the Society's Journal are reminded that some notes are available to help them prepare manuscripts in a form that will assist in securing uniformity of presentation, simplify the work of the Society's printers and draughtsmen and help ensure that their instructions are easily understood. A copy of *Hints to Contributors* can be obtained on application to the Editor.

All contributions to the Society's Journal including those for the *Clubroom* and *Forthcoming Events* features should be typed with double spacing between lines using one side of the paper only. Information for the RSGB BULLETIN should not be included on the same sheet of paper as material for news bulletins.

Photographs should be clear and sharply focused. Prints should preferably be glossy and should contain information of general interest to members. Captions should be written on a separate sheet of paper.

The amount of the copyright fee paid to contributors to the RSGB BULLETIN ranges from £2 2s. to £5 5s. per 1,000 words.

News from Headquarters

Symposium on Amateur Radio

A new venture, believed to be the first ever organized by an Amateur Radio club, will take place at the new Residential Youth Centre at Ollerton, Nottingham on September 11 and 12, when a symposium for youth leaders and teachers in Nottingham under the title " The Hobby of Amateur Radio " will be held.

The symposium is being organized by the Newark (Nottingham) and District Amateur Radio Society and sponsored by the Radio Society of Great Britain. It will consist of a course of lectures and practical demonstrations designed to introduce the hobby into schools and the youth service.

There will be a parallel residential course at the centre to which established amateur radio enthusiasts from the East Midlands are being invited. At certain periods the two courses will be combined so that the enthusiasm of established amateurs will be communicated to would-be beginners.

Lectures will be given by prominent speakers, including RSGB Council members, of international repute and will cover all aspects of Amateur Radio.

The new residential centre, lying in the heart of the Robin Hood country, is equipped with all modern facilities including a swimming pool, some of which will be available to guests at the symposium.

Beacon Stations
ZE1AZC (50·046 Mc/s) and ZE1AZD (1,801 kc/s)

These stations are operating continuously in connection with the research being undertaken by the Cyprus and South Africa Propagation Study Group, who also operate ZC4WR on 29·008 Mc/s. There have been some reports of both ZE1AZC and ZE1AZD being heard in the UK but these have been too few to establish any type of pattern, and a much greater number of reports would be welcome. These should give times (in GMT), signal strength and type of fading noted, and may be sent to G2BVN, c/o RSGB Headquarters, for collation and despatch to the Project Co-ordinators ZC4WR and ZE2JV.

REGION 1 OFFICIAL REGIONAL MEETING

The Imperial Hotel, North Promenade, Blackpool

SUNDAY, MAY 16, 1965

12.15 p.m.	Assemble
1.15 p.m.	Luncheon
2.30 p.m.	Business Meeting
5.15 p.m.	Buffet Tea

Top Band talk-in stations will be in operation: outstations G3TNN (St. Annes) and G3OCX (Cleveleys) should be called first, followed by the Imperial Hotel station G3UCA/A.

The proceedings will include a raffle of components donated by members. The hotel is fully licensed, and has ample parking space.

Headquarters will be represented by L. N. Goldsbrough, G3ERB, Zonal Representative, F. K. Parker, G3FUR, Council Member, and John A. Rouse, G2AHL, General Manager, and Editor of the RSGB BULLETIN.

Admission will be by ticket only, available until May 10, price 25s. each, from:

B. O'Brien, G2AMV, 1 Waterpark Road, Prenton, Birkenhead, Cheshire.

H. G. Newland, G5ND, 161 Penrose Avenue, Marton, Blackpool.

Radio Research Station

The DSIR Radio Research Station at Ditton Park, Slough, Bucks, has for many years been engaged in research into the fundamentals of radio wave propagation through the ionosphere and troposphere. Recently, however, about half of this work has been concerned with the use of space satellites and rockets, and the name of the station has accordingly been changed to the *Radio and Space Research Station.*

Affiliated Societies

The following societies are now affiliated to RSGB:

BATTERSEA COLLEGE OF TECHNOLOGY ELECTRONICS AND AMATEUR RADIO SOCIETY:
c/o Students Union, London, S.W.11.

DUNFERMLINE RADIO SOCIETY:
c/o A. Lawrence, 40 Blake Street, Brucefield, Dunfermline, Fife.

FAREHAM AMATEUR RADIO CLUB:
c/o N. Carless, 16 Waterloo Road, Alverstoke, Gosport, Hants.

GOVERNMENT COMMUNICATIONS AMATEUR RADIO CLUB:
c/o E. A. Fowles, Benhall, Gloucester Road, Cheltenham, Glos.

HAVERING & DISTRICT AMATEUR RADIO CLUB:
c/o P. J. Moore, 1 Bons Farm Cotts, Stapleford Tawney, Romford, Essex.

HEANOR & DISTRICT RADIO SOCIETY:
c/o R. Harrod, 36 Lodge Road, Newthorpe, Notts.

NORTHAMPTON COLLEGE LONDON AMATEUR RADIO SOCIETY:
c/o M. Stevens, Northampton Hall, Bunhill Row, London, E.C.1.

SALOP AMATEUR RADIO SOCIETY:
c/o K. E. Jones, Greystones, Shrewsbury Road, Church Stretton, Salop.

Representation

The following are additions to the list of Affiliated Society Representatives:

CRYSTAL PALACE & DISTRICT RADIO CLUB:
G. M. C. Stone, G3FZL, 10 Liphook Crescent, Forest Hill, London, S.E.23.

LICHFIELD AMATEUR RADIO SOCIETY:
V. Hickman, G3LXR, 2 Church Road, Stonnall, Walsall Wood, near Walsall, Staffs.

SOUTH BIRMINGHAM RADIO SOCIETY:
N. Gutteridge, BRS25474, 4 Middlemore Place, Wellesley Street, Lozells, Birmingham 19.

SOUTH SHIELDS & DISTRICT AMATEUR RADIO CLUB:
K. Sketheway, BRS20185, 51 Baret Road, Newcastle-on-Tyne 6.

The following is an addition to the list of Area Representatives:

BELFAST & DISTRICT:
S. H. Foster, GI3GAL, 31 Belmont Park, Belfast 4, N. Ireland.

RSGB National Mobile Rally

United States Air Force Base, Wethersfield, near Braintree, Essex

SUNDAY, JUNE 6, 1965

To be opened at 11 a.m. by Col. Baer, Wing Commander of the USAF Base

Talk-in stations will be operating from 10 a.m. GB3RS on 1·8 Mc/s; GB2VHF on 70 Mc/s and 144 Mc/s

The proposed programme includes:

Mobile installation competition, trade exhibition, grand raffle, exhibition station, static aircraft display, RTTY display, fire-fighting display, Go-Karts, PT display, drill display, model aircraft demonstration, dog display, baseball match, Civil Defence display, Laser demonstration, a tour of the control tower, and a children's lucky dip.

Refreshment stalls will be available, and there will be two acres under cover. Car parking facilities have been centralized.

Further information will be broadcast in GB2RS News Bulletins

Organized by the Radio Society of Great Britain

Radio Amateurs' Examination

The winter examination will take place this year on Thursday, December 9, from 6.30 p.m. to 9.30 p.m. The fee is £1 10s., and all candidates must apply to a local examination centre by November 8, although some technical colleges close for applications earlier than this. Late entries will not be accepted.

RAE Course

The Surrey County Council Education Committee is considering forming an evening class for the Radio Amateurs' Examination, which will probably be held in the Woking area. The course will begin in September, 1965, provided enough applications are received. Those interested should forward their names and addresses to Mr H. C. Pryse, 36 Hart Road, Byfleet, Weybridge, Surrey, who will pass them on to the SCC when sufficient are obtained.

Instructor for RAE

Mr. Goldsmith, the Principal of Battersea Institute, Latchmere Road, S.W.11 (Near Clapham Junction), requires an instructor to continue his Institute's RAE course, commencing September 1965, for the May 1966 examination. The pay is 42s. for 2 hours, and 59s. for 3 hours. The class normally lasts 3 hours each week. Mr. Goldsmith's telephone number is BATtersea 5876 (2-10 p.m.).

Silent Keys

We record with sorrow the passing of the following amateurs:

E. C. Woods, G3FST, of Northfleet, Kent.

M. J. Drakes, G3TVE, of Lincoln.

J. B. Corbin, VK2YC, of Eastlakes, N.S.W., Australia.

A. S. Brown, BRS705, of Sidcup, Kent.

Special Events Station

On May 21 and 22, between 12.00 and 22.00, members of the Wimbledon and District Radio Society will be operating /A at the Wimbledon Handicrafts Exhibition at the Community Centre, Wimbledon. Contacts will be welcome on all bands from 160m to 10m.

RSGB Intruder Watch

Correspondence for the Intruder Watch should be addressed to the Honorary Organizer, RSGB Intruder Watch, Radio Society of Great Britain, 28 Little Russell Street, London, W.C.1.

Area Representatives Badges

Badges for Area Representatives are now available from RSGB Headquarters, price 10s. each including postage.

Receipts

Receipts for subscriptions paid by cheque, bankers' order or postal order are not now issued unless specially requested.

Eddystone Radio Equipment

Stratton and Co. Ltd. have announced that the Eddystone radio business has been purchased by the English Electric Co. Ltd., and will become a subsidiary of the Marconi Co. Ltd. The title of the Company is being changed to Eddystone Radio Ltd., but all orders will continue to be handled as in the past until further notice.

Correction

In the Headquarters Fund List 25 published on page 251 of the April issue, the total amount contributed should have been shown as £2020 8s.

Amateur Licences

On March 31, 1965, 11,139 Amateur (Sound) Licences A, and 196 B were in force; 1799 held Mobile Licences A and 2 B. In addition, 164 Amateur (Television) Licences had been issued.

Society Affairs

Brief Report on the March, 1965 meeting of the Council

THE March meeting of the Council was held on Saturday March 6, 1965, and was attended by Messrs. E. W. Yeomanson (President), N. Caws, J. C. Graham, E. G. Ingram, L. E. Newnham, J. Fraser Shepherd, R. F. Stevens, G. M. C. Stone, J. W. Swinnerton (Members of the Council), and John A. Rouse (General Manager and Secretary).

Apologies for absence were submitted on behalf of Messrs. H. A. Bartlett, J. C. Foster, L. N. Goldsbrough, R. C. Hills, R. H. James, A. O. Milne, F. K. Parker, A. D. Patterson and Louis Varney.

Committee Recommendations

The Council accepted recommendations relating to the formation of an investment company to own the proposed new Society Headquarters (Finance and Staff Committee), to the Tenth Anniversary Rally at Oxford and the Northern Ireland Mobile Rally (Mobile Committee), to the RSGB 70 Mc/s Band Plan (V.H.F. Committee), to a weekend training course at Newark and to the Essex Easter Science Teachers' Conference (Education Committee) and the results of the Second 70 Mc/s Contest 1964 (V.H.F. Contests Committee).

Membership

The Council approved 173 applications for membership (124 Corporate and 49 Associate). In addition, 12 applications for transfer from Associate to Corporate grade were accepted. The subscriptions of two applicants were waived on the grounds of blindness. The subscription of a blind member was also waived.

Affiliation

The Council granted affiliation to:

Fareham Amateur Radio Club
Heanor and District Radio Society
Northampton College London Radio Society
Salop Amateur Radio Society

RSGB Amateur Radio Handbook

It was agreed to place an order with the Garden City Press Ltd. for another printing of the *Amateur Radio Handbook*.

New Publications

Quotations submitted by the Garden City Press Ltd. for printing the 1966 edition of the *Call Book* and for a new technical publication were accepted. (The Garden City Press Ltd. is the name used by Loxley Bros. Ltd. for their Letchworth plant where most RSGB publications are now produced.)

Reciprocal Licensing

The President reported to the Council on recent developments in the Society's long campaign for reciprocal licensing facilities (The successful outcome of these activities was reported in the April issue of the BULLETIN.—EDITOR).

Region 7/8 ORM

Approval was given to the organization of a joint Region 7/8 Official Regional Meeting on June 27.

International Amateur Radio Union

The Council agreed to cast the Society's vote in favour of the admission to IARU of the Radio Society of Zambia and the Bahamas Amateur Radio Society.

Region 1 ORM

The Council approved a proposal to hold an official Regional Meeting in Blackpool on May 16.

Reports of Committees

The Council received reports of the following meetings of Committees:

V.H.F. Contests (6.1.65), H.F. Contests (7.1.65), Finance and Staff (1.2.65), Mobile (4.2.65) and V.H.F. (8.2.65).

* * *

The meeting ended at 4.45 p.m.

GB2RS SCHEDULE

RSGB News Bulletins are transmitted on Sundays in accordance with the following schedule:

Frequency	Time	Location of Station
3600 kc/s	9.30 a.m.	South East England
	10 a.m.	Severn Area
	10.15 a.m.	Belfast
	10.30 a.m.	North Midlands
	11 a.m.	North West England
	11.30 a.m.	South West Scotland
	12 noon	North East Scotland
145·10 Mc/s	9.30 a.m.	Beaming north from London
	10.00 a.m.	Beaming west from London
145·8 Mc/s	10.15 a.m.	Beaming south from Belfast
145·30 Mc/s	10.30 a.m.	Beaming north west from Sutton Coldfield
	11.00 a.m.	Beaming south west from Sutton Coldfield
145·50 Mc/s	11.30 a.m.	Beaming north from Leeds
	12 noon	Beaming east from Leeds

News items for inclusion in the bulletins should reach Headquarters not later than first post on the Thursday preceding transmission. Reports from affiliated societies and from non-affiliate societies in process of formation will be welcome.

Writing to Headquarters?

When writing to Headquarters please use separate sheets of paper for:

Changes of Address (return a wrapper from the *Bulletin* if possible)
Orders for Publications
Queries
Bulletin Items

When paying your subscription please return the reminder card sent to you by Headquarters or quote the date on which your subscription falls due.

Whenever you write to Headquarters please write your name in block letters and quote your call-sign, BRS or A number.

RSGB 7 Mc/s DX Contest

The 7 Mc/s DX Contest held on October 31-November 1 (Telephony), and November 21-22 (C.W.) created more interest than in the two previous years. There is a record 214 entries for the c.w. section which includes a welcome increase of home entrants. Even so, there is still room for an even bigger number of entries when it is realized that overseas entrants outnumber the UK by 3 to 1 or more.

The inclusion this time of a multi-operator section has resulted in G8FC, operated from RAF Locking becoming the leading station with 3039 points. Runner-up in this section is GW3GHC whose operators totalled 2755 points.

The leading single-operator certificate goes to B. D. Simpson, G3PEK, with 2858 points. Taking second place with 2795 points is R. G. Cary, G3DYY.

Committee's Comments

Generally the contest appears to have been enjoyed despite strong European QRM and the lack of signals emanating from VE who can usually be relied upon for a fair portion of the points for Gs. The USA were not very prominent, though a clash with a States-only contest on the Sunday kept some away. Only three or four VKs were heard or worked and so far as can be gleaned from the logs, ZL1HV was the only signal from New Zealand. He made only one contact, this being with G8PB and took nearly half-an-hour to complete. It should be noted that the leading station in the Receiving Section, BRS24775, heard the contact, he being the only one in this section to do so.

On the other side of the record is the fact that several letters from VK or S.E. Asia report hearing and calling many G stations but it would seem that they were inaudible through the terrific European QRM. It comes down to the fact that many home stations could not dig deep enough into the cacophony. A pity.

The rules were approved in the relatively few comments received, but there are one or two suggesting 24 hours only as the last six hours become an endurance test, and an idea of running it from 18.00 to 18.00 rather than 24 hours from 12.00. These points will be considered for the 1965 contest by the Committee.

Logs were received in what is now the customary good form regarding clarity and style. The main trouble resulting in the loss of points for UK stations was the geographical location of Russian states. Several concluded that all of the U call signs were east of the Urals. Quite a lot of overseas competitors possibly referred to rules for 1963 and claimed bonus points for each 10 British stations contacted. This created an alarming loss of points. As an aside the Committee wishes to point out that Iceland (TF) is in Europe.

The Telephony Contest has been won by L. M. Lyske, GI3CDF, who totalled 1614 points. Second place in the single operator section (there were no multi-operator entries) is taken by G5HZ/P with 1370 points. Here the general opinion was that there was insufficient home activity and what little DX there was had great difficulty in breaking through the European QRM.

E. Howell, BRS24775, is the winner of the Receiving Section (C.W.). This is his second successive triumph in this competition. R. S. Unsworth, A3633, is to be congratulated on being runner-up with 2050 points. He did not compete last year.

The Telephony Section of the Receiving Contest was finally resolved by D. G. Rumsley, BRS22844, who won by the narrow margin of 20 points over L. Margolis, A2111. The former was sixth in the C.W. Section last year and the latter fifth in the Telephony.

Comments from Competitors

" What happened to GM land? My rx cannot be that bad"— DJ2SR; " I think the new rules are a great improvement though European contacts dominate despite ' DX ' label"—G2DC; " Conditions as good as in the two previous years, though did not hear VE or ZL—have no quarrel with rules or duration of contest"—G3DYY; " Having retired at 13.19, exhausted, I feel it becomes an endurance test after 24 hours"—G3HQT; " 30 hours rather too long, would like to see the first six hours dispensed with"—G3JVJ.

G3OLN sent in a log for the Telephony Contest, but with his entry for the C.W. Section he enclosed a letter asking that both entries be treated as check logs. The reasons for the decision were that while operating on the Sunday morning of the C.W. Contest, G3OLN " was appalled at the lack of operating ethics displayed by the majority of the stations heard including some who should have known better." Also, he wrote that " it occurred to me that contest operation, at least in its present form is seriously detrimental to good operating practice and contrary to the true spirit of Amateur Radio."

There were several other interesting letters and comments but to do them justice they would require publishing in their entirety. Among these was a two page commentary of the C.W. Contest by BRS24775. This made most interesting reading but the recording here of a paragraph or two would be unfair to the author.

Check logs from EA2CR, DJ9OZ, DM2BJD, G3OLN, HB9DD, LA5IH, OH2BDS, OK2KHD, OK3BA, PA0WAC, SM5BGK, SM5BNX, SM5CPD, SM5DVE, SP2AEL, UA1KIL, UA1SW, UA3FD, UA6KLA, UA9TW, UW3MX, UW9CS and ZL1HV in the C.W. Section, and from G3MWZ, G3OLN, OH2TJ, OK1ADM and 9M2LO in the Telephony Section are most gratefully acknowledged by the Contests Committee.

RECEIVING SECTION (TELEPHONY)

Position	Identification	Points	Position	Identification	Points
1	BRS22844*	1490	10	BRS25429	640
2	A2111*	1470	11	A4124	595
3	A1798	1145	12	A3724	560
4	A3942	1090	13	A4065	480
5	NL455 (Fred Weidema)*	1005	14	A3539	285
6	BRS19682	990	15	A2966	240
7	DE-15143-105 (Wolfg Künning)*	855	16	A4273	225
8	A3670	810	17	A4093	105
9	Rolf Johansson (Sweden)*	760	18	JA1-3619 (Nobuyuki Toyama)*	75

* Certificate Winners

C.W. SECTION (Single Operator)

Posn	Call-sign	Points
1	G3PEK*	2858
2	G3DYY*	2795
3	G2DC	2715
4	G8PB	2675
5	G3HQT	2660
6	G3KSH	2639
7	G3FM	2595
8	VK5ZP*	2570
9	G2QT	2422
10	G3MXJ	2375
11	G3HS	2315
12	G3EYN	2235
13	GW3JI*	2185
14	G5HZ	2110
15	GW3CW	1965
16	G3IGW	1945
	G3JVJ	1945
18	G8AB	1880
19	G3PDL	1830
20	UA9DN*	1725
21	G3MGL	1645
22	W2JAE*	1620
23	G2GM	1605
24	G3APN	1530
25	G6TC	1440
	G6VC	1440
27	G3SEP	1400
	G8MY	1400
29	G3NST	1240
30	DJ7LQ*	1205
31	SP8AOV*	1152
32	SM5DKH*	1150
	SP4TW	1150
34	I1NT*	1126
35	SM6CMU	1125
36	DJ5JH	1120
	G3FTQ	1120
38	G2TH	1110
39	G3TJD	1100
	UA9WS	1100
41	OK2BEC*	1084
42	G3KZR	1080
43	F8OP*	1055
44	G3TKK	1045
45	G3NSY	1035
46	DJ2YE/LX*	1034
47	OK3UI	1025
	PA0LV*	1025
49	OH5VF*	1015
50	DL3MO	1002
51	G3GGS	1000
52	UP2OM*	995
53	OZ1LO*	985
54	G3GSZ	980
	SM5AOG	980
56	G3RWL	960
	G8KU	960
58	OZ1TL	950
	SM5DXE	950
60	LA2HC*	945
61	SM5CCF	930
62	ON5AX*	925
	PY4AP*	925
64	G3HZL	920
	SM5BDY	920
66	DJ8IF	915
67	DJ1XI	895
	GM3PGO*	895
	UP2PT	895
70	OH1WM/2	885
71	OZ7BW	880
72	PA0VB	875
73	G2DSF	870
74	G3JKY	865
75	SP5YC	859
76	OK1SV	845
	SM7DQK	845
78	OK1AFN	840
	SP9AMA	840
80	UL7IR*	835
81	OH3ZN	833
†	SP5ZA	820
82	F8TM	815
	LA7H	815
84	PA0VO	810
85	G5JU	800
86	OK3SL	785
87	9M4LP*	770
88	F2PO	760
	SP6TQ	760
	YU1NFP*	760
91	G3RCY	750
	TF3AB*	750
93	G3SFR	745
	GM3TLI	745
95	OH3NV	738
96	LA6CF	735
	SP9YP	735
98	DL3WC	730
99	SL3AJ	702
100	SM5DSF	700
101	SM3TW	684
	W8JIN*	684
103	SP8MJ	669
104	HA0HN*	665
	YU1DVW	665
106	SM6CVX	660
	UA6GB*	660
108	OH6VP	650
	OK1LY	650
110	SM4DXL	644
111	EA2DT*	635
	PA0MAR	635
	YU1NGO	635
114	SP8AJK	630
115	UC2AR*	620
116	OH6UE	610
117	G8TK	600
118	VK3XB	595
119	F3JL	592
120	OH2BH	580
	OH5UQ	580
122	G3ORU	570
	SM5BUT	570
124	PA0LIS	565
125	SM5CZK	560
126	OZ4DX	555
127	EI9F*	553
128	VK4SS	550
†	SP8CK	545
129	HA5KFZ	540
130	YU1YG	537
131	OZ4H	535
132	PA0WDG	529
133	HA9PB	527
134	EP2BQ	525
135	LA2Q	522
136	ZB1J*	515
137	YU1AG	509
138	UP2NR	508
139	OH2PM	505
	SP9AGS	505
	GI3OLJ*	500
141	OH2NB	500
141	ZC4CZ	500
144	DJ5QK	495
145	F9DW	493
146	OZ7KV	475
	UA3XN*	475
148	UO5AA*	455
	UT5BW*	455
150	F3AT	450
	SM6ARH	450
152	SM5DFM	445
153	OK2QX	440
154	OK1DK	435
	SM3DNI	435
	YO3RF*	435
157	UP2AW	429
158	HB9QA*	420
†	SP6UK	415
159	OZ5WQ	415
160	SP3AOT	410
161	OZ3JR	405
†	OH2FS	400
162	SP5ARN	400
	UB5GX	400
164	LA6U	385
165	G8CO	365
166	UL7CH	345
167	OK1NK	340
168	SM6CMR	335
169	SP6YB	330
170	YO8FR	325
171	K6AHV	320
	OH3XZ	320
173	DM2ATL	310
174	OH5PT	305
175	HB9DX	260
176	OK1AEH	245
177	ON4CE	229
178	ON4PG	200
179	OH2BDA	195
180	OH3YI	185
181	PY2CQ	165
182	F5BO	145
183	PA0CWF	140
184	UA3YQ	125
†	F8FU	120
185	SM4DRD	120
186	OH5VR	75
187	OZ1GW	60

* Certificate Winners † Late Entry

C.W. SECTION (Multi-Operator)

Posn	Call-sign	Points
1	G8FC*	3039
2	GW3GHC*	2755
3	G3JUL	2150
4	G3PSG	1975
5	G3GJL	1637
6	G3CIO	1420
7	G3LHZ	1340
8	HA1KSA*	1200
9	YO8KAE*	1090
10	OK3KAG*	942
11	G3SKY	910
12	UA9KSC	825
13	ET3USA*	820
14	YU1BCD*	730
15	OK2KBH	630
16	OK1KUL	563
17	OK2KOS	560
18	UA4KCE*	525
†	UQ2KAT	480
19	OK2KJU	460
20	G3PRC	365
21	UQ2KHL	297

* Certificate Winners † Late Entry

TELEPHONY SECTION

Posn	Call-sign	Points
1	GI3CDF*	1614
2	G5HZ/P*	1370
3	G3DYY	930
4	G3KSH	925
5	DJ2YE*	865
6	G3NLY	830
7	G3MQD	735
8	G8FC	690
9	OH2TH*	680
10	PA0LV*	670
11	G3OMK	645
12	SM2AYE*	560
13	ON4PG*	545
14	DJ5VQ	540
15	GW3OCD*	530
16	OX3JV	510
17	F2VX*	500
18	DJ2UU	490
19	OZ1TH*	485
20	OH2BH	475
21	F8WE	435
22	OH1OE	415
23	9M4LP	400
24	LA6U	390
	DL9HC	390
26	OZ1FO	360
27	LA8WF	355
28	DL7LQ	341
29	OH0NI	325
30	SM4CMG	310
	VK3XB	310
32	GM3NQB*	305
33	UD6BR	255
†	UQ2KAT	250
34	OK1AHZ	245
35	OH3ZN	240
36	CT1LN	220
	G3RAA	220
38	G3JVJ	200
	G3PZO	200
40	SM5FT	175
41	SP8AJK	170

* Certificate Winners † Late Entry

RECEIVING SECTION (C.W.)

Position	Identification	Points
1	BRS24775*	2210
2	A3633*	2050
3	A3470	1735
4	BRS18461	1670
5	A2340	1610
6	A4068	1340
7	OK3-9280*	525
8	UA9-2847*	450
9	A2966	420
10	BERS195*	265

* Certificate Winners

Rules for the V.H.F. National Field Day 1965

The rules for V.H.F. National Field Day, 1965, have been changed to make them more compatible with those of the IARU Region I V.H.F. and U.H.F. Contests on the same date.

Entrants are strongly recommended to operate within their local frequency zones in the 144-146 Mc/s, 432-434 Mc/s and 1296-1298 Mc/s bands.

Cover sheets will be forwarded to all 1964 entrants: other groups should write to RSGB HQ as soon as possible.

1. **Duration.** From 18.00 GMT September 4, to 18.00 GMT September 5, 1965.

2. **Eligible Entrants.** Any group of RSGB members within the British Isles may enter. The group may be any group of RSGB members, a club or an Affiliated Society.

3. **Operators.** Operators of portable stations competing in the contest must each hold a current British Isles Amateur (Sound) Licence and must be fully paid up Corporate Members of the RSGB at the time of the contest.

4. **Power Supplies.** Power for any part of the station shall not be derived directly from supply mains.

5. **Stations.** Each competing group will be permitted to put one or two stations in operation; these two stations must use different call-signs. There is no restriction on the combination of bands allocated to each call, but only one station may be operated on each band and only one transmitter on any band at a time under one call-sign. Stations may operate from the same site or from different sites. It will be permissible for two groups from a single region or from adjacent regions to amalgamate for the purpose of scoring; if this is done frequency bands must be allocated between the two stations as detailed above.

6. **Apparatus.** No apparatus may be erected on the site prior to 12.00 GMT on September 4, 1965. This rule includes aerials and aerial fittings as well as accommodation for the stations, but does not apply to accommodation to be used for storage purposes.

7. **Contacts** may be made on any mode permitted in the Amateur (Sound) Licence except A2 (m.c.w.), in the bands 70·1 to 70·7 Mc/s, 144 to 146 Mc/s and 420 to 450 Mc/s with an input not exceeding 25 watts to any stage of the transmitter; or in any amateur band above 1215 Mc/s with any power or type of emission permitted under the terms of the Amateur (Sound) Licences.

8. **Scoring.** Points will be scored on the basis of 1 point per kilometre, and crossband contacts will not count for points. The whole score for the band 420-450 Mc/s is to be multiplied by 3 and that for bands over 1215 Mc/s is to be multiplied by 10 (Contestants should *not* multiply the individual contact scores by the band multipliers).

9. **Contest Exchanges.** RST or RS reports followed by the contact number (starting at 001 for each station and continuing in sequence irrespective of band), and location. Location must be specified either as a five character QRA locator or at a place clearly identifiable on the 10 mile to 1 inch Ordnance Survey map or as a distance and bearing from such a place. It is the responsibility of the receiving operator to obtain the information he requires to calculate distances correctly.

All Entrants must be prepared to supply QRA Locator details on request. Contestants are advised when calling to indicate on which band they are operating.

Only one contact on each band may be claimed with a specific station whether fixed, portable, mobile or alternative address. Duplicate contacts must be logged and clearly marked as duplicates without claim for points. Proof of contact may be required.

10. **Logs.** (*a*) Separate logs must be submitted for each band and tabulated in columns headed (in this order): Date/time (GMT); Call-sign of station contacted; Our report on his signal and serial number sent; His report on our signal and serial number received; Location of station contacted as received; Operator's call-sign; Points claimed.

(*b*) The special cover and summary sheets provided for this event must be completed and signed by a member who will be responsible for the entry. These cover sheets are available from RSGB Headquarters on receipt of a large stamped addressed envelope.

11. **Entries.** Must be postmarked not later than **September 27, 1965.**

12. **Awards.** At the discretion of Council, the Surrey Trophy will be awarded to the overall winner and a miniature cup to the runner-up. Miniature cups will be awarded to the leading station in each British Isles Country and to the leading station on each band on which there is sufficient activity.

Certificates of merit will be awarded to the runners-up on each band and to the band leaders in each country.

D/F Qualifying Event

Details of the South Manchester Qualifying Event are as follows:

Sunday, May 23, 1965

Organizer: M. Barnsley, G3HZM, " Greenways," 11 Cemetery Road, Denton, Lancs.

Map: Ordnance Survey, sheet 111, New Popular Edition.

Assembly: 13.00 BST for first transmission at 13.20 BST.

Location: NGR 145815, Dirtlow Rake, near Castleton, Derbyshire.

Entries and Tea: Intending competitors should notify the organizer by May 16 stating the number in their party requiring tea.

Region 1 Cup: The first competitor from Region 1 to find both transmitters will be awarded the SMRC Region 1 Cup for the year 1965-1966.

CONTESTS DIARY

May 8-9	- USSR DX (C.W.) Contest.
May 9	- High Wycombe D/F Qualifying Event (see page 256, April, 1965).
May 15-16	- Second 70 Mc/s Contest (Open), (see page 000).
May 22-24	- Alexander Volta RTTY DX Contest.
May 23	- South Manchester D/F Qualifying Event. (see above).
May 23	- 145 Mc/s Frequency Measuring Test (see page 323).
May 29-30	- First 432 Mc/s Contest (see page 256, April, 1965).
May 30	- 1296 Mc/s Contest (see page 255, April, 1965).
June 4-7	- CHC/FHC/HTH QSO Party.
June 12-13	- National Field Day (see page 119, February, 1965).
June 27	- Salisbury D/F Qualifying Event.
July 4	— Fourth 144 Mc/s Contest (Portable) (see page 339).
July 17-18	— 1296 Mc/s Tests.
July 18	— Oxford D/F Qualifying Event.
July 25	— Third 70 Mc/s Contest (Portable).
August 1	— Slade D/F Qualifying Event.
August 14-15	— WAE Contest (C.W.).
September 4-5	— Region 1 IARU V.H.F. Contest.
September 4-5	— V.H.F. National Field Day.
September 11-12	— WAE Contest (Phone).
September 12	— 80m Field Day.
September 19	— D/F National Final, Derby.
September 25-26	— 21/28 Mc/s Telephony/Reeeiving Contest.
October 2-3	— WADM Contest (C.W.)
October 9-10	— Raynet Rally.
October 16-17	— 7 Mc/s DX Contest (Phone).
October 23-24	— CQ World Wide Contest (Phone).
November 6-7	— 7 Mc/s DX Contest (C.W.).
November 13-14	— Second 432 Mc/s Contest.
November 20-21	— Second 1·8 Mc/s Contest.
November 28-29	— CQ World Wide Contest (C.W.).
December 5	— Fourth 70 Mc/s Contest (C.W.).

CONTEST NEWS

— RESULTS — REPORTS — RULES —

Second Top Band Contest 1964

The Second Top Band Contest took place on November 28 and 29 and was almost as well supported as the corresponding contest in 1963.

Frank Robb, GI6TK, from County Down is the winner this time with a total of 828 points from 170 contacts.

In second place is D. J. A. Andrews, G3MXJ, whose total of 819 points came from 169 contacts. G3MXJ went to great lengths to find a spot in a " rare " county from which to operate so as to obtain the advantage of only three adjacent counties. He transported his gear to a farmhouse in Suffolk and put up an aerial for the occasion.

In third place (and similarly placed in the 1963 contest) is D. G. Alexander, G3KLH, who stayed at home in Berkshire and had 167 contacts for 751 points.

Conditions seem to have been reasonably good with a fair number of Europeans appearing in the logs: DL, HB, OE, OK and OH all being in evidence, although the *CQ* WW contest taking place at the same time may have been responsible for these stations appearing!

Comments

Comments were quite numerous but inevitably included the objection that the scoring system prevents someone from winning. Perhaps the best solution to this particular problem is to take the advice of G3NHE: " Pick two or three systems from the list of suggestions and put them on in rotation—that way you may please all of the people some of the time."

Several entrants commented on the length of the contest and suggest that it should finish earlier, say 3 a.m. There is, of course, the first contest each year which finishes at that time to satisfy these operators. However, there is also a popular demand for a long contest! As a compromise the Committee arranged two contests—one short and one long—in the hope that it might achieve the position " all of the people some of the time."

" Most enjoyable " seems to be the usual comment on the contest and operating was generally of a high standard, except for the failure of some operators to acknowledge serial numbers. This is a breach of the rules and the contact should therefore be logged with a suitable comment but not claimed for points. Scrutiny of the logs soon reveals the guilty party, who will be surprised how many contacts will be disallowed.

G3HBW makes a point that is also brought out by G3GJL. He suggests that a multiple operator section be allowed so that clubs can use the contest as a means of giving training to club operators. This certainly seems a good way of encouraging younger operators to try their skill at contest operating. A surprise visitor to the l.f. bands was G5ZT: " thought I'd have a change from 144 Mc/s for old time's sake when I was a 160 metre addict—certainly hotted up since those days " (he did not do so badly though with 99 contacts that kept him going till 07.56).

HB9QA takes us to task for fixing the contest at the same time as the *CQ* WW Contest. This is unfortunate, but an occasional clash is inevitable with so many contests and the Society does publish its dates well in advance. Please note, however, that the 1965 contest has already been announced for November 20/21, and this avoids the *CQ* contest.

Logs

The standard of logs was very good with only a few errors. The county code letters do not present any difficulty except when another county is visited—then you have to remember where you are!

Check logs from OK1AJY, OK1KIT, OK1OO, OK2QX, G3CEU, G3SVK, G4VF, and G5AO are gratefully acknowledged.

RESULTS

Position	Call-sign	Points	Position	Call-Sign	Points
1	GI6TK	828	34	G2DU	411
2	G3MXJ	819	*	G3GJL	406
3	G3KLH	751	35	GM3KLA	405
4	G6BQ	735	36	G3KDV, G3CWW	382
5	GM3AVA	731			
6	G3RQX	721	38	G3SPJ	381
7	G3NHE	720	39	G3PEO	370
8	G3FM	678	40	GM3KHH	346
9	G3BMY	637	41	G3LZZ	345
10	G3JVJ	618	42	G3SIA	342
11	G3PYI	592	43	G3NQT, GM2HCZ	341
12	G3OSW	587			
13	G3LBA	580	45	G3ILO	334
14	G3ITH	579	46	G3TAM	330
15	G3KBC	575	47	G3KZZ/A	319
16	G3JLE	574	48	G3LUN, G3OVL, G3OLM	311
17	G3GVA	570			
18	G3JSK	567			
19	GW3CW	554	51	G3JKY	301
20	G3KOR	550	52	G3RTU	295
21	G2MJ	547	53	G3PJB	280
22	GM3KMR	543	54	G3SVW/A, G3SVL	276
23	G3RCY	505			
24	G3LAS	499	56	G3SFR/A	267
*	G3HBW/A	486	57	G3RIX	246
25	G5ZT	480	58	G3SGR	245
26	G3JFY	472	59	G2QT	230
27	G8AB	460	60	G3BTU	201
28	G3RXQ	456	61	G3EMO	152
29	G3SWH	452	62	G3PYC	150
30	G3GFG	431	63	G3DGN	148
31	G3PJX	424	64	G3TPJ	133
32	G3RZI	421	65	G2ABK	90
33	G3KMQ	415	66	G3TIG	82
*	G3RSD	418	67	G2VV	60
			68	G6OO	13

* Multi-operator.

Affiliated Societies' Contest 1965

The Affiliated Societies' Contest took place on January 23 and 24, and after a very close contest the Edgware Trophy goes to the Gravesend Amateur Radio Society, G3GRS, operated by G3MXJ and G6BQ from the QTH of G6BQ. They made 220 contacts, of which 119 were with affiliated society stations to give them a total of 1685 points and a lead of only 30 points over Maidstone YMCA Amateur Radio Club, G3TRF, in second place. G3TRF, operated by G3ORH, made 215 contacts, 118 with affiliated society stations to give his total of 1655 points. Third place goes to the Surrey Radio Contact Club, G3SRC, by a very narrow margin over the Reigate " B " Station, G3FM.

With logs from 59 stations, entries are slightly up on last year's but their increase is entirely due to five clubs entering more than one station each. The logs were generally good, but obviously some stations forgot to send " AFS " in the heat of the moment, while at times others heard an " AFS " that was never sent. Accordingly, most logs have had their total scores amended, generally down, but in some cases up. The first four logs were subjected to a very close scrutiny and detailed cross-checking which resulted in no less than 47 alterations to the points claimed.

It will be noted that the AERE Harwell No. 2 station, G3HS, has entered although the station did not send " AFS " during the contest. This was due to their being unfortunately misinformed about the admissibility of more than one entry per club. The contests committee is quite prepared to accept more than one entry per club where the club has more potential operators than can be reasonably accommodated

at one station. However, three of the multiple entries on this occasion were in fact single operator stations and it may well be that if this trend continues a rule will have to be framed setting a minimum number of operators per multiple station in order to prevent the contest becoming virtually another single operator affair.

Comments from Logs

Relatively few clubs have sent in comments so it must be assumed that most are satisfied with the contest as it is. Of those that commented on the rules four would like a further increase in the differential between club and non-club contacts and three would like earlier start and finish times.

" Would like to draw operators' attention to several signals which had pronounced clicks and chirps"—G3PWU . . . " The station did not manage to start till 19.40 due to the breaking system breaking down! "—G3HOX . . . " Lost quite a few QSOs through stations netting way off frequency "—G2DJ . . . " We run contests from club rooms, and the 11 p.m. finish is difficult for some members "—G3GIW . . . " Thoroughly enjoyed the contest "—GW3PMR.

Check Logs

Stoke-on-Trent Amateur Radio Society, G3GBU have sent in a check log only, owing to some errors made. Cannock Chase Amateur Radio Society, G4CP, also decided to submit only a check log owing to criticism by the members about the quality of the signals radiated. Both groups are to be congratulated for their actions which are truly in the spirit of the contest. Check logs from non-club stations are particularly useful in this event and the committee wishes to thank the following for their logs: G2HJ, G3DGN, G3JFY and G3LWQ.

RESULTS

Position	Society	Call-sign	Points
1	Gravesend Amateur Radio Society	G3GRS	1685
2	Maidstone YMCA Amateur Radio Club	G3TRF	1655
*	AERE Harwell Radio Club No. 2	G3HS	1602
3	Surrey Radio Contact Club	G3SRC	1409
4	Reigate Amateur Transmitting Society	G3FM	1403
5	Oxford and District Amateur Radio Society	G3KLH	1385
6	Thames Valley Amateur Radio Transmitters Society	G3JEQ	1375
7	Crawley Amateur Radio Club " A "	G3TR	1320
8	Derby and District Amateur Radio Society	G2DJ	1271
9	AERE Harwell Amateur Radio Club No. 1	G3PIA	1198
10	Dollis Hill Radio Club	G3NHZ	1140
11	Ariel Radio (Langham)	G3AYC	1120
12	Crawley Amateur Radio Club " B "	G3TIR	1114
13	Reading Radio Club	G3PWU	1094
14	Sutton and Cheam Radio Society	G2BOF/A	1090
15	Harlow and District Radio Society " A "	G3ERN	1075
16	Radio Society of Harrow No. 1	G3EFX/A	1069
17	Cheltenham Amateur Radio Society	G5BK	1066
*	Scarborough Amateur Radio Society	G4BP/A	1055
*	Royal Air Force Amateur Radio Society	G8FC	1040
18	University College of North Wales Amateur Radio Society	GW3PMR	1043
19	RAF Sealand Amateur Radio Society	GW3ITZ	1000
20	Midland Amateur Radio Society	G3MAR/A	983
21	Cray Valley Radio Society	G3RCV	965
22	Bristol Amateur Radio Club	G3TAD/A	945
23	Verulam Amateur Radio Club	G3STA	938
24	Ainsdale Radio Club	G2DQX	930
25	Manchester and District Amateur Radio Society	G3HOX	929
26	Burnham-on-Sea Radio Club	G3GIW	920
27	Radio Society of Harrow No. 3	G3SHK	896
28	Newark Amateur Radio Society	G3ELJ	875
29	Acton, Brentford & Chiswick Radio Club	G3IIU	865
30	Grimsby Amateur Radio Society	G4XC/A	860
31	Reigate Amateur Transmitting Society	G3REI/A	850
32	Royal Naval Amateur Radio Society	G3BZU	821
33	Clifton Amateur Radio Society	G3GHN	820
34	Guildford & District Radio Society	G3TLM	788
35	Edgware & District Radio Society	G3ASR	780
36	Ariel Radio Group (Caversham)	G3SWB/A	755
37	Moray Firth Amateur Radio Society	GM3TKV	754
38	Ariel Radio Group (Bush House)	G3GDT	743
39	South Manchester Radio Club	G3FVA/A	708
40	Conway Valley Amateur Radio Society	GW3CW	707
41	Magnus Grammar School Radio Society	G3PAW/A	703
42	South Shields & District Amateur Radio Club	G3DDI	698
43	Radio Society of Harrow No. 2	G3RRU	675
44	West Kent Amateur Radio Society	G3RST	609
45	Crawley Amateur Radio Club " C "	G3RXJ	570
46	Signal House Amateur Radio Society	G3PMZ	560
47	Harlow & District Radio Society " B "	G3TLJ	531
48	Loughborough Amateur Radio Society	G3RAL/A	489
49	Echelford Amateur Radio Society	G3SZG	436
50	Garendon School Radio Club	G3MKX/A	425
51	Bishop Rawstorne Secondary School Radio Society	G3TCD	315
	Dudley Amateur Radio Club	G3RXK/A	
53	University of Keele Radio Society	G3COY	305
54	Mount School Radio Society	G3TNG	275

* No indication of operators on logs. General rule 6(a).

First 70 Mc/s Contest 1965

This event, held on St. Valentine's Day, attracted 46 entrants, and shows promise for similar contests on this band later in the year. It will be seen that there were three entrants from N. Ireland and one from Wales, while the number of stations known to have been active in these countries during the contest were 20 and five respectively, with four in Scotland and three in Eire. A further 17 portable stations were contacted who did not send in their logs.

The winning station, GW3RUF/P, was operated by

RESULTS

Call-sign	Position (section A)	Position (section B)	Points	Contacts	Power (watts)	Location
GW3RUF/P		1	5897	70	10	Monmouth
G3PIA/P		2	5730	89	20	Berks
G3JHM/A	1		4464	91	15	Sussex
G3ENY/A		3	3665	58	48	Salop
G3IMV	2		2645	62	50	Bucks
G3PXB/P		4	2483	45	10	Leics
G3MEH	3		2341	73	45	Surrey
G3ORL	4		2129	53	35	Essex
G2AUD	5		1975	47	40	Bucks
G3MHW	6		1928	80	45	Berks
G3OJE		5	1758	64	45	Bucks
G5UM	7		1741	50	25	Herts
G3OWA	8		1726	51	15	Surrey
G2DSP/P		6	1681	46	8	Sussex
G3PLX	9		1669	45	50	Liverpool
G3PPG		7	1323	26	50	Worcs
G3PWW	10		1319	48	12	Surrey
G3IIJ/P		8	1258	38	5	Lancs
G2AXI	11		1248	34	20	Hants
G3RMN	12		1207	58	50	Surrey
G3TSL/M		9	1189	40	5	Lancs
G3KCJ	13		1160	38	12	Beds
G5JU	13		1160	21	50	Birmingham
G3CCM	*		1058	36		Potters Bar
G3PJK	15		1022	28		Manchester
G3THQ	16		996	52	6	London
G3ABM/P		10	983	38	5	Cheshire
G3PHG	17		926	35	25	Sussex
G3RAN/A		11	890	35	25	Herts
G3FD	18		838	35	25	London
G3THH/P		12	780	27	9	Cheshire
G3HRH	19		754	26	25	Herts
G3EKP	20		726	25		Lancs
G3TA	21		686	35	10	Bucks
GI3ONF	22		652	21	50	Co. Armagh
G3TOT	23		623	27	15	Herts
G3GOX	24		595	30	25	Middx
G2BJY	25		551	12		Staffs
GI3TOH/M		13	501	15	6	Londonderry
G3PUO/P		14	473	22	10	Lancs
GI3HXV	26		426	17	25	Belfast
G2WS	27		395	11	15	Coventry
G3RWM/P		15	370	17	4	Lancs
G2DHV	28		266	21	18	Kent
G3JKY	29		219	15	10	Kent
G2BRR/P		16	132	5		Wilts
G3JMY	30		128	4	10	Bristol

* No Cover Sheet

G3KXA and achieved 26 contacts at distances exceeding 100 miles, while second came G3PIA/P operated by G3SJP and G3NNG, who made 11 contacts over 100 miles. The winner of the home station section was G3JHM/A who made six such contacts. The longest distance contact was between G3JHM/A and G3OHH at 182 miles. Check logs received from BRS15744, G3GDN and G3NKS were found most useful.

Activity from the south and west was again curtailed by television troubles; three stations in Somerset worked a few stations only. It is hoped that the extended hours of the May contest will attract some entrants from these areas. The Home Counties again appear to be the area of greatest activity. The Northern Ireland entrants were active for the entire period of the contest but their only contacts with the mainland were with the four Scottish stations. The high level of activity in Northern Ireland should encourage people to turn their beams in that direction more often.

Equipment

The predominance of 4 element beams in the c.w. contest was not repeated—all types from dipoles to 6 element arrays being widely used. Only two entrants used transistorized receivers, the Nuvistor type of r.f. stage being most popular.

Comments

Conditions were not good, but most stations reported an improvement towards the end of the contest period. GW3RUF/P, however, worked only eight stations in the last three hours and suggested an earlier finish to facilitate dismantling of the equipment. G3PJR (Manchester) reported hearing nothing of G3JHM whom he usually hears, nor of the Northern Irish stations, although several calls were made in that direction. GI3HXV made contacts in all but one of the Northern Ireland counties, but was disappointed with the lack of cross-channel working. He heard few carriers which were not worked. Near the bottom of the table, G3JWM/P was using a fixed frequency receiver only, being active for four hours. G2BRR/P (Swindon) made his contacts within an hour and G3JMY (Bristol) a little longer, being troubled by TVI. The contest was enjoyed by all taking part as a welcome addition to the calendar and the large number of entrants was most encouraging.

Third 70 Mc/s Contest (Portable) 1965

This is a new event in the contest calendar and comments on the rules and timing are invited. Check logs from listeners are invited and will be credited towards the Listeners' V.H.F. Championship.

1. **When:** 10.00 GMT to 19.00 GMT on Sunday, July 25.

2. The general rules of RSGB Contests as published in the January 1965 issue of the RSGB BULLETIN will apply except as superseded by the rules of this contest.

3. **Eligible entrants:** All operators must be fully paid up members of the RSGB and hold a current Amateur Radio (Sound) Licence. Multiple operator entries will be accepted provided only one call sign is used.

4. **Power supplies:** Power for any part of the station shall not be derived from supply mains, and the input shall not exceed 50 watts to any stage of the transmitter.

5. **Contacts** may be made on any mode permitted in the Amateur (Sound) Licence A except A2 (m.c.w.).

6. **Scoring** will be on the basis of one point per mile for contacts with fixed stations and two points per mile with portable or mobile stations.

7. **Contest exchanges:** RST or RS reports followed by the contact number and location (e.g. RST 599001, 4 north Macclesfield, Cheshire). This location must be identifiable without ambiguity on the Ordnance Survey "ten-mile" map. It is the responsibility of the receiving operator to obtain the information necessary to calculate his distances correctly.

8 (a). Logs must be tabulated in columns headed in this order: "Date /Time (GMT)"; "Call sign of station contacted"; "My report on his signal and serial number sent"; "His report on my signal and serial number received"; "Location of station as received"; "Call sign of operator (multi-operator stations)"; "Distance in miles"; "Points claimed."

8 (b). The cover-sheet must be made out in accordance with RSGB Contests rule 4 and the declaration signed. Operators of multi-operator stations must be listed, the QTH as sent and the NGR full six figure reference recorded. Stations outside the area of the National Grid should show latitude and longitude.

(c). Entries must be post-marked not later than Monday, August 9, 1965.

9. **Awards:** At the discretion of council, certificates of merit will be awarded to the winner and to the runner-up.

Fourth 144 Mc/s Contest (Portable) 1965

RSGB members throughout Europe are again invited to take part in this popular contest. The QRA locator may be used if preferred and all entrants are advised to determine the five character group appropriate to their site. Check logs from listeners are invited and may be credited towards the V.H.F. Listeners' Championship. Any comments on the rules will be welcome and will be considered when the rules for the next similar contest are made.

1. **When:** 10.00 GMT to 18.00 GMT on Sunday, July 4, 1965.

2. The general rules of RSGB contests as published in the January, 1965, issue of the RSGB BULLETIN will apply except as superseded by the rules of this contest.

3. **Eligible Entrants:** All operators must be fully paid-up members of the RSGB resident in Europe and hold a current Amateur Radio (Sound) Licence. Multiple operator entries will be accepted provided that only one call-sign is used.

4. **Power Supplies:** Power for any part of the station shall not be derived from supply mains, and the input to any stage of the transmitter shall not exceed 25 watts.

5. **Contacts** may be made on any mode permitted in the Amateur (Sound) Licence except A2 (m.c.w.).

6. **Scoring** will be on the basis of one point per mile for contacts with fixed stations and two points per mile with portable or mobile stations.

7. **Contest Exchanges:** RST or RS reports followed by the contact number and location (e.g. RST 599001, 4 north Macclesfield, Cheshire). This location must be identifiable without ambiguity on the Ordnance Survey "Ten-mile" map. Alternatively, five-figure QRA locators may be exchanged. It is the responsibility of the receiving operator to obtain the information necessary to calculate his distances correctly.

8. **Entries** (a) Logs should be tabulated in columns headed in this order: "Date/Time (GMT)," "Call-sign of station contacted," "My report on his signal and serial number sent," "His report on my signal and serial number received," "Location of station received," "Call-sign of operator (Multi-operator entries only)," "Distance in miles," "Points claimed."

(b) The cover sheet must be made out in accordance with General Rule 4 and the declaration signed. Multi-operator entries should be so marked and the operators listed. The QTH as sent, QRA if used, and the NGR full six-figure reference should be recorded. Stations outside the area of the National Grid should show latitude and longitude.

(c) Entries must be post-marked not later than Monday, July 19, 1965.

9. **Awards.** At the discretion of Council a miniature cup will be awarded to the winner and Certificates of Merit to the runner-up and the non-transmitting member submitting the best check log.

RSGB 21/28 Mc/s Telephony Contest 1964

J. K. Harvey, BRS19682, was not included in the results table for the Receiving Section of the 21/28 Mc/s Telephony Contest 1964 published in the March, 1965 issue. He scored 1262 points, and should have been placed seventh.

Club Insurance

Club organizers may not be aware that it is far simpler and wiser to take out a policy for a club on a yearly basis rather than seek insurance cover for single events such as Field Days. Most companies should be quite willing to arrange this, but if any difficulties are encountered, Mr F. H. Chambers, G2FYT, will be glad to give assistance.

Second 432 Mc/s Contest 1965

To avoid a clash with the RSGB International Radio Communications Exhibition, the date of the Second 432 Mc/s Contest has been changed to November 13-14, 1965.

CLUBROOM

A Monthly Survey of Group and Club Activities

For information on membership or activities of a particular club, please apply to the person whose call is indicated at the end of the item. Full addresses may be obtained from a Call Book.

Aldridge and District ARS. Formed earlier this year, the club now has some 30 members with RAE and Morse classes in full swing. (*G3RUI*)

Baden-Powell Scout RS has cleared the hurdle of its first AGM and the members are now getting down to another year of work. A series of talks introducing Amateur Radio for the beginner has commenced. On May 15/16 the club station GB3GP will be operating on all bands s.s.b. (*G3FXC*)

Barnet Radio Club has been going through a difficult time lately, but a programme of lectures has been arranged and it is hoped that this will inspire interest. Newcomers are always welcome, and particularly anyone who has a good idea for a future lecture. (*G8ACJ*)

Basingstoke ARC will have its next meeting on May 8 when the evening will be devoted to preparation for NFD. Some members will have been through the fire and brimstone of the RAE on the previous day.

Bromsgrove ARC are holding their next meeting on May 14 when G6WI will lecture on 14 Mc/s Operating and Conditions.

Bury and Rossendale RS will meet on May 11 at the Old Boars Head with the intention of giving its younger members the chance of asking the old hands some pertinent questions. Ale power to the purpose.

Conway Valley ARC paid a visit to a Royal Signals Training Regiment recently and members of the party came away with the impression that there will be some very fine receivers on the surplus market in about 10 years' time.

Cambridge ARC is now planning for the forthcoming year having its AGM behind it. (*G3GGJ*)

Chester and District ARC meets every Tuesday in the month except the first. On May 11 a sale of surplus surprises should satisfy sapient seekers. (*G3TZO*)

Clifton ARS. On May 8, under the cover of darkness, a D/F contest is to be held. For those lacking cats' eyes, a repeat is being held during the sun up hours of May 23. (*G3OGE*)

The **Cornish ARC** is having a quiet moan about the lack of activity on "two" and "four," and reckons the chance of hearing anything is just about as great as winning the pools. Your conductor is of the opinion that some 2m operators suffer from a complex which manifests itself as self strangulation at even the thought of calling CQ, and that the hearing of a CQ causes almost complete paralysis due to shock.

Cray Valley ARC is delighted that A. O. Milne, G2MI, has agreed to become President of the Society. Fun was recently had with a 40 ft. pole which wanted transporting 4½ miles from point A to point B. Transporters left them with visions of special permits, Police Outriders, in fact the lot. The solution? Five helpers, a builder's hand cart, and a lot of pushing. (*G3MCA*)

Mr E. W. Yeomanson, G3IIR, President of the RSGB, addressing the 17th Annual Dinner of the Sutton and Cheam Radio Society on March 13. The other Guest of Honour, Mr L. Cooper, G5LC, President of the Thames Valley ARTS, and Mrs Cooper are on the left of the photo. Mrs Yeomanson is on the right.

Crystal Palace RC is as active as ever, but is sorry to have to release Eric Yeomanson from office so that he can better fulfil his tasks as President of the RSGB. Joking aside, they are very proud of Eric's new appointment. (*G3FZL*)

East Kent RS has a very full programme of lectures. Its latest licensed member is Peter Parker, G3UAP, who at 14 may be the youngest licensee in the country. Any challengers? (*G3LTY*)

East Worcs. ARG has completed a new transmitter for the forthcoming NFD and the members are now getting down to the finer points of organization. The average attendance at meetings numbers 20, and they have in mind trying to beat the national productivity target of 3½ per cent by bringing this up to an average of 25 persons. New members will therefore be especially welcome. (*G3HZG*)

Echelford ARS is going to run an exhibition station at the BP Meadhurst Sports Day and Fête on May 29. With this society probably ranking amongst the strongest in the country, with a keen and active membership, we are sure that this exhibition station will reflect real credit on our hobby. (*G3ATF*)

Edgware and District RS was given a most interesting talk on the island of Sarawak by Ron Skelton (ex-VS4RS), backed by a fascinating collection of colour slides. (*G3KSH*)

The **Ex-G Club** has decided that in future the Sunday net on 14·345 Mc/s will not take place when contests are running, and thus make an extra 3 kc/s available to participants. This action is in the true ham spirit, and we feel that the decision is worthy of the highest praise. (*G2FUX*)

Flintshire RS members were treated to a demonstration of Amateur TV late in March by GW3JGA. Not content with monochrome, it also included colour. Meetings are held on the last Wednesday of each month when visitors and new members are always welcome. (*GW3JGA*)

Gosport and District ARC recently had a demonstration and talk on 4m mobile. The club meets each Monday at the Gosport Community Centre.

Harlow and District RS is taking occupation of new headquarters at Mark Hall Barn, 1st Avenue, Harlow. Regular meeting nights are Tuesdays and Thursdays when anybody interested in the art will be most welcome. (*G3TLJ*)

Harrow RS has noted a pronounced increase in mobile activity, and a large party went to the Berford Rally. At the end of May a constructional contest is to be held. (*G3TUX*)

Keele University RS will be out and about on May 10 testing its equipment for NFD. The society is active each Monday evening. (*G3COY*)

Liverpool and District RC now has an active group on 4m, with some seven stations mobile on a frequency of 70·26 Mc/s. Meetings in May will be on the 4th, 11th, 18th, and 25th, the latter date being devoted to NFD preparations. (*G3MCN*)

With the reduction of UK Forces in **Malta** some while ago, the turnout at meetings of the local radio group dropped so much that meetings were suspended entirely. The secretary, ZB1HKO, has just sent us the good news, however, that owing to some Service movements, the amateur population has grown considerably and the club may have a new lease of life. At least one meeting has been held so far, and several more are planned; more details have been promised as soon as the fate of the club is more certain. **ZB1HKO**'s address is 2 Sunnyvale Ville, Naxxar Road, Lija, Malta.

Mid-Lanark Group is also under way on 4m as a result of a demonstration by GM3MXN which produced quite a number of converts. Meetings are on the third Friday in each month. (*GM3NRP*)

Mid-Warwick ARS has at last been able to secure satisfactory

premises. Members recently enjoyed a transmitting session with G3TWY as master of the switches and knobs. (*G3HBX*)

Magnus Grammar School RS held its first reunion of old members on April 5. Graphic and humorous was the description of the Radio Club as it was in the 1920's. The present society is most anxious to hear from Old Magnusians who are still active amateurs. (*G3JNK*)

Medway ARS really has the treatment of TVI complaints buttoned-up in their current *Newsletter*. Large fierce dogs, buckets of water and other similar deterrents are in the armoury of maintaining one's constitutional rights. (*G2FJA*)

Midlands ARS. Newsletter *MARS* contains two particularly good articles: one on making a start in Amateur Radio by G3KPT and the other on 160m by G3PJT. The society did a particularly fine job of presenting Amateur Radio to the public at the *Birmingham Post and Mail* Boat Show Exhibition. So much so that it looks as though they will have an invitation to return next year. (*G3AVE*)

Newbury and District ARS meets on the last Friday in each month in the canteen of Messrs Elliots. On May 28 G3LLK will talk on improving contest operating, and this will be followed by a discussion on the arrangements for NFD. Visitors and prospective members are always welcome. (*G3TEK*)

Newark SW Club has a new clubroom, and although only formed some four months ago, now boasts some 32 members. Meetings are on Monday and Thursday nights. (*G3TWV*)

Northern Heights ARS has been able to secure the call G2SU for the club station. This call is that of one of the founder members who has passed on to Higher Service, and the society is delighted to have the re-issue. At the Warley Charity Gala on May 29 a demonstration station will be operational. (*G3MDW*)

North Kent RS is another society giving detailed thought to NFD under the guidance of G2FNT. The programme of scheduled events is most impressive. (*G3PUI*)

Norfolk ARC is going through the all too familiar dosage of destructive criticism by vocal but unwilling-to-work members. This is one of the joys of voluntary service. The success of any club literally depends on the humblest member, not only on the Committee, and unless each and every member supports the club fully, then they may as well pack their bags and leave—and in some cases it would probably be better if they did. If you are unattached clubwise NARC will be pleased to meet you. (*G3TLC*)

Plymouth RC is now turning its thoughts to the summer months. With three mobile rallies in the vicinity, and a host of other outdoor escapades, the south-west promises to be busier than ever this year. The monthly film shows are a rip-roaring success. (*G3SCW*)

Reading ARC will be holding its next meeting on May 29 and this will take the form of a full scale rehearsal for NFD. Battle commences at 2.30 p.m. (*G3TOQ*)

Reigate ATS is also having a dummy run on May 23 to iron out any possible snags in the NFD organization. For the first time it is putting on A and B stations, and hopes to ensure that the various bits don't get cross-mixed. A week later there will be a 432 Mc/s trial. (*G3NKT*)

Roding Boys Society has made further progress with its test bay which now has a very enviable array of equipment. (*G3JIX*)

Royal Naval ARS is running a station during the 70cm contest week-end. Signing G8ACI/A, operation will be from a site adjacent to *HMS Mercury*. Skeds can be arranged by writing to G3JFF.

Saltash ARC has meetings on May 7 and 23. In the club magazine, "Stinker" does it again with a first rate article on how to work DX. Not often does one see such really basic secrets let out into the open. (*G2DFH*)

Scarborough ARS members have their noses to the grindstone sorting out the operation of two stations during NFD. Visiting operators will be assured of a hearty welcome. (*G8KU*)

Slade RS is running a D/F event on May 2, while on May 14 a lecture is being given on Logic and Digital Circuits. Aspirant musicians will have their ego satisfied on May 28 when there will be a demonstration and talk on Electronic Organs.

South Birmingham RS is holding the half-yearly junk sale on May 20. Goodies for all are promised so arrive with well lined pockets. From their newsletter, *QSP*, this society certainly has a lot of activities planned, but what is of greater interest is its support for events organized by other clubs. (*G3RUK*)

South Dorset RS is all set to take part in NFD and the V.H.F. Field Day. In addition they also intend to participate in the Weymouth Model Engineering Society Exhibition. (*G2TZ*)

On July 3, 1961, Peter, G3MQD, and Wanda, DJ6BS, QSOd on 14 Mc/s. Gradually the QSOs became more frequent, personal QSOs were arranged, and finally, on March 6 this year they were married at Devizes, Wiltshire. The others in this photo, taken at the reception, are G3PXD, G3RWY, G3SGM and G3NMH. *(Photo by G3SGM)*

South London Mobile Club is having meetings on May 8 and over the week-end 22/23. The first will be a talk on Radar, and the latter two dates a week-end camp.

Southgate and Finchley Group is being given a talk by Truvox Ltd. on May 13, while on May 30 a mobile treasure hunt will be held. This last event enjoyed considerable support in 1964, and they are hoping for even larger entries this time. (*G3TDM*)

Thanet RS is holding its rally on May 9. The site is on the cliff-top at Cliffsend, Pegwell Bay, Ramsgate. Talk-in will be on 160m, 4m and 2m. (*G3BAC*)

Wimbledon and District RS is holding a meeting on May 14 at which G6QN and G3EPU will demonstrate the alignment of a superhet receiver. On May 21 and 22 support of the Wimbledon Handicraft Exhibition will be by a demonstration station. (*G3RZN*)

Wirral ARS is holding a sale of surplus equipment on May 5, while on May 19 a lecture will be given on Video Tape Recording. (*G3FOO*)

Wolverhampton ARS members should be very interested in the talk arranged for May 10 which will deal with Mobile Aerials. On May 24 the Annual Dinner, together with the presentation of awards, will take place. No society member should be absent from this last function. (*G3NOW*)

HELP US TO HELP YOU

Even if the club secretary does not hold a call-sign, when forwarding information for this feature, *please do* include the call-sign of a member to whom interested persons can apply for details of events and membership. It is essential that reports reach us by the deadline dates given, otherwise, regrettably, they cannot be included. This feature can help to increase your membership, so supply as much information as possible, particularly concerning plans for future meetings.

* * *

Deadline for **June** issue is **May 7.**
Deadline for the **July** issue will be **June 11.**

Can You Help?

● R. W. Johnston, P.O. Box 197, Benoni, Transvaal, Rep. of South Africa, who is anxious to obtain any information, or borrow a handbook for the Radio Vision "Commander" Receiver?

● D. Bowers, BRS26760, 95 Grenfell Avenue, Saltash, Cornwall, who wishes to borrow the circuit diagram for the Grundig TK20 tape recorder, and would like to know what type of microphone should be used with this recorder?

● L. Peace, G3SLP, 6 Briar Close, Billericay, Essex, who requires details of the transformers used in the transmitter/receiver C43, ZA.42203, manufactured in 1953?

● D. K. Thompson, 18 Whitecross Street, Barton-on-Humber, Lincs., who wishes to know the intermediate frequency of the McMurdo Masterpiece receiver?

Forthcoming Events

Details for inclusion in this feature should be sent to the appropriate Regional Representatives by the first of the month preceding publication. A.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 the copy, preferably typed double spaced, in the style used below. Standing instructions cannot be accepted.

REGION 1

Ainsdale (ARS).—May 12, 26, June 9, 8 p.m., 77 Clifton Road, Southport.
Blackburn.—Fridays, 8 p.m., Wes View Hotel, Revidge Road.
Blackpool (B & FARS).—Mondays (Morse tuition from 7.30 p.m.), 8 p.m., Pontins Holiday Camp, Squires Gate.
Bury (BRS).—May 11 (Junior Members' Night), 8 p.m., Old Boars Head (private room), Crompton Street.
Chester.—Tuesdays, except first in month, 8 p.m., YMCA.
Crewe & District.—June 7, 8 p.m., Earl of Crewe Hotel, Nantwich Road.
Eccles (E & DAC).—Tuesdays, 8 p.m., Patricroft Congregational Schools, Shakespeare Crescent, Patricroft, Eccles. Thursdays (Club Top Band net at 20.30).
Liverpool (L & DARS).—Tuesdays, 8 p.m., Conservative Association Rooms, Church Road, Wavertree.
Macclesfield.—May 11, 25, June 8, The George Hotel, Jordongate.
Manchester (M & DARS).—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10.
(SMRC).—Fridays, 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.
Morecambe.—May 5, June 2, 125 Regent Road.
Preston (PARS).—May 11 ("Transistor Transmitters," by M. Brierly, G3RUW), May 25 (NFD arrangements), 7.30 p.m., St. Paul's School, Pole Street, Preston.
Southport (SRS).—Wednesdays, 8.30 p.m., Sea Cadets Camp, The Esplanade.
Stockport.—May 5, 19, June 2, The Blossoms Hotel, Buxton Road, Stockport.
Wirral.—May 5 (Sale of surplus equipment), May 19 (Lecture on "Video Tape"), June 2 (NFD Discussion), 7.45 p.m., Harding House, Park Road West, Claughton, Birkenhead.

REGION 2

Barnsley.—May 14 (Visit, venue to be announced), May 28 ("Quad Aerials," by F. Finn, G6UF), King George Hotel, Peel Street.
Bradford.—May 11 (Field Day Arrangements, Informal), May 25 ("Amateur Television," by L. A. F. Stockley, G3EKE/T) 7.30 p.m., 66 Little Horton Lane.
Catterick.—Tuesdays & Thursdays, 7.30 p.m., Clubroom, Vimy Road.
Durham.—Alternate Thursdays, 8 p.m., The Bridge Hotel, North Road, Durham City.

LOOKING AHEAD

May 16.—UBA AGM.
May 18-21.—RECMF Exhibition, Olympia, London.
July 11.—Sixth South Shields Mobile Rally.
July 11.—Torbay ARS Mobile Rally, Newton Abbot.
August 25-September 4.—Radio Show, Earls Court, London.
August 30.—Peterborough Mobile Rally.
September 12.—RSGB National Mobile Rally, Woburn Abbey.
September 26.—Harlow and District RS Mobile Rally, Magdalen Laver.
September 18.—N.W. V.H.F. Convention.
October 10.—Manchester Amateur Radio Convention, Belle Vue.
October 16-17.—Eighth Jamboree-on-the-Air.
October 27-30.—RSGB International Radio Exhibition.
December 17.—RSGB Annual General Meeting.

Details of Mobile Rallies are given on page 304

Northern Heights.—May 12 (Visit to Manchester Civil Airport), May 26 ("Microphones," a tape recording by the late G2SU), 7.30 p.m., Sportsman Inn, Ogden.
Scarborough.—Thursdays, 7.30 p.m., rear of 3 Trinity Road.
Sheffield.—May 7 (Audio & Hi-Fi Group), May 14 (Plans for NFD), May 21 (General Meeting), May 28 (Taped Lecture on "Mobile Operation," by the late G8TL), 8 p.m., 8 Sandbeck Place, Sheffield 11.
Spen Valley.—May 13 (Visit to Wharfedale Wireless Works, Idle, Bradford), May 27 (Discussion on "Communication via Earth Satellites," by H. Tomlinson, AMIEE of N.E. Region GPO), 7.30 p.m., Heckmondwike Grammar School.

REGION 3

Birmingham (SLADE).—May 14 ("Logic and Digital Circuits," by D. Collins), May 28 ("Designing an Electronic Organ," by R. H. Edmunds), 7.45 p.m., The Church House, High Street, Erdington.
(South).—May 20, 7.30 p.m., Friends Meeting House, Moseley Road, Birmingham.
Cannock (CCARS).—June 3, The George Inn, Walsall Road, Cannock.
Coventry (CARS).—Mondays, 8 p.m., Westfield House, Radford Road, Coventry.
Dudley (ARC).—Fridays, The Art Gallery, Dudley.
Salop (ARS).—May 13, 7.30 p.m., Morris Hall, Bellstone, Shrewsbury.
Redditch (EWRG).—May 13 ("Practical 2m evening), June 10 ("Printed Circuits"), 8 p.m., Redditch Old People's Centre, Park Road, Redditch.
Stratford-upon-Avon (S-u-AARS).—Fridays, 7.30 p.m., Masons Arms, Sanctus Road, Stratford-upon-Avon.
Stourbridge (SARS).—May 31 (NFD Arrangements), 7.45 p.m., Foley College, Stourbridge.
Wolverhampton (ARS).—Mondays, 8 p.m., Neachells Cottage, Stockwell End, Tettenhall.

REGION 4

Derby (D & DARS).—May 5 (Bring and buy sale), May 12 (Technical Film Show), May 19 (D/F practice night—social evening), May 26 ("Basic Principles of Television," by J. Anthony, G3KQF), June 2 (Surplus sale), 7.30 p.m., Room 4, 119 Green Lane, Derby.
Heanor (H & DARS).—May 11 ("Films—Tape recording"), May 18 (Open night), May 25 ("Simple Test Equipment," by E. West, G3KTP), June 1 ("The KW2000 and Joystick," by S. Read, G2ATM), 7.30 p.m., Heanor Technical College, Ilkeston Road, Heanor, Derbys.
Leicester (LRS).—Mondays, 7.30 p.m., Sundays, 10.30 a.m., Club Room, Old Hall Farm, Braunstone Lane, Leicester.
Loughborough (LARC).—May 7 (SWL night), May 14 (Components sale), May 21 (NFD preparation), May 28 ("TVI and the Amateur," by F. C. Ward, G2CVV), June 4 ("SWL Night—E & M," by L. Hellier, G3TED), 7.30 p.m., Club Room, Bleach Yard, Wards End, Loughborough.
Mansfield (MARS).—Fridays, 7.30 p.m., The New Inn, Westgate, Mansfield.
Melton Mowbray (MMARS).—May 27 (Shack visit—Mr. D. Fisher), 7.30 p.m., St. John Ambulance Hall, Asfordby Hill, Melton Mowbray.
Nottingham (ARCN).—Tuesdays, Thursdays, Room 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Sherwood.
Worksop (NNARS).—Tuesdays (RAE Class), Thursdays (Lectures), 7.30 p.m., Club Rooms, 13 Gateford Road, Worksop, Notts.

REGION 5

Bedford (B & DARC).—May 11 ("Test Equipment—Instruments & Techniques"), May 27 ("Aerials," member's lecture), June 3 (NFD—Final Meeting), Harpur Secondary Modern School, Horne Lane, Bedford.
Cambridge (C & DARC).—May 7, 14 (Informal), May 21 (Take your Pick Quiz), May 28 (Activity Evening), 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.
Cambridge University (CUWS).—Tuesdays, 8.15 p.m., Psychology Department, Downing Site, during University Term.
Haverhill (H & DARC).—Mondays, 7.30 p.m., 41a High Street, Haverhill, Suffolk.
Luton (L & DARS).—May 4 (Green & Davis Demonstration), Tuesdays, 8 p.m., ATC Headquarters, Crescent Road, Luton, Bedfordshire.
March (M & DRAS).—Tuesdays, 7.30 p.m., rear of Police Headquarters, High Street, March, Cambs.
Royston (R & DARC).—Wednesdays, 8 p.m., Manor House Social Club, Melbourn Street, Royston, Herts.
Shefford (S & DARS).—Thursdays, 7.45 p.m., Church Hall, High Street, Shefford, Beds.

REGION 6

Cheltenham.—May 28 (Gloucestershire Amateur Radio Buffet Dinner and Social), Bell Vue Hotel, Cheltenham. Tickets, price 18s. 6d., from G3CGD and G3MA. Meetings on first Thursday in each month, 8 p.m., Great Western Hotel, Clarence Street, Cheltenham.

REGION 7

Acton, Brentford & Chiswick (ABCRC).—May 18 (Talk on Aerials), AEU Club, 66 High Road, Chiswick.
Ashford (Middx.) Echelford ARS.—May 12 (RAE Course), May 26 (Lecture), 7.30 p.m., Links Hotel, Ashford.
Bexley Heath (NKRS).—May 13, 27, 7.30 p.m., Congregational Hall, Chapel Road, Bexley Heath.
Barnet (BRC).—May 18, 8 p.m., Red Lion Hotel, Barnet.
Chingford (Group).—May 21, contact the Secretary, Loughton 2397.
(SRC).—Friday (except first), 8 p.m., Friday Hill House, Simmons Lane.
Croydon (SRCC).—May 11, 7.30 p.m., Blacksmiths' Arms, South End, Croydon.
Dorking (D & DRS).—May 11, 8 p.m., Wheatsheaf, Dorking.
East Ham.—Tuesdays fortnightly, 7.30 p.m., 12 Leigh High Road, East Ham.
East Molesey (TVARTS).—First Wednesday in each month, Prince of Wales, Bridge Road, East Molesey.
Edgware and Hendon (EADRS).—May 11, 24, 8 p.m., John Keble Hall, Church Close, Deans Lane, Edgware.
Enfield.—May 20, 8 p.m., George Spicer School Southbury Road, Enfield.
Gravesend (GRS).—May 19, 7.30 p.m., RAFTA Club, 17 Overcliffe, Gravesend.
Guildford (G & DRS).—May 10, 24, 8 p.m., Guildford Model Engineering Society, in Stoke Park.
Harlow (DRS).—Tuesdays, 7.30 p.m., Mack Hall Club House, First Avenue.
Harrow (RSH).—Fridays, 8 p.m., Roxeth Manor County School, Eastcote Lane, Harrow.
Holloway (GRS).—Mondays & Wednesdays (RAE and Morse), 7 p.m., Fridays (Club), 7.30 p.m., Montem School, London, N.7.
Hounslow (HADRS).—May 17, 31, Canteen, Mogden Main Drainage Department, Mogden Works, Isleworth.
Ilford.—Thursdays, 8 p.m., 579 High Road, Ilford (Nr. Seven Kings Station).
Kingston.—May 13, 27, 8 p.m., YMCA, Eden Street, Kingston. Fridays (Morse Classes), 2 Sunray Avenue, Tolworth.
Leyton & Walthamstow.—May 18, 7.30 p.m., Leyton Senior Institute, Essex Road, London, E.10.

LONDON MEMBERS' LUNCHEON CLUB

will meet at the White Hall Hotel, Bloomsbury Square, London, W.C.1 **at 12.30 p.m. on Fridays, May 21, and June 18, 1965.**

Telephone table reservations to HOL 7373 prior to day of luncheon. Visiting amateurs especially welcome.

London U.H.F. Group.—May 6 (G2AOX Reports on *OSCAR III*), 7.30 p.m., Bull & Mouth Bloomsbury Way, Holborn.
London Members' Luncheon Club.—12.30 p.m., third Friday every month
Loughton.—May 6, 7.30 p.m., Loughton Hall (Nr. Debden Station).
Mitcham (M & DRS).—May 14, 7 p.m., "The Cannons," Madeira Road, Mitcham.
New Cross (CARS).—Wednesdays & Fridays, 8 p.m., 225 New Cross Road, London, S.E.14.
Norwood & South London (CP & DRS).—May 15, CD Training Centre, Catford, London, S.E.6.
Paddington (P & DARS).—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2a Warwick Crescent, London, W.2.
Purley (P & DRC).—May 21, 8 p.m., Railwaymen's Hall (side entrance), Whytecliffe Road, Purley.
Reigate (RATS).—May 15 (Visit to ITA, Crystal Palace), 7.30 p.m., George & Dragon, Cromwell Road, Redhill.
Romford (R & DRS).—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road, Romford.
Scout ARS.—May 20, 7.15 p.m., Baden Powell House, Queens Gate, South Kensington.
Science Museum (CSRS).—May 18 (Informal Meeting & Tape Recording), 6.30 p.m., Science Museum, South Kensington.
Sidcup (CVRS).—May 6, 7.30 p.m., Congregational Church Hall, Court Road, Eltham.
Slough (SARS).—First Wednesday in each month, 8 p.m., United Services Club, Wellington Street, Slough.
Southgate & District.—May 13 (Lecture by Truvox Ltd.), 7.30 p.m., Atlasta Lodge, Tottenhall Road, Palmers Green, London, N.13.
St. Albans (Verulam ARC).—May 19 ("RSGB Representation," by G4KD), 8 p.m., Hedley Road.
Sutton & Cheam (SCRS).—May 18, 8 p.m., The Harrow Inn, High Street, Cheam.
Uxbridge.—May 17, 8 p.m., Railway Arms, Vine Street.
Welwyn Garden City.—May 13, meet at 7 p.m., QTH of G5UM, Bulls Green, for visit to Post Office Radio Station, Baldock.
Wimbledon (W & DRS).—May 14, 8 p.m., Community Centre, St. Georges Road, Wimbledon, London, S.W.19.

REGION 8

Crawley (CARC).—May 12 (Informal, for details contact G3FRV), May 26 ("V.H.F. Aerials," by J-Beam Aerials Ltd.), 8 p.m., Trinity Congregational Church, Ifield.
East Kent (EKRS).—May 5 ("Aerials," tape lecture), May 12 ("V.H.F. Antennas," by J. C. Foster, G2JF), May 19 (Film show, "Humanity in Action"), May 24 ("Transmitter Design and TVI," tape lecture), no venue supplied.

REGION 9

Bath.—May 21, 7 30 p.m., Room 247, Fourth Floor, Main Building, Bath Technical College.
Bristol.—May 21, 7.15 p.m., Small Physics Theatre, Royal Fort, Bristol University, Woodland Road, Bristol 8.
Burnham-on-Sea (B-o-SARS).—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford Street, Burnham-on-Sea.
Camborne (CRAC).—First Thursday in each month, Staff Recreation Hall, SWEB Headquarters, Pool, Near Camborne.
Exeter.—First Tuesday in each month, 7.30 p.m., George and Dragon Inn, Blackboy Road, Exeter.
Plymouth (PRC).—Tuesdays, 7.30 p.m., Virginia House, Bretonside, Plymouth.
Saltash (SADARC).—May 7, 21 7.30 p.m., Burraton Toc H Hall, Warraton Road, Saltash.
South Dorset (SDRS).—First Friday in each month, 7.30 p.m., Labour Rooms, West Walks, Dorchester.
Torquay (TARS).—Last Saturday in each month, Club HQ, Belgrave Road, Torquay.
Weston-super-Mare.—First Friday in each month, 7.15 p.m., Victoria Hotel, Weston-super-Mare.
Yeovil (YARC).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil.

REGION 10

Cardiff.—May 10 (Junk sale and NFD arrangements), 7.30 p.m., TA Centre, Park Street, Cardiff.
Port Talbot.—June 1 (Surplus Sale), 7.30 p.m., Trefelin Workmen's Club, 8-10 Jersey Street, Port Talbot.

REGION 11

Bangor (UCNWARS).—Thursdays fortnightly, 5.30 p.m., Department of Electronic Engineering, University College of North Wales, Dean Street, Bangor. Details from the Hon. Secretary, c/o this address.
Llandudno (CVARC).—May 13 ("Transistors in Amateur Radio," by J. T. Lawrence, GW3JGA), 7.30 p.m., Cross Keys, Madoc Street, Llandudno.
Prestatyn (FRS).—Last Wednesday in each month, 8 p.m., Railway Hotel, Prestatyn. Details from A. Antley, Fairholme, Fairfield Avenue, Rhyl.

REGION 14

Glasgow.—First and third Wednesdays in each month, Christian Institute, 70 Bothwell Street, Glasgow, C.2.

REGION 16

Basildon (BDARS).—May 17 (Discussion on NFD), June 1 (Social evening at the Bullseye), 8 p.m. Details from G3IJB.
Chelmsford (CARS).—June 1, 7.30 p.m., Marconi College, Arbour Lane, Chelmsford. Details from G3LTF.
Great Yarmouth (GYRC).—Fridays, 7.30 p.m., the Manager's Office, the Old Power Station, South Quay, Swanston's Road, Great Yarmouth. Details from G3HPR.
Norwich (NARC).—Mondays, 7.30 p.m., the Club Centre, 140 Oak Street, Norwich. Details from G3LTC.
Southend (SDARS).—Meetings in the Executives' Canteen, E.K. Cole Ltd., Priory Crescent, Southend-on-Sea. Details from G3SLP.

REGION 17

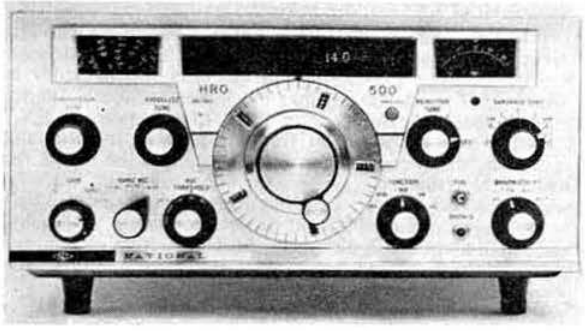
Harwell (AERE ARC).—May 18 ("Moonbounce," illustrated talk by P. K. Blair, G3LTF), 7.30 p.m., AERE Social Club.

HRO-500 Receiver

The National Radio Co. Inc. has just put on the market a new HRO: the solid-state HRO-500. It was produced after four years' research and technical development, and is claimed to be the most advanced, highest performance equipment ever offered to the advanced amateur.

The HRO-500 covers 5 kc/s to 30 Mc/s, with frequency control by means of an electronically bandswitched, phase-locked crystal frequency synthesizer, which eliminates multiple crystal oscillators for high frequency oscillator injection. The dial calibration is accurate to within 1 kc/s over the entire tuning range. The sensitivity and image rejection are superior to previous HROs; the 5 kc/s to 500 kc/s sensitivity is 25-50 μV without the LF-10 preselector, and a minimum 60db image rejection is achieved.

This receiver is distributed throughout the UK by Ad. Auriema Ltd., 125 Gunnersbury Lane, London, W.3.



The new fully transistorized National HRO-500

Membership Badges

New style membership badges are now available from Headquarters, price 2s. each including postage. The badges are available in either stud or pin fitting.

Tie clips incorporating the new $\frac{1}{2}$ in. badge are also available, price 5s. each post paid.

SECOND LONDON S.S.B. DINNER

Waldorf Hotel, Aldwych, W.C.2

SATURDAY, MAY 29, 1965

Tickets, price 3 guineas per person, are available from Mr N. A. S. Fitch, G3FPK, 79 Murchison Road, London, E.10.

NEWS . . .

Collated by John Clarricoats, O.B.E., G6CL

Russia Two Up. According to reports from Madrid the USSR has launched two satellites to map the Earth's magnetic field under an IQSY agreement, while the Americans have yet to launch one. The agreement covered launchings by both countries. The Russians gave news of the successes during the IQSY Conference held in the Spanish capital last month. The American counterpart POGO (Polar Orbiting Geophysical Observatory) is due to be launched in the autumn.

Achievement. Beginning little more than five years ago the US lunar exploration programme by Ranger spacecraft has achieved results superior to those anyone hoped would be possible in so short a time. Ranger VI was the first of the series to carry a six-camera television system but the cameras failed. The next three worked to perfection and most excellent pictures were transmitted back to earth. Reproductions of these pictures in technical journals provide proof of the high quality of the transmission system.

What's a Hologram? Three-dimensional pictures, generated in space by the beam of a laser have recently been demonstrated in the University of Michigan. These 3-D images, when recorded on films, are called holograms and have been known to science for only a few months. They differ entirely from the usual 2-D picture produced on slides, films and television. The hologram itself appears to be only a greyish mottled photographic film but when illuminated by a laser, it forms an image, having height, width and depth which can be " peeked " around like a solid object hanging in space.

Scandinavian Earth Station. The Telecommunication Administrations of Denmark, Norway and Sweden recently opened a new experimental receiving earth station at Råö about 30 miles south of Gothenberg.

Long Session. The 20th Session of the Administrative Council of the ITU began in Geneva on April 12 and is due to end on May 18—the day after the ITU officially celebrates its centenary.

U.H.F. Television Conference. A Conference to discuss U.H.F. Television will be held in London on September 1 and 2, 1965. Timed to take place during The '65 Radio Show the Conference will have an international content. Aspects to be covered include receiver and transmitter design, propagation, aerials, parametric amplifiers and test equipment.

Japanese Blind Hams Club. Five years ago the Japanese Amateur Radio League assisted in the formation of the Japanese Blind Hams Club. The club, which has 300 members, has begun a project with the assistance of JARL similar to the well-known Christmas Seal project. Money collected will go towards printing reference books in Japanese Braille. There is no organized solicitation outside Japan but any amateur who would like to help can send a donation to the Japanese Blind Hams Club c/o JARL, Mr. Shirai, Box 377, Tokyo (Source, *CQ*, March 1965).

Helicopter/A.M. Larry Hartwick, WA8CJK recently operated Aeronautical Mobile from a US Navy SH-34J helicopter en route from Goose Island, Michigan to Key West, Florida. He used the 50 Mc/s band for what was believed to be pioneer work by a radio amateur from a 'copter (way back in the early 1930's Douglas Walters, G5CV, carried out pioneer work from gliders using the old 56 Mc/s band).

Good Lookers. *QST* for March 1965 ran a feature article " ZS-Land YLs," illustrating it with pictures of six of South Africa's many attractive YL-operators. Incidentally, there are about 150 YLs in South Africa, many of whom are married to licensed amateurs. Pity someone hasn't yet found time to tell the story of Britain's YLs and of the pioneer work done by two of them more than 30 years ago.

Looking Ahead. For the next two years the Physical Society Exhibition will be held at Alexandra Palace in North London. " Ally Pally "—birthplace of BBC Television in pre-war days and now used for sundry TV purposes—has for long been regarded by many as an ideal Exhibition centre. The dates, for reference purposes, are March 28-31, 1966, and April 17-20, 1967.

Instrument Show. B & K Laboratories are staging their Eighth International Instrument Show at Grosvenor House from May 17-21, 1965. Tickets are obtainable from B & K, 4 Tilney Street, London, W.1.

Microwave Applications of Semiconductors is the title of a joint Conference being arranged by the IERE and IEE for June 30 to July 2 at University College, London. There will be six main sessions. Further details from IERE, 8-9 Bedford Square, London, W.C.1.

Faraday Medal for 1965 is to be awarded to Dr Vladimir Zworkin " for his notable scientific and industrial achievements, including the invention of the iconoscope and his important role in medical electronics." Dr Zworkin has been associated with the Radio Corporation of America since 1942.

ITU Centenary Stamps. There is every indication that each one of the 125 Member Nations that constitute the International Telecommunication Union will be issuing special stamps this month to mark the 100th anniversary of the Union. To form a complete collection—mint, used and on first-day cover—is likely to prove a costly business if the prices quoted in stamp magazines are anything to go by. It could even mean holding back for at least a month the first down payment on that new DX-FLIER!

Old Timer Honoured. Cecil Clarabut, licensed just after World War I as 2WD and now holding the call G2VS was recipient of engraved gold cuff links at the annual dinner of the Association of Public Address Engineers held last month in Harrow, in appreciation of his services to that organization. Mr Clarabut, whose home is in Bromham, Beds, was Founder Chairman of the now well-established APAE.

US Colour Market. Reliable sources estimate that two million colour TV sets will be sold in the United States during the current year.

RECMF Reminder. The RECMF Components Exhibition will be held at Olympia, London, from May 18 to 21, 1965.

Science Journal, a new Iliffe monthly publication covering a wide range of subjects of scientific interest is now on the bookstalls, price 4s.

US Amateur Licences. Fees are as follows: New Licence, Renewed Licence, Modified and Renewed Licence, $4.00; Modifications only, $2.00; Novice Licence, no charge. There is also no charge for a Military Recreation Station licence or for a Radio Amateur Communication Emergency Service (RACES) authorization.

Veil Lifted. The mystery of the American amateur who last summer operated openly from Leningrad, Kiev and Moscow has been solved by the publication of a picture story in March *QST*. It turns out that the US Information Agency put together an exhibit called " Communications—USA," staffed it with a number of Russian-speaking students and communications people and sent them off to the USSR for six months. One of the group was Larry De Milner, W8NRB who succeeded in achieving what everyone had said couldn't be done—he obtained official Soviet permission to operate the exhibits' amateur station in the USSR, signing his own call W8NRB/UA1 in Leningrad, /UB5 in Kiev and /UA3 in Moscow.

Portent for the Future. A complete range of equipment for the alignment of colour TV is now available from RCA, Great Britain Ltd., for £350.

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The Amateur Radio Handbook (Third Edition)	36/6
Radio Data Reference Book	14/-
Amateur Radio Circuits Book	8/6
Amateur Radio Call Book, 1965	5/9
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S.S.B. Equipment	3/-
Communication Receivers (Second Edition)	3/-
The Morse Code for Radio Amateurs (Third Edition)	2/-

ARRL PUBLICATIONS

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Hints and Kinks, Volume 6	10/-
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Buckram Bound	50/-
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Guide to Broadcasting Stations (*Iliffe*)	5/6
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Manual of Transistor Circuits (*Mullard*)	13/6
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MISCELLANEOUS

FREE! Most days except Fridays 3501-3505 c.w. I will present the first G stn. to make 2 way contact with me while we are both using indoor Joysticks with only the 8 ft. feeder (as supplied), 1 year's free subscription to N.Z.A.R.T. (this includes monthly issue of "*Break In*" and an up-to-date ZL call book. This offer is not impossible, remember G5WP worked me on 3·5 m/c and gave me 569, during 1965 B.E.R.U. Contest, and I was using the Joystick against the shack wall. Use the codeword " Joyin " and I will tune up my indoor Joystick immediately for the qualifying 2 way contact. Who will be the first ? ? ? 73, Alan Frame, ZL4GA.

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£50 TAPE RECORDER, 3 speed Collaro " transcriptor " deck, mike, L.P. tape, amp similar Mullard 3 valve. Exchange for good general purpose RX—AR188 D/LF Eddystone etc. Cash adjustment, excellent condition. K. Wallace, 42 Chepstow Road, Leicester.

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Prospective applicants who would like to visit the Central Communications Establishment for an informal preliminary discussion are invited to telephone STOnegrove 5691, Extension 20, for an appointment.

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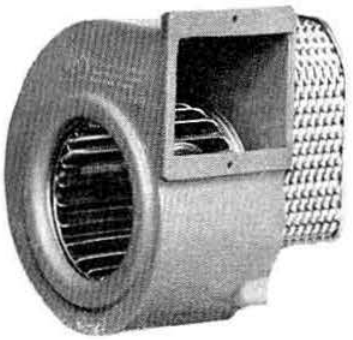

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