SEPTEMBER, 1957

R S G B

BULLETIN

2/6 Monthly

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

VOL. 33, NO. 3

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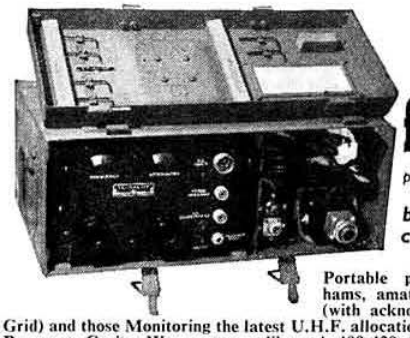

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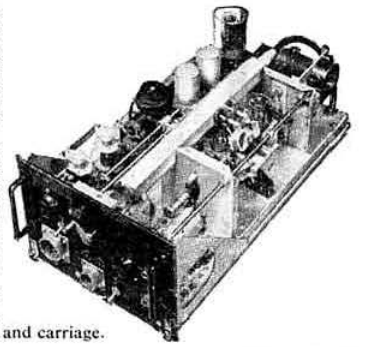

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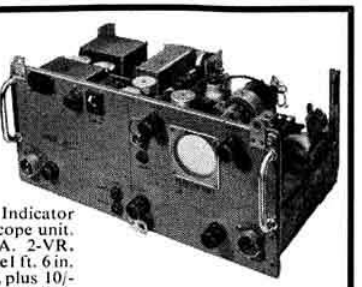

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Devoted to the Science and Advancement of Amateur Radio

Vol. 33 No. 3 SEPTEMBER 1957

CONTENTS

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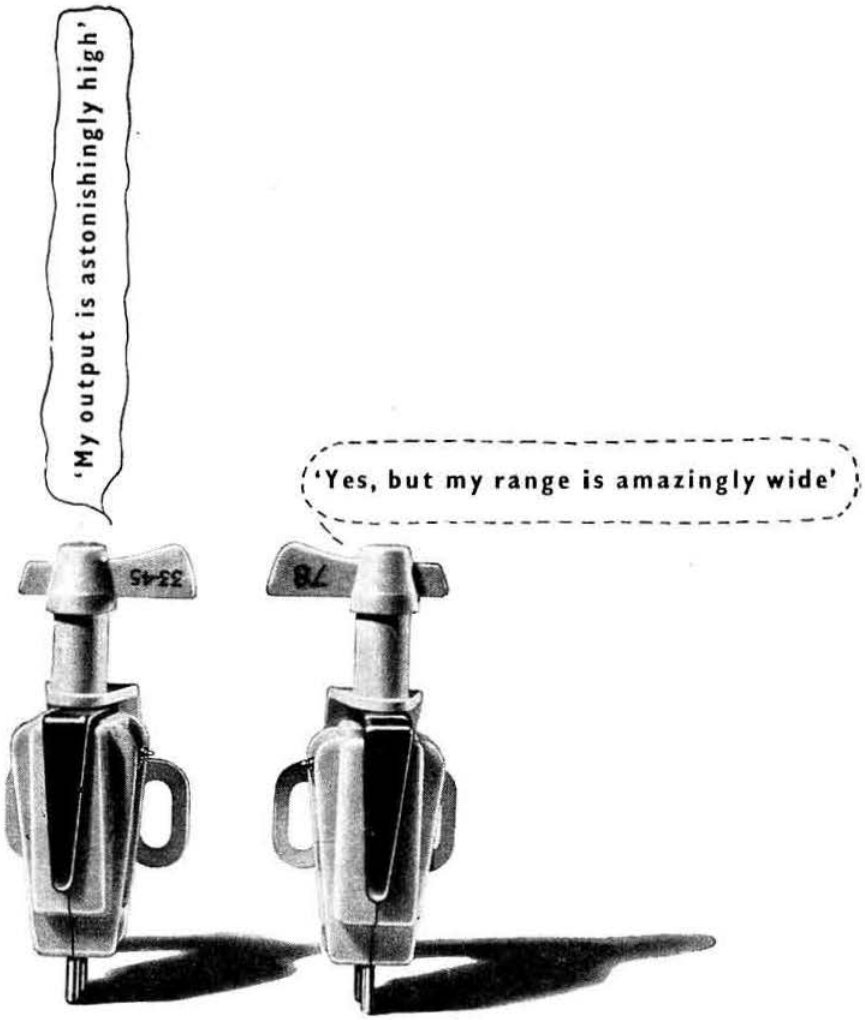

On the left is Acos Cartridge Type 65-3. Its output is as high as 1.0 V * (but its compliance is very good, for all that). On the right is Cartridge 65-1, whose frequency range extends to 12 kc/s. This one is particularly hi-fi, hi-g, high-quality (but its output is 0.15 V*, for all that). Both have x500 individually tested styli, in slip-in fittings. The length and breadth of the matter is that you'll not find a range of cartridges better than this Acos Series 65.

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Current Comment

" There are Two Megs on Two Metres "

" REMEMBER, you have to tune over two megs on the Two Metre Band," said the Old Hand to the Unangry Young Man who had his fingers on the controls of the receiver perched on a stool inside the tent.

The second Two Metre Field Day was about to begin, and the amateurs of Lambdaville had decided to go in for it for the first time with their town group call-sign G7LM/P (actually it belonged to a local Club station, but was being " borrowed " for the occasion). A few months earlier a Large Electronic Company in their town had presented them with a 230 volt a.c. petrol generator, and naturally, being radio amateurs, they could not resist the temptation to try it out, any more than radio amateurs ever can when they are given a new toy to play with.

Apart from this, the prospect of a limitless source of power opened up prospects of " going portable " with existing station equipment and power units that did not exist before. Well, the prospects *did* exist, but no one was wildly enthusiastic over accumulator-driven vibrator or " converter-units " nor of operating a Field Day station under what one of the members called " starvation conditions "—and noticing his well-fed look everyone knew he was talking in an electronic context and not a human one.

Nobody minded humping that weighty petrol-electric set (three could just lift it) for the good of the cause on to and, at the site, off the shooting brake which The Man with the Lowest B.R.S. Number in the R.S.G.B. provided for National Field Day every June.

But this was not another N.F.D. It was the Second Two Metre Field Day of August 1957, and none of the Group's members had ever participated in it before, except the Old Hand—and he only from the safety of his home station. Now here he was about to " have a go," to use the terminology which his dozen or so colleagues applied to this first essay by their Group into regions where there are ten times more megacycles than there are on " 20."

Hence the Old Hand's adjuration to the Unangry Young Man (G4UYM of only three months' status) to remember that there are " two megs on Two, and it'll tune rather differently from your bandspread on 20." Nor, he added, would he find stations netting on to him. Everyone used crystal control on " two " and you had to search over the whole 2 Mc/s spectrum for them.

Two hours later, his larynx limp, G4UYM passed the microphone and log sheet to The Doc, who had just arrived. Both of them shared the view widely held in the Group that Two Metre Field Day was rather to be preferred to N.F.D. not only because it was largely " phone only " but because you could actually stop and talk to the other station for a while. On N.F.D., it was grimly and earnestly " RST—b-r-r-p " and then fish for the next. And all on the key, too, which was not to the liking of those members whose knowledge of Morse was confined to " mugging up enough to pass the test and then with a sigh forgetting it all," to quote one of them.

This attitude of mind was not entirely approved of by the Old Hand, who had long adhered to the view that there was *art* in key communication but none in voice—a view which had been somewhat modified over the years with his experience on the v.h.f.s showing him how pleasantly the lion and the lamb could lie down together when there were plenty of megacycles for all.

But that afternoon it seemed that there were not enough megacycles for all. Remote though G7LM/P was from centres of 2 metre activity, powerful portables scores of miles away pressed down the a.v.c. background of the receiver, and there seemed to be one every 10 kc/s. Nor was it " phone only," as The Major discovered when he came up to the hillside site that afternoon to relieve The Doc, whose vocal chords by now had followed those of G4UYM in to the decibel-minus state.

Having recently launched himself on to " two " at home, The Major was an enthusiastic exponent of the band as a noise-free telephone link with friendly like-minded people. To use c.w. on it did not occur to him, and the pleeping Morse CQ coming through on the receiver at G7LM/P behind the phalanx of fat phone signals from the North Downs portables barely stirred his consciousness. But the Old Hand, as if the unearthed receiver had given him an extra powerful shock, leaped from the camp stool and grabbing a Morse key in the flat of his left hand proceeded furiously to pump-handle it with the right.

" Now I've seen everything," murmured The Major. To his relief phone operation was quickly resumed after the c.w. contact had been safely " Gottim "-ed and added to the lengthening list in the log.

Everything stops for tea on National Field Day, but not on Two Metre Field Day, which goes on for two hours longer until 8 o'clock. The Member with the Lowest B.R.S. Number in the R.S.G.B., with his small son, had in fact brought provisions for the whole day, inflicting an exquisite torture on his fellows when they laid the aroma of fried bacon and egg heavily upon the fresh outdoor air at lunchtime. But by teatime no one seemed anxious to stop. " See it through till eight and we'll eat then," they said. And they did.

" You must make it 40 contacts," urged The Major in what little voice he could by then command to

G4LFF (Little Father of Five). It was ten to eight. Came the 39th. And then the 40th—with a man who had just finished his first 2 metre installation and could barely believe his ears at the tintinnabulations that broke loose when he put out his first tentative CQ. For a moment he thought he had peaked his converter on London Airport Control, not the 2 metre band, which he had always been told was quiet and sedate.

Before the contact was finished The Major and The Lowest B.R.S. had removed the tent from over the heads of LFF and The Doc (now log-keeping), and in a couple of minutes more the petrol-electric set had coughed its last.

Lambdaville Town Group struck camp, and down the winding country lane from the high open field where G7LM/P had had nine hours of glorious life, coasted The Doc's " Consul," the little Austin Seven of G4LFF, and The Major's Wolseley Four-Forty-Four, followed by " The Famous 800 " (from its registration number) of The Lowest B.R.S. and his tank transporter. No one could blame The Major for calling it that; it bore half a ton of aerial masts and motor generator and cable reels and small son and camping equipment.

Bringing up the rear came the Old Hand, sitting between his special " ham radio " number plates. His contentment with the day's proceedings was enhanced both by the " discovery " of Two Metres which many of the members had been able to make for the first time, and by his surprise that his " rig " had kept on working all the day. For one who had learned his radio in the Pleistocene age when it was wireless, soldering was suspect and connections were made by screwing wires under terminal nuts, this was quite the most astonishing thing of all.—J. H.

Lecture Season

PROVERBIAL if not actual ice blocks are *de rigeur* at meetings of the Technical Committee and subsequently of the Council at about mid-year, when the I.E.E. lecture programme for the forthcoming winter is considered. To organize lectures for the hobby enthusiast, whatever his particular field of interest, is an exacting business. Blinding the lecture-going radio amateur with the sort of science that can be sat through imperturbably by University graduates makes him (or most of him) restless. On the other hand, so does too much " child's guide stuff " of the type which he left behind him perhaps even before he learned Morse.

Something between the two extremes represents just about the right balance for a lecture-audience of radio amateurs, whose desire is to go away from a meeting with more knowledge than they had before they went to it, and no regrets at being left with a certain healthy discontent. It is with such requirements in mind that the forthcoming I.E.E. syllabus has been framed.

Many R.S.G.B. London lectures have become classics, and if, arbitrarily, two are singled out for mention (Charman on Aerials and Hicks-Arnold on Aerial Matching Devices), this is simply to select a couple which are still current far beyond the purlieus of the Victoria Embankment on Thames-side. Preservation of lectures on tape for reproduction at local meetings has been an economical way of allowing many more members to enjoy them than could get along to the I.E.E.

It is well worth watching *Forthcoming Events* for the date of the next I.E.E. meeting, and to bear in mind that admission is free to any and every member who finds it convenient to go along.—J. H.

Support Groups

ONLY if a national newspaper enjoys a circulation around the four or five million mark can it expect to make a profit from its actual sales. If it prints and sells much less than that number it must look to its advertisers to keep it solvent.

This basic fact of publishing life, which is often overlooked by the reader, applies with even more force to the smaller specialist magazines. If the R.S.G.B. BULLETIN were printed purely as a *bulletin*, devoid of advertising, it would in its present size absorb the greater part of the Society's income, leaving a mere shoe-string on which to suspend Headquarters, the QSL Service, Conventions, and the numerous other facilities that make R.S.G.B. membership worth while.

Seen in this light, the exhortation " Support BULLETIN Advertisers " ceases to be a catchphrase and becomes a matter of life or death. Without the consistent purchase by BULLETIN readers of the goods offered by its advertisers the value of this publication as " a medium," to use advertising agents' jargon, would soon decline.

Quite the contrary is happening. The faith of manufacturers and suppliers in THE BULLETIN as a means of communicating with a highly specialized, discriminating and hard-bargaining clientele is evident from the sustained volume of advertising which it has been enjoying for some time.

Informatory announcements, phrased in the sophisticated language of the amateur electronic engineer, bring their reward, and the radio amateur, supporting BULLETIN advertisers by buying the equipment they offer, does himself a good turn in a second sense—for besides getting the gear he wants, he ensures the continuance of his own magazine.—J. H.

On The Map

THE Story of GB3SP, published elsewhere in this issue, will help to convey to those who were not able to visit the Boy Scout Jamboree last month an idea of the monumental task undertaken by Alan Dennis (G3CNV), Tom Douglas (G3BA) and their colleagues. It is a story in the best tradition of Amateur Radio, a record of achievement shared by more than 100 Midland amateurs and brought to fruition by the splendid co-operation of the radio industry.

The hourly news bulletins made history: never before in this country has the Postmaster-General permitted an exhibition station to enter the broadcasting field—for that is what the permission amounted to.

As memories of the Jamboree fade slowly away many will wish to offer their congratulations to those who put Amateur Radio well and truly on the map in Sutton Park.—J. C.

Operation and Manufacture of Transistors

By A. J. OLIPHANT, F.H.-W.C., Assoc.I.R.E. (B.R.S.20002)*

Introduction

THE purpose of this article is to present the principles of operation and general manufacturing techniques of the new solid-state device called the transistor. This device was invented and patented eight years ago by Bardeen and Brattain of the Bell Telephone Laboratories in the U.S.A. The original transistor consisted simply of two fine wires pressing lightly on one surface of a small piece of germanium. The three terminal device, the third lead being the germanium itself, was observed to have oscillation, amplification and negative resistance properties. From that moment onwards work in this field of electronics gathered momentum until today many hundreds of technical papers have been written dealing with the physical and chemical aspects as well as the application of the new device in electronic circuits. It is of interest to note that in 1924 Lossev produced a point-contact device using zincite with steel wires and observed properties similar to that of the point-contact transistor of Bardeen and Brattain.

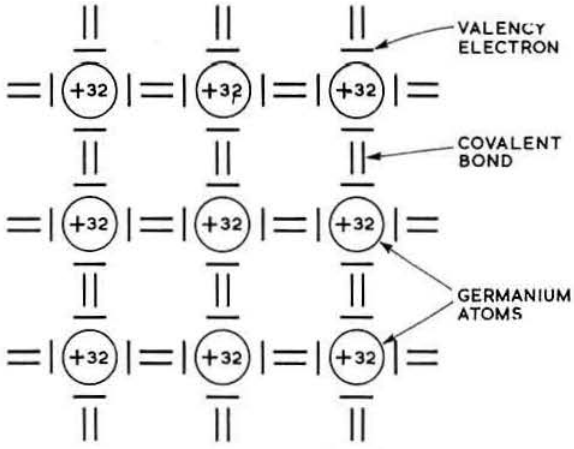

Fig. 1. Intrinsic semiconductor.

The transistor, although having somewhat similar static characteristics to the thermionic valve, operates in an entirely different manner to the conventional valve. Whereas the thermionic valve depends on the flow of electrons in free space, i.e. between cathode and anode, the transistor is concerned with the behaviour of current carriers in solid materials. These current carriers consist essentially of two types, namely electrons and holes. The media in which this takes place is an extremely pure material having regular atomic arrangements. Modern commercial transistors have germanium as the semiconducting medium although experimental silicon types have been produced.

The materials used in transistor work are called semiconductors. As the name suggests it can neither be classified as a conductor nor as an insulator, in that the resistivity of a semiconductor lies between that of a good conductor and insulator.

* "Midmar," 39 St. Baldred's Road, North Berwick, East Lothian, Scotland.

Semiconductors

Transistors are made from elements appearing in the fourth column of the periodic table, i.e. the elements are of valency 4. In the crystal they form a diamond type lattice having four near neighbours at the corners of a regular tetrahedron. The atoms are bound together by covalent bonds thus producing a stable group of eight valency electrons round each atom. Fig. 1 shows a two-dimensional representation of the crystal structure of germanium.

If the crystal structure consists entirely of germanium atoms then the material is known as an intrinsic semiconductor. As the valency electrons are in a stable state very little conduction arises. Intrinsic semiconductors are of no use as transistor material and it is necessary to " dope " it thus producing extrinsic semiconductors. The doping process merely replaces substitutionally a small number of atoms of valency 4 by atoms having valencies of 5 or 3 producing donor or acceptor material. Typical donors are phosphorus,

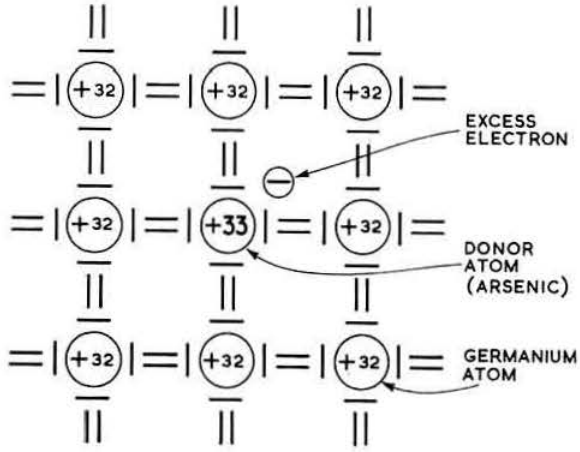

Fig. 2. N-type semiconductor.

arsenic or antimony forming *n*-type semiconductors and typical acceptors are boron, gallium, aluminium or indium forming *p*-type semiconductors.

n-type Germanium

Fig. 2 shows the original germanium lattice structure except that one of the atoms has been replaced substitutionally by a donor atom: in this case arsenic. As the donor atom is of valency 5, four of these valency electrons have been used up in forming convalent bonds while the fifth electron is bound loosely to the atom. Under the influence of an electric field this loosely bound electron will move through the crystal lattice thus constituting an electric current. Thus in *n*-type semiconductors the conductive properties are essentially by electrons.

p-type Germanium

If instead of introducing an atom of valency 5 an atom of valency 3 was introduced, Fig. 3, then the covalent

bonding would be unsatisfied. An electron would be missing thus producing a " hole " in the structure. Should some stimulus be applied to the material, say an electric field, then one of the electrons constituting another covalent bond would move into this " hole." When this occurs the original incomplete convalent bond is completed but the " hole " has moved to the new incompleted bond. Thus the " hole " appears to have a positive charge and is known as a positive hole or simply a hole. Whereas the electron has physical mass the hole has no mass, although in theoretical considerations holes and electrons have effective masses; the effective mass of an electron being less than that of the physical mass of the electron. Thus in *p*-type semiconductors the conductive properties are essentially by holes.

The number of impurity atoms introduced into the lattice is of the order of one part in 100,000,000 and consequently, as the average distances between donor and acceptor atoms are so great, there is no possibility of interference.

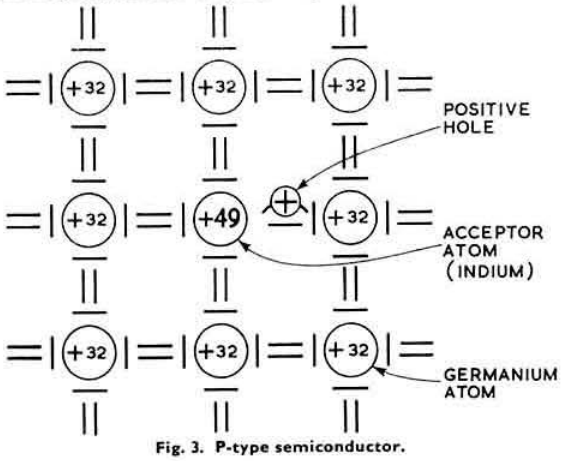

Fig. 3. P-type semiconductor.

Thus to conclude, semiconductors exist in three forms and conduction in these three types then are:

(*a*) Intrinsic conduction where the number of electrons is equal to the number of holes.
(*b*) *n*-type conduction where the number of electrons is greater than the number of holes.
(*c*) *p*-type conduction where the number of holes is greater than the number of electrons.

If both donor and acceptor atoms are present the more numerous decides the type of conduction. Further, if one started off with intrinsic material and added *x* donor atoms followed by *x* acceptor atoms then the resultant material would be intrinsic although not a pure intrinsic semiconductor, i.e. the resistivity is lower than that of 100 per cent pure germanium.

p-n Junction

A *p-n* junction is a device which has a donor region adjoining an acceptor region (Fig. 4); the diagram shows the *p-n* junction with external electrical connections. If no external voltage is applied it is found that electrons diffuse

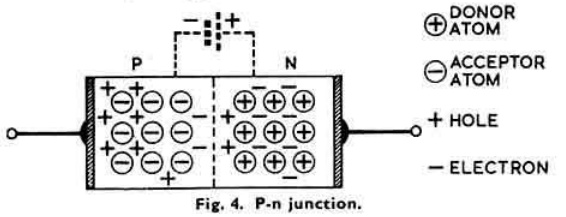

Fig. 4. P-n junction.

into the *p*-type region and holes into the *n*-type region. This continuous diffusion process produces an internal electric field which eventually opposes any further increase in the diffusion current. Thus a small potential difference exists between the two regions and is known as a " potential hill "; represented in the diagram by an equivalent battery which is of the order of a few tenths of a volt depending on junction characteristics and temperature.

If external voltage is applied to the leads the polarity of the signal may aid or oppose this potential barrier. Should the *p*-type region be made positive with respect to the *n*-type region then electrons will cross the junction towards the positive terminal and the holes towards the negative terminal. In making the *p*-region positive the potential barrier is reduced and the nett result is that conduction is rendered easy. This is the forward condition. Suppose now the polarities are reversed then the potential barrier is increased making it difficult for electrons and holes to cross the junction. Alternatively the majority carriers (i.e. holes in *p*-type and electrons in *n*-type) are attracted away from the junction giving the reverse condition. The characteristics of the device are shown in Fig. 5, where the small reverse

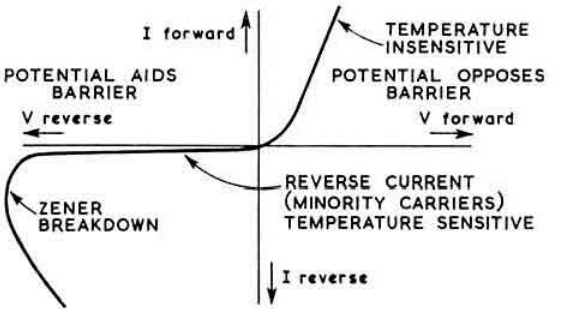

Fig. 5. Current/voltage characteristics (not to scale).

current is due to the passage of minority carriers (i.e. holes in *n*-type and electrons in *p*-type). It will be observed that the reverse characteristic has a Zener breakdown region.* This is due to the extremely high reverse voltage appearing across the junction causing the stable breakdown of the valency bonds. The forward characteristic is exponential up to the point where the external voltage neutralizes the potential barrier. Following this point the characteristic is linear where the device acts as a resistor and large currents result for small impressed voltages.

The characteristics of the device display rectifying properties: the point-contact diode operates on more or less the same principles except that the device has a metal/semiconductor contact.

Transistors

Transistors exist in many forms and this article is mainly concerned with crystal triode transistors. The basic transistor has three electrical connections called the emitter, base and collector which are analogous to the cathode, control grid and anode of the conventional thermionic valve.

The Emitter

The purpose of the emitter is to inject minority carriers into the base region of the transistor. A metal wire of almost any type in contact with a specimen of an extrinsic semiconductor exhibits a rectifying characteristic and, if biased in the forward direction, minority carriers are injected into the

*The Zener or avalanche breakdown voltage is the voltage at which there is a sharp increase in current due to secondary ionization of carriers into the conduction band.

semiconducting medium. The injection ratio γ of an emitter is defined as the proportion of the total forward current carried by the minority carriers in the semiconductor. With *n*-type material γ is found to be higher than with *p*-type semiconductor and is one of the reasons why point-contact transistors use *n*-type germanium. With junction transistors the most effective emitters are those in which the impurity concentration is greater in the emitter region than the base region. Values of γ with *p-n* and *n-p* configurations may be of the order of 0·99 or greater depending on junction characteristics.

The Base

The base region may be regarded as the connecting link for the passage of minority carriers from the emitter to the collector. The effectiveness of the base region is given by the base transmission factor β which is defined as the ratio of the number of minority carriers leaving the base to those entering from the emitter. Consideration must, therefore, be given to the average transit time and lifetime of the minority carriers in the base region in order to prevent excessive trapping, i.e. the base region should be thin.

The Collector

The function of the collector is twofold:

(*a*) to provide a current gain such that the ratio of collector current to emitter current approaches or exceeds unity and

(*b*) to make the ratio of output-current/collector-voltage small for constant emitter current, i.e. high output impedance.

Condition (*a*) depends on the type of transistor and (*b*) achieved by the combined effects of the reverse biased collector-base junction and the saturation effect of the minority carriers with high collector-base voltages. The collector current gain α_c, defined as the ratio of the collector current to the minority carrier current emerging from the base, is considered to be unity for a junction transistor. Thus the current gain for a junction transistor is $\gamma\beta\alpha_c$ or simply α and is of the order 0·95-0·98 for good units with short circuited output. Point contact transistors, on the other hand, have the collector specially formed which results in values of α being greater than unity.

p-n-p Transistor

The *p-n-p* transistor essentially consists of two *p-n* junctions placed back to back as shown in Fig. 6.

Under the influence of the emitter bias battery the emitter-base junction is biassed in the forward direction and holes are injected into the base region. These holes then drift towards the collector primarily by diffusion and by the influence of the electric field of the reverse-biassed collector-base junction and there collected in the collector region. As the holes are minority carriers in the base region the transit time of the holes must be less than the minority carrier lifetime otherwise no holes would reach the collector. As it is some recombination does take place resulting in the collector current being less than the emitter current. This results in the small base current.

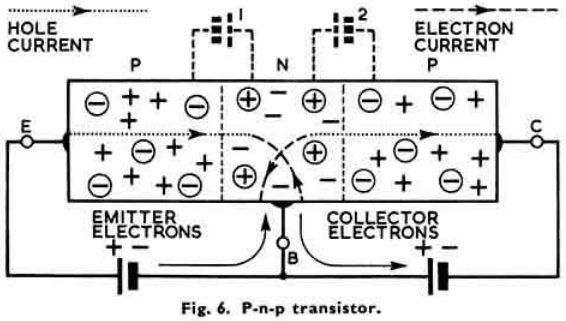

Fig. 6. P-n-p transistor.

In the *n-p-n* junction transistor the operation is identical to that of the *p-n-p* type except that the bias polarities are reversed, i.e. the minority carriers in the base are electrons.

From these considerations the *p-n-p* or *n-p-n* transistor is a current operated device and is analogous to the voltage controlled thermionic valve.

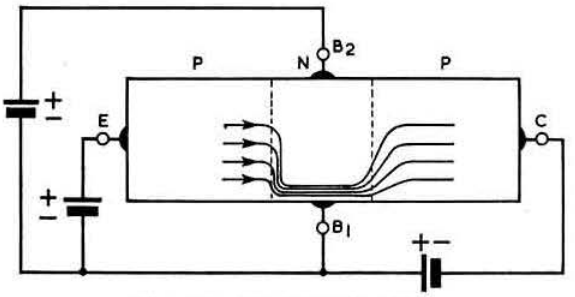

Fig. 7. Junction tetrode transistor.

Junction Tetrode Transistor

The junction tetrode transistor is a double-based type where the second base connection, placed directly opposite the normal base lead, causes the minority carriers to move very close to the normal base (Fig. 7) and is achieved by applying a suitable bias voltage between the base leads. This process of forcing the minority carriers towards the normal base lead reduces the equivalent circuit base resistance and, if the base layer is thin and of small cross-sectional area, the frequency response is improved considerably due to the reduction of the collector/base capacitance, transit time and base resistance (see references 1, 2, 3, 4, 5).

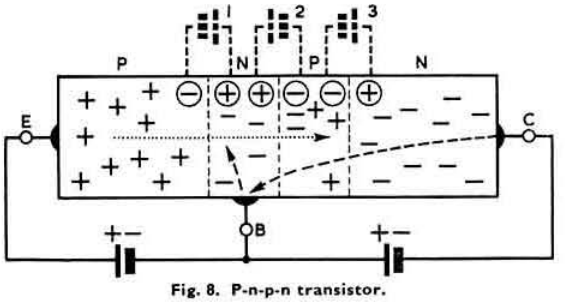

Fig. 8. P-n-p-n transistor.

p-n-p-n Transistor

Consideration is given to this transistor configuration because the principle of operation of the point-contact transistor is similar as will be shown later. This configuration has a " floating " acceptor region between the base and collector and the presence of this produces the " *p-n* hook collector " current amplification mechanism (Fig. 8).

When the holes arrive at potential barrier 3 their motion is impeded by the array of donors on the right hand side of the junction. The presence of these holes reduces this potential barrier and electrons pass easily through and leave by the base. The characteristic of the " hook collector " is that the number of electrons leaving the collector donor region is in excess of the number of holes causing this. Thus current amplification results and may be of

the order of 15 or more. Further, the base and *p*-type region of the hook collector must be thin otherwise excessive recombination of minority carriers result.

Manufacture of Transistors

This section briefly describes the extraction and purification of germanium together with general manufacturing techniques of transistors.

In this country germanium is extracted from the flues and ashpits of power stations and producer gas plant. This raw material, containing a small percentage of germanium, also has carbon, copper, iron and arsenic as impurities and the first process is treatment in hydrochloric acid. The resulting solution is distilled and arsenious trichloride and germanium tetrachloride pass over leaving the other impurities in solution. $AsCl_3$ and $GeCl_4$ are then separated by fractional distillation and $GeCl_4$, in the presence of steam, is converted into $Ge(OH)_4$. The hydroxide is then heated at 650° C. in an atmosphere of hydrogen and germanium results.

Although the resulting germanium is chemically pure, even to the spectroscope, the degree of purity is not high enough for semiconducting devices. The germanium powder, therefore, is put into an atomically pure graphite boat and heated up to approximately 1,000° C. in the presence of hydrogen or argon. The molten mass is then allowed to cool, after a period of time in the molten state, and a bar of solid germanium results.

Zone Melting

The zone melting process is the final operation for removing a large percentage of the impurities in the germanium ingot. The ingot is placed in a quartz tube with a circulating supply of an inert gas to prevent oxidation. Six series r.f. coils wound in opposite sense to each other surround the tube and suitable mechanical drives are present to move the ingot at a predetermined speed through the tube (usually a few inches an hour). When the coils are energized and the bar moves through the tube six separate molten regions pass down the bar and the impurities, preferring the molten state to the solid state, are " swept " along the bar to one end. When this process is completed the impure end is removed (by a diamond edged circular saw): the resulting intrinsic germanium may have a resistivity as high as 60 ohm-cm.

Should *n*-type material be required (e.g. for manufacture of point-contact transistors) a small quantity of donor impurity (e.g. antimony) is placed at the pure end of the bar and the bar passed through one or more excited r.f. coils. In order to even out the donor impurity concentration along the length of the bar the germanium ingot is " reverse passed ": the direction of motion of the bar being reversed.

Crystal Pulling

The crystal pulling technique is a process whereby germanium of required crystal orientation and type (e.g. intrinsic or extrinsic) results. Purified *Ge* from the zone melting stage is remelted by r.f. means in a special crucible in an atmosphere of hydrogen, argon or nitrogen. A germanium seed of correct crystal orientation is lowered until it touches the surface of the molten *Ge*. The seed is then raised slowly and the molten *Ge* adheres to form on solidification an ingot of required crystal orientation. The seed may be rotated (at about 150 revolutions per minute) and vibrated in the direction of pull. In this process close temperature control is necessary as variations in the crystal characteristics may result.

Another tremendous advantage of this pulling process is that donor or acceptor germanium may be produced at will. The impurities are inserted into the melt by small pellets of germanium-impurity element alloy when required. The pellet is so small that it has no effect on the temperature of the melt when inserted, and, due to the agitation caused by the rotation and vibration of the seed, the impurities are well mixed. Thus a " series " of *p*- and *n*- type regions may be constructed.

Throughout the zone refining and crystal pulling processes a constant check is made on the resistivity of the material. This is achieved by means of a suitably calibrated four-probe device whose probes are located in a straight line. A known current is introduced into the specimen of germanium by the outer probes; the resulting voltage across the inner probes appearing on a voltmeter calibrated in ohm-cm (Fig. 9).

The completed ingots are sliced and diced into finished sizes by diamond edged circular saws. An alternative is to dice the slice by blades operated by supersonic vibrations or alternatively the germanium is scratched and broken into dice as in glass cutting. In order to remove deep saw cuts on the finished dice the material is first lapped with carborundum powder paste and then etched. This etching process is also used to remove surface impurities, reveal the grain structure and to reduce the material to the required size.

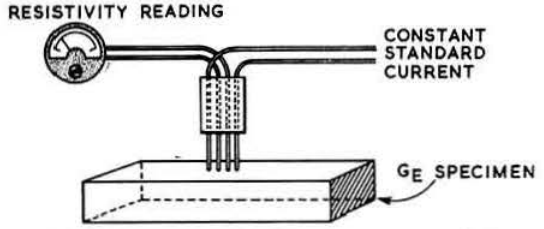

Fig. 9. Four-probe resistivity measurement method.

Junction Transistors

Junction transistors exist in three forms namely the grown junction, alloy junction and surface-barrier types.

Grown junction transistors are manufactured by the crystal-pulling process. They are normally of the *n-p-n* configuration to achieve the higher cut-off frequency caused by the higher mobility of electrons as minority carriers in the base region. 2-3 mm of about 10 ohm-cm *n*-type Ge is pulled first and then 25-50 microns of 1 ohm-cm *p*-type Ge is pulled, forming the base region. More donor impurity is added and 2-3 mm of resistivity 0·01 ohm-cm is pulled forming the emitter end. The complete ingot of about 1-2 cm diameter is cut into bars parallel to the direction of crystal growth and connections made, using *n*-type solder, to the emitter and collector regions. Each bar is then etched and the base region located by potential exploration and a non-rectifying contact made. The whole unit is then hermetically sealed for protection against humidity, foreign impurities and mechanical damage. *P-n-p* units may also be made by this method but the most convenient way is by the alloying process.

The alloy junction transistor is the most common junction type made in this country and is usually of the *p-n-p* configuration. The base region consists of an *n*-type germanium wafer (approximately 2 × 3 × 0·1 mm³) of resistivity 1-10 ohm-cm. A small quantity of indium is placed on one side of the wafer and alloyed at 500° C in an inert atmosphere. After cooling a larger quantity of *In* is placed on the reverse side and the process repeated. The indium dissolves a definite quantity of *Ge* and re-deposits it as strongly *p*-type material; the *p-n* junctions being of concave form. Electrical connections are made to the emitter, base and collector (the larger indium " dot " being the collector) and the unit hermetically sealed. In order to reduce base resistance for high-frequency operation the base wafer is usually of thicker material with recesses for the emitter and collector regions (Fig. 10). An *n-p-n* version of

the alloy-junction type may also be constructed by using antimony " dots " on acceptor type material.

The surface-barrier transistor is somewhat similar to the alloyed type except that indium is not dissolved into the base region. The indium is deposited electrically on the *n*-type base wafer by small jets of indium sulphate (or chloride) playing on both sides of the wafer. The wafer is first etched away by controlling the electric current in the electrolyte streams until the base thickness is of the required value. The current is then reversed and indium deposited; the whole process taking place at room temperature. Surface-barrier transistors are so called because hole emission and absorption by the emitter and collector regions respectively are somewhat similar to the action in point-contact transistors. Rectifying barriers are supposed to exist between the indium and germanium rather than *p-n* junctions.

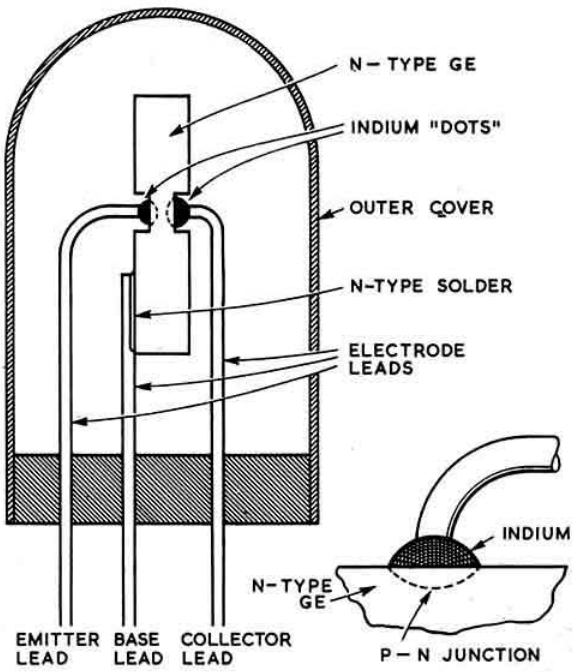

Fig. 10. P-n-p alloy junction transistor.

Point Contact Transistor

The theory of operation of this solid-state device is complex as consideration has to be given to surface as well as volumetric effects. A *p-n* hook-collector is thought to exist under the collector cat's whisker resulting in current amplification factors of greater than unity. Point contact transistors consist of a small block of *n*-type germanium ($1 \times 1 \times 0{\cdot}5$ mm^3, resistivity 2-10 ohm-cm, and minority carrier lifetime of 5-20 micro-seconds) with two cat's whiskers spaced 50-100 microns touching one of the surfaces (Fig. 11). The emitter is of beryllium-copper wire and the collector of phosphor-bronze wire: both of diameter 300 microns and pointed either mechanically or by electrolysis. In the electroforming process pulses of current applied between the base and collector cause the formation of the " hook collector "; copper atoms appearing to enter the germanium before the phosphorus atoms (copper is what is known as a thermal acceptor). Thus the complete transistor behaves as a *p-n-p-n* type already described and results in high, greater than unity, current amplication factors. The whiskers are maintained in position on the block by a force of about one gram-wt. and the whole unit potted using suitable resins and sealed with a mechanically strong metal case.

Transistor Limitations

The present day limitations on transistors are frequency response, power handling capacity and temperature, and transistor noise.

The current gain falls with increase of frequency due to the spread of transit times of the minority carriers in the base region. Point-contact and junction transistors have the current gain reduced by 3 db below their low-frequency values in the frequency range 0·3 to 5 Mc/s although better performances have been reported with specially prepared types.

Power handling limitations are dictated mainly by the temperature increase at the collector where nearly all the power dissipation takes place. With germanium transistors the equivalent circuit parameters vary widely; especially the steep fall of collector impedance with temperature increase causing reduction in circuit-efficiency. Deterioration of the formed regions in point-contact and alloyed-junction transistors have also been observed due to high temperature effects. The maximum collector dissipation of point-contact transistors is about 200 mW at room temperature while junction types may be rated up to 40 mW. Special power transistors have been produced experimentally using heat sinks with collector power dissipations in the range 5 to 20 watts.

Transistor noise is greater than that of the conventional thermionic valve. Point-contact and junction transistors have noise levels of 40-50 db and 10-20 db respectively greater than the expected noise-level of an ideal transistor. Improved manufacturing techniques should reduce the noise level although an ideal transistor will have a certain noise level due to thermal effects.

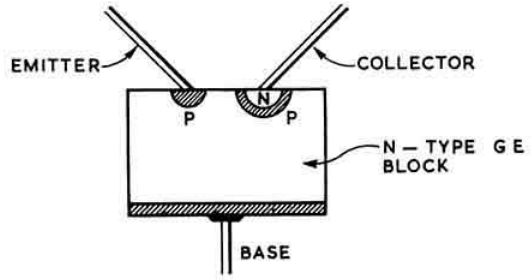

Fig. 11. Point contact transistor.

Conclusion

Although this article has dealt only with the general principles of operation and manufacture of transistors, no consideration has been given to circuit applications of these devices. This is because the circuit applications of transistors cover a large field and the author has prepared a bibliography which covers solid-state theory, circuit design and measurement of transistor parameters. The first reference is to be strongly recommended as practical circuits are presented which may be constructed using standard components.

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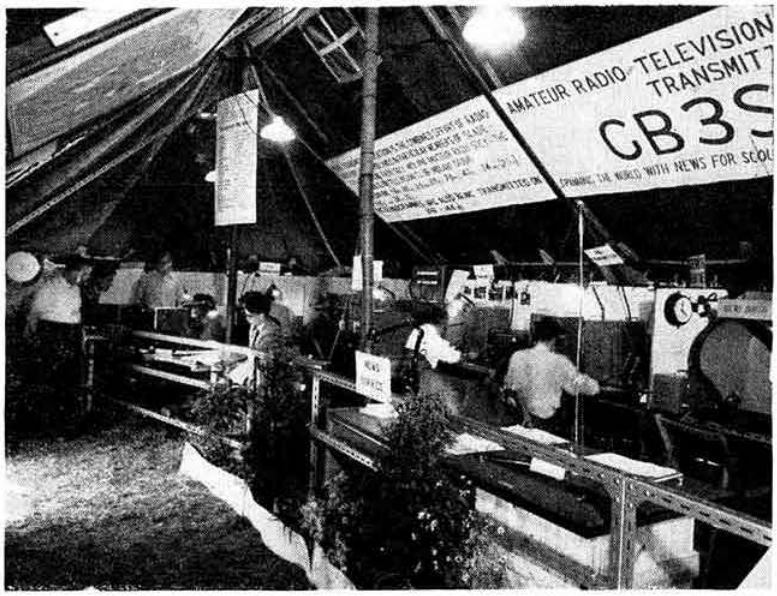


General view of the Amateur Radio station GB3SP which operated from the site of the Boy Scout Jubilee Jamboree at Sutton Park during the first 12 days of August 1957. The booth from which the news bulletins were broadcast is at the extreme right, followed by the 28 and 21 Mc/s transmitters.

The Story of GB3SP

Told by Alan Dennis (G3CNV) *

THE story of GB3SP began nearly two years ago when the writer approached Imperial Headquarters for Scouting with a suggestion that an Amateur Radio station should form an integral part of the 1957 Jubilee Jamboree celebrations in Sutton Park. The matter was duly considered by the main directing committee who enthusiastically agreed to the suggestion, adding " It must be the biggest and best station possible." The writer then set about obtaining support for this venture and to that end proceeded to " sell " the idea to the British Amateur Television Club (Birmingham Group), Midland Amateur Radio Society and Slade Radio Society. When the committees of the various societies had discussed the idea, two representatives from each were nominated to form the working committee of the Jamboree Amateur Radio station.

Special Call Allocated

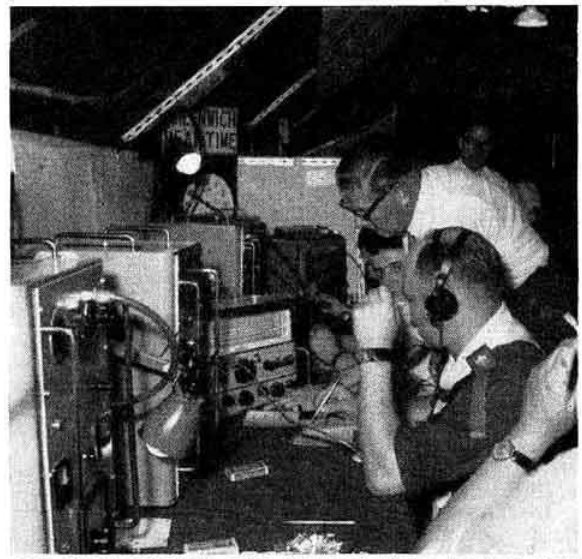
Having decided on the broad policy of the station the Postmaster General was approached for certain additional facilities and these were duly granted. A special call-sign, GB3SP, was allocated and, most important of all, permission was granted to radiate, simultaneously on all bands, a news service of Scouting matters. It is believed that this was the first occasion that the Postmaster General had given permission for an exhibition station to radiate its own news service. The idea behind this latter concession was to allow Scouts all over the world to take part, in a small way, in celebrating fifty years of Scouting and the centenary of the man who founded Scouting—Lord Baden-Powell.

Approaches were then made to more than twenty manufacturers for equipment of all kinds. The immense amount of co-operation which the committee received from the radio trade contributed in no small way to the success of the station.

News Service

The news service was radiated on all bands simultaneously from 160 down to 2 metres, all transmitters being linked back to the news booth *via* an isolating amplifier unit. The newscasts, which took place on the hour every hour while the station was operative (1200-2100 G.M.T.), were greeted enthusiastically by radio amateurs all over the world, while the comments of the general public who, having visited the station, returned home to find GB3SP on the domestic receiver, were most gratifying. One such person remarked that our news was at least up to the minute and not distorted as were some reports in current circulation!

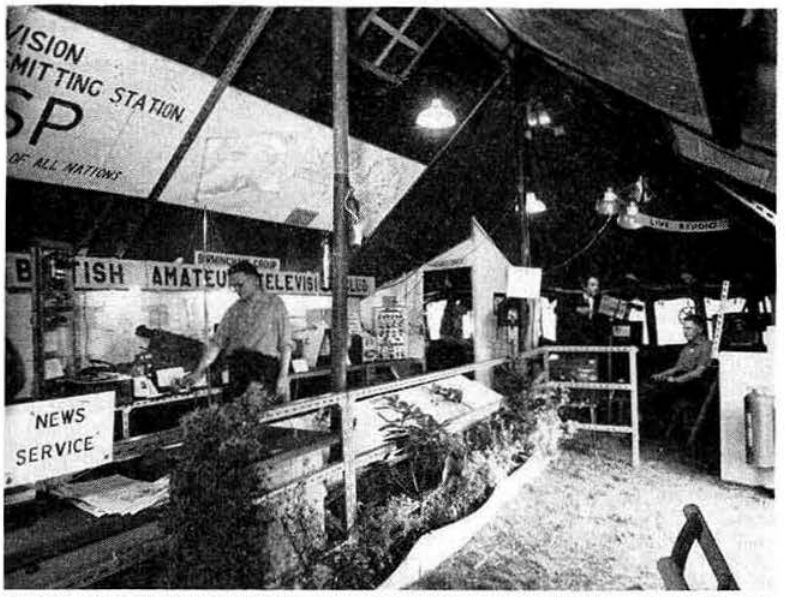
On the day the station opened Lord Peter Baden-Powell, son of the founder, visited the station and made a special recording for broadcasting. He was greatly impressed by the scope and layout of the station. Later on that day a group of German Scouts came along and quite spontaneously broke into one of their national songs, which was duly recorded on tape for future use. Meanwhile liaison had been established at the Press Camp and a team of reporters—in the main members of the Mountbatten Sea Rover Crew—were out and about in the various camps covering some of



Alan Dennis (G3CNV), chief organizer of the Amateur Radio station at the Jubilee Jamboree, takes a Scout call from a W station on 21 Mc/s, hooked originally by Doug. Edwards (G3DO), seen standing in the centre of the picture.

* *47 Helmingford Road, Walmley, Sutton Coldfield, Warwickshire.*

Radio amateurs throughout the world will wish to read The Story of GB3SP, the Amateur Radio station which operated for 12 days at the beginning of August, 1957 from the site of the World Boy Scout Jubilee Jamboree at Sutton Park, Warwickshire. The author of this article, Sea Scoutmaster Alan Dennis (G3CNV), was twice stricken with serious illness after he had offered to organize the station. One of his legs was amputated a few months ago, yet he continued to direct the work of bringing into being the largest Amateur Radio station that has ever operated from the United Kingdom. Alan was on duty every day the station was in operation and supervised its dismantling at the conclusion of the Jamboree.



A view of the Amateur Television equipment which was assembled together at the Boy Scout Jubilee Jamboree at Sutton Park. The v.h.f. station operated from the Live Studio section.

the many events going on round and about us. In this work they were greatly assisted by the use of a portable battery operated tape recorder specially loaned for the occasion.

It is not possible to detail all the people who were interviewed for the news service, suffice it is to say that they numbered nearly twenty nationalities. Musical items varying from the bagpipes to an oil drum band from Trinidad were also featured as part of the 121 news bulletins broadcast from the station.

In order that the activities of GB3SP, and in particular its own news service should become widely known, a circular letter had previously been sent to all I.A.R.U. member societies for circulation to their members and also, through the organising commissioners, world circulars to all countries involved in the Jamboree celebrations had mentioned the camp's own radio station.

Station Description

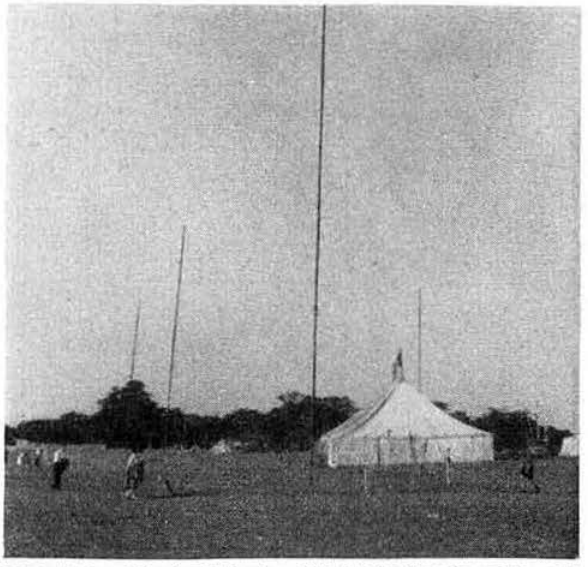
The station itself comprised in all seven transmitters as follows: 1·8 Mc/s from Slade Radio Society; 3·5 Mc/s—Panda PR120V; 7 Mc/s—Panda PR120V; 14 Mc/s—Labgear LG300; 21 Mc/s—Labgear LG300; 28 Mc/s—Labgear LG300; 144 Mc/s from Ron Rew (G3HAZ). Receivers which were many and varied included an Eddystone 888, Marconi, Redifon R150, Airmec C864, and a BRT400 belonging to G3AG.

Aerial Farm

Having plenty of space available on the highest point in the park it was possible to erect something in the way of aerials most amateurs can only dream about. Tom Douglas (G3BA), who was put in charge of " The Farm," went into a huddle in a corner with himself and a slide rule, to emerge later with the remark that " these should do the trick." " These " were Sterba curtains on 14 and 21 Mc/s and a lazy " H " for 28 Mc/s, plus dipoles for 3·5 and 7 Mc/s, topped off by a long wire for Top Band—which vanished into the woods at the rear of the station. It is believed that this aerial was 600 ft. long approximately!

The main aerial system was suspended between four 80 ft. poles specially erected and loaned by Poles Ltd. for the event. The masts dominated the scene at Camp Centre, being visible for a considerable distance. Many visitors paused to admire the array, and more than one asked: " Are these for the B.B.C.? " (who were adjacent to GB3SP, incidentally).

While the station was in operation more than 1100 contacts were made in less than a week and the popularity of GB3SP, judging by the queues that formed up on the various frequencies, was very great. Reports were sent in by listeners all over the country many of them being very detailed indeed and all expressed great interest in the news bulletins.



General view of the Aerial System. The Sterba Curtains and Lazy H were suspended between the 80 ft. masts.

Amateur TV

A popular feature of GB3SP was the amateur TV stand manned by members of the Birmingham Group of the B.A.T.C. Demonstrations using a live camera were staged, also of Telestill and Telecine. " On the spot " interviews were arranged and on one occasion some very large and ferocious looking Redskins, complete with headdress, war-paint and tomahawks, were to be seen on the monitors in the tent. Two Maoris complete with bead skirts and war-paint also paid a visit, as did a Scots group with their bagpipes.

The magnetic effect of seeing oneself on the " telly " drew large audiences who on more than one occasion over-flowed the tent. In addition to all this, the group had on display a varied selection of apparatus made by members, including the part-completed Group camera. George Flanner (G3KBA/T) provided a camera and its associated equipment and did most of the camera operating. Incidentally he found life rather difficult on some occasions, especially when darker skinned Scouts were being interviewed against a natural dark background. " Can't get any —— contrast!" muttered George twiddling knobs furiously to little effect. Despite this, the picture quality was excellent and compared very favourably with B.B.C. and I.T.A.—the results fully justifying the tremendous amount of " behind the scenes " work that went into this side of the venture.

International Gathering

During the first few days of the Jamboree more than a quarter of a million people visited Sutton Park, many coming long distances specially to see this great international gathering of 35,000 Scouts from 62 different countries.

Many Visitors were " Hams "

Quite a number of visitors were " hams " and the number of personal QSOs which took place is not recorded but they were many and lengthy. The visitors' book records callers from many countries, all of whom were astonished to see such a magnificent set-up and said so in no uncertain terms to the embarrassment of the operators and committee alike.

On Friday, August 9, the President of the R.S.G.B., Douglas Findlay (G3BZG) and the General Secretary, John Clarricoats (G6CL) and Mrs. Clarricoats visited the Jamboree at the invitation of the Chief Scout (Lord Rowallan) and later attended a show in the nearby arena. It was not unnatural that this should be followed by a visit to the radio station which they duly inspected and admired. At the time activity was at its peak and the contacts were rolling in, nevertheless it wasn't long before both the President and " Clarry " had a mike in their respective hands and were renewing acquaintances over the air.

Amateur Television camera operator George Flanner prepares for an outside broadcast from GB3SP.

Presentation of Whitworth Trophy

On Saturday morning the official party again visited the station, this time to perform an interesting little ceremony. One of the society's newest trophies (the Whitworth) was presented to the winner of the 1956 R.S.G.B. Telephony Contest (Doug. Edwards, G3DO) by the President, who was officially introduced by the Regional Representative (Alec Higgins, G8GF). The whole ceremony was recorded by the news team and featured in several broadcasts from GB3SP. The tape is being kept and will form part of the R.S.G.B. Tape Library.

Local societies, as well as the National Society (R.S.G.B.), staged displays which attracted much attention from the visiting public. M.A.R.S. produced a special edition of their monthly *News Letter* for the occasion and copies were dispatched from the site to members on the first day of issue of the special Jamboree stamps. The Slade Radio magazine *Contact* was also on sale as was the B.A.T.C. Birmingham Group's news letter—again specially produced for the occasion.

Sixty licensed amateurs, at one time or another, operated the seven transmitters and were responsible for the 1,712 contacts made with 71 countries. The DX highlight was perhaps a contact with VP8CI—the station attached to the Royal Society's Antarctic expedition at Halley Bay on 14 Mc/s—when signals were RST569 both ways. Several /M and /MM stations were worked.

Visitors to the station included LA8AF, W8VBX, W8WJK, W8DS, K8AJW, ZL2NR, K6CNM, W3IRW, W2RLE, LA6BB, VE1CB, W2MXM, VP2GZ, W3FHG, KN2AJG, and a host of Gs too numerous to mention.

Retrospect

Looking back on the Jamboree in retrospect it can be recorded that the amateur station was a triumph of co-operation between Midlands amateurs—particularly the three societies involved (M.A.R.S., Slade and B.A.T.C.), who plugged, by all available means through the medium of their own journals " the Jamboree Radio Station "—and the radio trade who loaned or donated apparatus to equip the station. More than 100 amateurs in one way or another contributed to the operational success of the station, together with members of 1st Sutton Sea Scouts—" Mountbatten " Sea Rover Crew. The picture would not be complete if mention were not made of those who left our channels clear for news broadcast and QSO alike, all of which helped towards spreading international goodwill amongst the youth of the world.

The organisers set out to put Scouting on the air and judging by the number of operators far and wide who admitted membership of the movement, the station did fulfil a useful rôle. Many others have written to say how much they appreciated the news bulletins.

Thanks

Finally thanks are offered to the following firms who contributed to the success of the station.

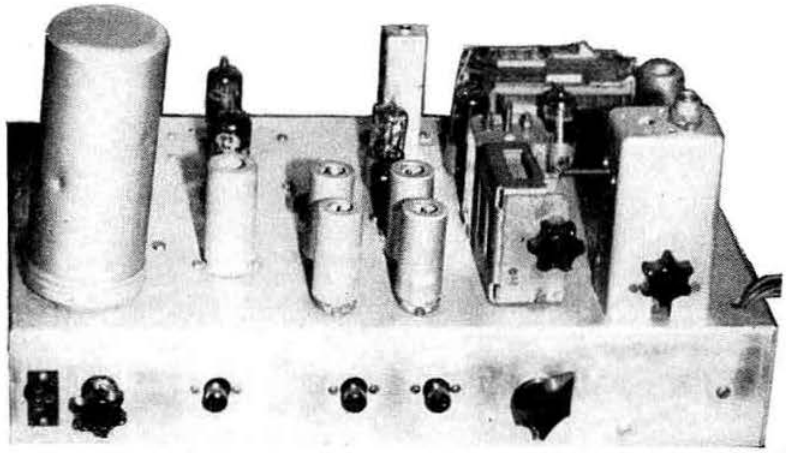
Airmec Ltd., receiving apparatus; *Aeraspray*, spray painting equipment; *Bullers Ltd.*, insulators; *Cosmocord Ltd.*, microphones; *Desco Ltd.*, office furniture and typewriter;

(*Continued on page 118*)

Simple Simon

An inexpensive S. S. B. Exciter with suggestions for modifying existing amplitude modulated equipment.

BY B. J. ROGERS (G3ILI)*



The Simple Simon single sideband exciter. This particular version is complete with built-in v.f.o., speech amplifier and voice control circuits. The large round can at the right of the picture contains the audio phase shift circuit.

DURING contacts between s.s.b. and A3 stations the operators of the latter are often heard to complain " I would go in for s.s.b. myself if only there were a reasonably simple exciter " or " I don't intend to scrap all my existing gear." The answers to these objections are " there is " and " you needn't," so read on!

The exciter to be described (Fig. 1) has been evolved with three aims in mind: first, to use as much existing gear as possible; second, to cull what more is required from components to be found in every shack, and third, to be as simple as possible. Naturally the design is to some extent a compromise but it gives results that will bring no complaints from other s.s.b. operators.

Between one and two watts of r.f. drive are required from the station v.f.o. The speech amplifier from the existing A3 modulator can also be used if desired. This exciter can and has been used by the writer on the air as it is but suggestions are included for modifying a class C final for use as a linear amplifier.

Referring to the block diagram (Fig. 2) the v.f.o. is fed into an RLC 90° r.f. phase shift network. In spite of its technical name this is only two resistors, a capacitor and an inductor, of which more anon. Each output of this network provides r.f. drive for one of the two balanced modulators that generate upper and lower sidebands, the carrier being balanced out. Audio from the speech amplifier is fed into an audio phase shift network, the outputs of which differ in phase by 90°. This is the part " *they* " all say is so difficult, the very matter of phase shift networks having frightened many away from s.s.b. This closed shop is now open, the device being seen to consist of only four resistors and four capacitors. The writer believes it is a proven fact that all junk boxes have built-in phase shift networks: go and look!

Now back to the two audio outputs and their 90° phase difference. After a further stage of amplification they screen modulate one valve in each balanced modulator. The outputs of the two balanced modulators are combined in parallel-pushpull fashion in a balanced tank circuit with the well known result that one sideband cancels, leaving the other. Choice of sidebands is obtained by transposing the outputs of the audio phase shift network. One stage of class A amplification following the balanced modulators and the exciter can be used on the air.

The balanced modulator system is capable of operating up to a frequency of 16 Mc/s but it is suggested that it be used straight through only on 1·8, 3·6, and 7 Mc/s. For 14 Mc/s and higher the class A amplifier should be used as a mixer with cathode oscillator injection from a crystal oscillator.

* *108 Woodvale, Forest Hill, London, S.E.23.*

The Phase Shift Networks

Now to tackle the " *difficult* " parts in detail. First, the r.f. phase shift network. Referring again to the block diagram (Fig. 2), there are in fact two arms to the network. In one, the output voltage leads the input by 45°, in the other its lags the input by 45° giving a total phase difference of 90° between the two outputs. This magic only occurs when the reactance of C and L equals the resistance of R, in this case 200 ohms. To calculate the value of C for a reactance of 200 ohms is no feat of maths; it is even easier to calculate L for 200 ohms but unfortunately coils come by turns, not Henries, per inch! All is well since it is only necessary to select C of the appropriate value and resonate L with it at the operating frequency, the only piece of test gear required being a grid dip meter. Naturally both C and L will be a little smaller than the calculated values owing to stray capacitances in the valve and circuit. Since both C and L are adjustable and the effects are small this offers no difficulty.

Next to consider the audio phase shift network. There are two possible arrangements, one being the " Single Sideband Junior " type (Fig. 3), due to W2KUJ; the other, known as the Dome network (Fig. 4), is due to W2WAM. They differ mainly in their input and output impedances. The S.S.B. Jr. type requires low input and an as-near-as-possible infinite output impedance. The Dome network can be driven from a higher impedance and has a fixed value of output impedance. The writer found that in spite of having four more components, the Dome network was easier to build from available parts; in particular it was found possible to construct it using Radio Spares silvered mica capacitors.

It is an advantage that most resistors and capacitors in junk boxes or elsewhere for that matter differ considerably from the nominal values, enabling a selection to be made, a capacity bridge and a reasonable ohmmeter being good enough for the job. The input transformer for the Dome network can be an ordinary class B driver transformer. As the S.S.B. Jr. network requires a lower input impedance. the best solution is a standard audio coupling transformer used in reverse giving a step down ratio of 2·5 or 3 to one.

Layout and Construction

The mechanical layout depends to a great extent upon how much existing gear is to be used and whether the r.f.

output stage of the exciter is to be used as a mixer as well as a class A amplifier in order to permit operation on the higher frequency bands. The wiring of the balanced modulators is conventional, the only part requiring a little care being the class A amplifier stage. It is essential to connect all r.f. by-pass capacitors to a common earth point; if this precaution is observed no instability should be experienced. Should there be any instability persisting, a damping resistor Rd can be shunted across the grid circuit as there is more than enough drive.

The v.f.o. requirements have already been discussed. The output should be taken via a low impedence coaxial line to the r.f. phase shift network. It is useful to be able to vary the drive; if no such adjustment is included in the v.f.o. it can be easily done by varying the coupling to the output link.

As a general guide to values suitable for use in the speech amplifier, that used by the writer is shown in Fig. 5. It is desirable to limit the response of the amplifier to the effective range of the audio phase shift network. It will be noticed that this has been achieved by the use of small cathode by-pass and coupling capacitors to limit the bass and by shunting the anode load resistors with capacitors to cause the upper limit of amplification to fall rapidly above 3000 c/s.

Testing

First put power on the entire exciter except the output stage. Loosely couple it to the receiver by means of a piece of wire twisted round the grid contact of the output valve and tune in the carrier. Next adjust the cathode resistor R1 so that the anode voltages of V1a and V1b are equal. While listening to the signal on the receiver, adjust the carrier balance controls R2 and R3 for minimum carrier. An audio tone is now fed into the speech amplifier. How it is obtained and its purity are not important but it should be somewhere between 1000 and 2000 c/s. In every amateur station there is a source of audio tone somewhere; for instance the phone jack of a class D wavemeter was used by the writer when no other source was available. If the signal is now inspected by tuning carefully across it with the

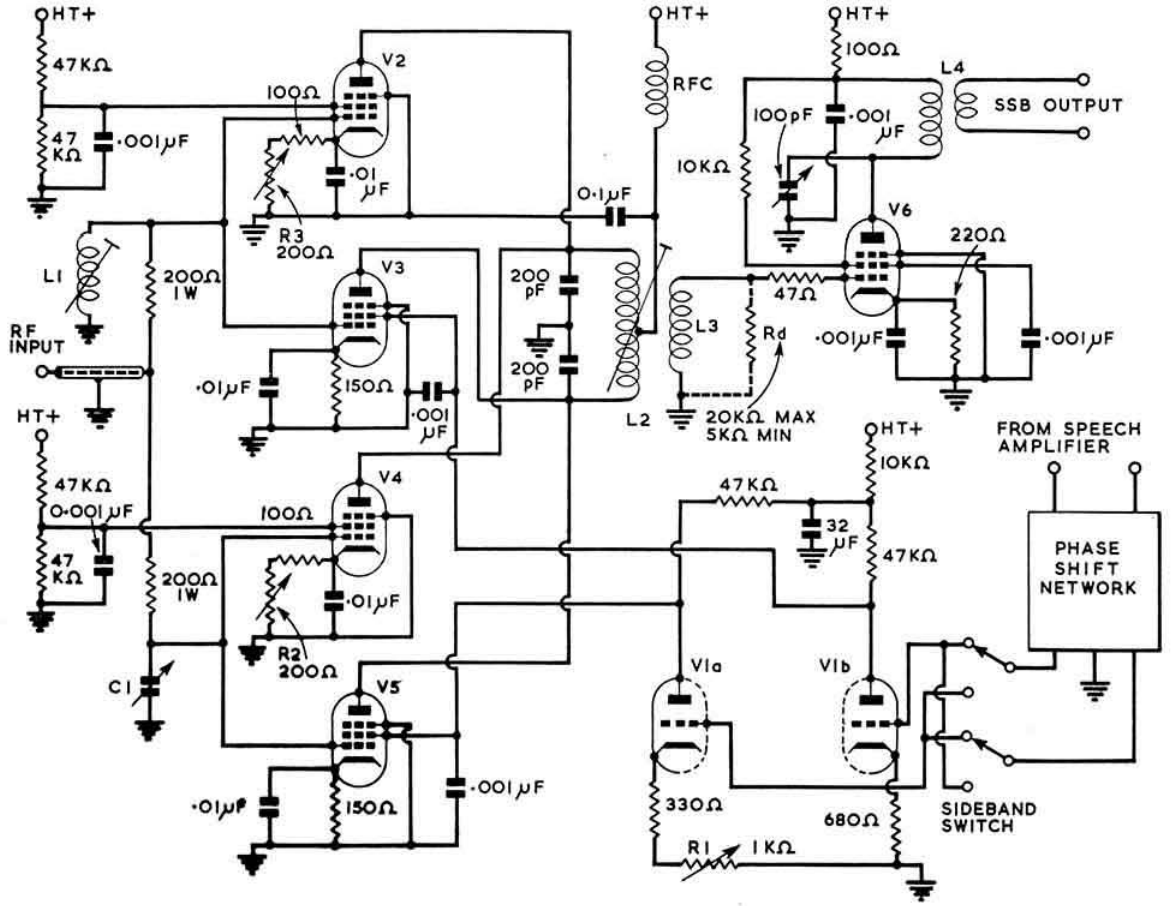


Fig. 1. Circuit diagram of the inexpensive single sideband exciter. Details of the r.f. phase shift network are: 1·8 Mc/s—C1, 350pF silver mica with 100pF air trimmer in parallel; L1, 58 turns 32 s.w.g. enam. wire; 3·8 Mc/s—C1, 150 pF silver mica with 100pF air trimmer in parallel; L1, 35 turns 28 s.w.g. enam. wire; 7 Mc/s—C1, 50pF silver mica with 100pF air trimmer in parallel ; L1,20 turns 26 s.w.g. enam. (L1 is wound on a $\frac{3}{8}$ in. Alladin former with dust iron core). The values in the balanced modulator anode tank circuit are: 1·8 Mc/s—C2, 3, 500pF; L2, 80 turns 32 s.w.g. enam. wire, centre tapped; L3, 50 turns 32 s.w.g. enam. wire wound over L2; 3·8 Mc/s—C2, 3, 350pF; L2, 53 turns 32 s.w.g. enam. wire, centre tapped; L3, 30 turns 32 s.w.g. enam. wire wound over L2; 7 Mc/s—C2, 3, 200pF; L2, 25 turns 32 s.w.g. enam. wire, centre tapped; L3, 18 turns 32 s.w.g. enam. wire wound over L2. (L2 and L3 are wound on a 0·3 in. screened Alladin former). L4 should tune to the same frequency as L2. The following valves may be used: V1, 12AT7, ECC81, 6SL7 or two 6C5s; V2, 3, 4, 5, EF50, EF91, EF80 or 6AC7; V6, 6CH6, EF55, 6AG7 or EL822. (The suggestions for V6 are in order of preference.)

b.f.o. on, three distinct and separate beats will be noticed, corresponding to the lower sideband, the residual carrier and the upper sideband. If the sideband switch is operated one can be identified as being weaker than the other, it being, of course, the unwanted sideband. The audio balance control in the phase shift networks and the r.f. phase shifting components L1 and C1 may now be adjusted for as much improvement in sideband suppression as possible.

When the following amplifier has been tuned and checked for stability in the conventional way the r.f. excitation from the v.f.o. can be adjusted for maximum output, care being taken that it is not so great that it upsets the sideband suppression or the carrier balance.

Increasing the Power Output

As far as the exciter is concerned adjustments are now complete and it could be put on the air as it stands as a low power device. Nevertheless most constructors will wish to use a little more power, hence the following hints on modifying the A3 p.a. for use as a linear amplifier to follow the exciter. They are only applicable to tetrode or pentode stages as most triode amplifiers are difficult or unsuitable to modify. For simplicity it is best to start by using the amplifier in class AB1 as in this mode adjustments are not at all critical. First of all it must be checked for stability. Load the output circuit lightly and reduce the grid bias until the valve draws about 50 per cent of the rated anode dissipation then swing both grid and anode tuning capacitors through their entire range. There must be no trace of regeneration at any setting. If there is any sign of oscillation, since it will not be stable enough, the screen potential varying with changes in input. With a small valve such as the 807 the screen supply is best stabilized by means of a pair of VR150s; for larger valves like the 813 a well bled power pack (the bleeder resistor drawing large current compared with the screen current) is the simplest solution. In both grid and anode circuits the appropriate class C values are correct for linear amplifiers but when in doubt err on the high capacity side.

When the above tests and modifications have been made, insert some carrier by means of the carrier balance controls and tune the grid circuit for maximum drive, then increase the carrier enough to drive the stage to the maximum desired input. The loading must be increased to just beyond maximum output as observed on the aerial current meter. At this point there will be little dip in anode current to be noticed at resonance.

The microphone may now be connected and the gain control advanced to a point where a continuous whistle drives the final to nearly the peak used to tune up and to adjust the loading; normal level speech will drive the transmitter to the maximum input.

It is important to note that the way the final anode meter kicks is not necessarily an indication of what is going on. It is unlikely that the meter will kick higher on normal speech than about 60 per cent of the value obtained on a prolonged whistle or when inserting a tone or a carrier. If the constructor possesses an oscilloscope it should be used to ensure that there is no flattening of the peaks of the r.f. envelope. Should this occur, there are three possible reasons:

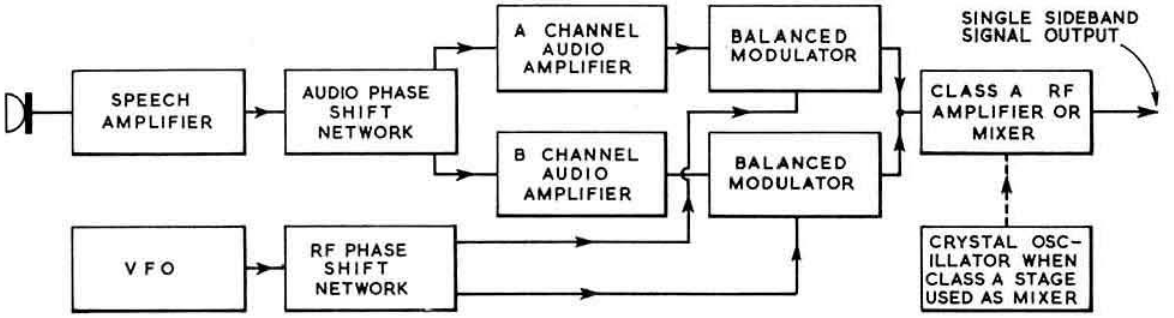


Fig. 2. Block diagram of the single sideband exciter. The complete circuit is shown in Fig. 1, together with the component values.

the stage must be worked on until it is absolutely stable. There is no substitute for this, and is as important for A3 as s.s.b. This, incidentally, is one of the reasons why s.s.b. causes so little TVI; the rig must be stable in every respect. Next examine the valve data to ascertain the conditions for class AB1 operation. The negative grid voltage can be set to this figure. If the screen is supplied by a dropping resistor from the anode supply some alteration will be necessary (*a*) over drive, (*b*) incorrect bias and, (*c*) incorrect loading; the first being by far the commonest.

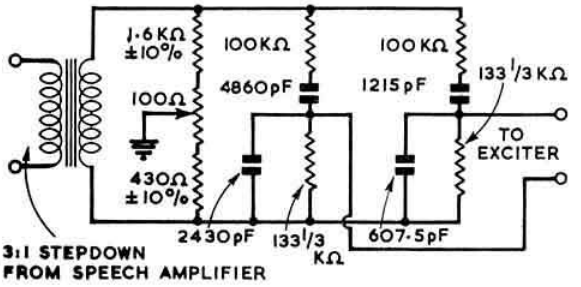


Fig. 3. The "Single Sideband Jr." type audio phase shift network.

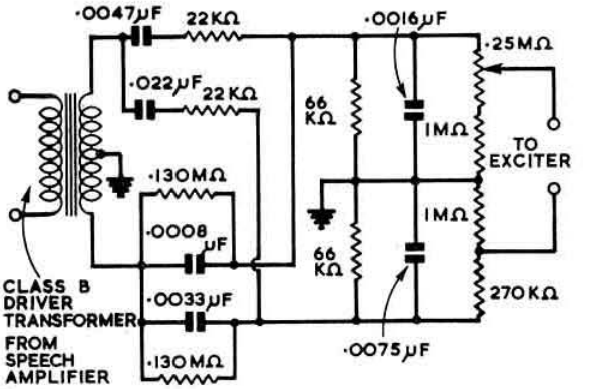


Fig. 4. The Dome audio phase shift network. This differs from the arrangement shown in Fig. 3 in that it can be driven from a higher impedance and has a fixed value of output impedance.

If it is desired to use the class A amplifier stage as a mixer to convert 3·8 to 14 Mc/s two modifications (Fig. 6) are necessary. First the screen voltage must be reduced by an additional 100,000 ohm resistor in order that efficient mixing shall take place; second, the cathode resistor and capacitor must be lifted from earth and connected to a low impedance link on the output of the heterodyning crystal oscillator on 10·5 Mc/s, the anode circuit then being tuned to 14 Mc/s. When in doubt about the amount of oscillator injection err on the heavy side.

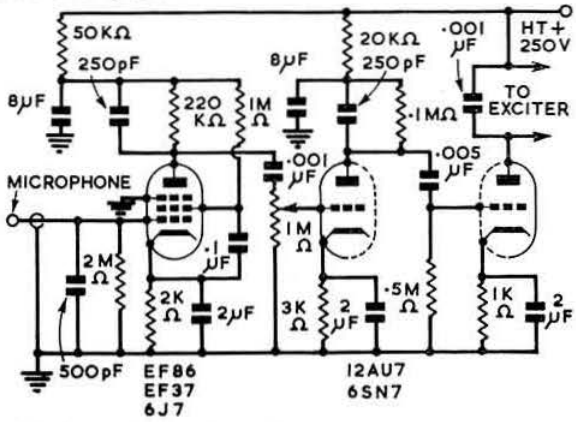


Fig. 5. Speech amplifier suitable for use with the s.s.b. exciter.

The information given here should be sufficient to enable most A3 stations to convert to s.s.b. in the minimum time and with the minimum expense. Once the rig is on the air it will be found that every s.s.b. operator will be ready to render every possible assistance. Try it!

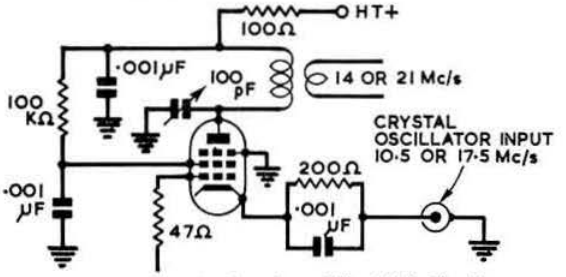


Fig. 6. Modification of the class A amplifier (V6 in Fig. 1) to act as a mixer for operation on 14 or 21 Mc/s. Although the input from the crystal oscillator may be at either 10·5 or 17·5 Mc/s, the former is to be preferred.

Special Achievement Award

THE Willamette Valley DX Club will award an attractive certificate attesting honorary membership, to any DX station (other than W-VE), having had two-way communication with ten or more regular W.V.DX.C. members. No QSLs need be submitted but listed contacts shall have been confirmed by QSL and verified by W.V.DX.C., and shall have been made after January 1, 1956. Applicants for this certificate should submit their lists to the Willamette Valley DX Club, P.O. Box 55, Portland, Oregon, U.S.A.

Some W.V.DX.C. members are: W7s AC, AGS, AMX, ASG, AOZ, DAA, DJY, DZL, ECI, ENW, FB, FMX, FZA, GBW, GHB, GJ, GXA, HIA, HKT, HQC, HXG, IQI, KVG, LVH, MVC, NKW, PB, QLE, QON, TMF, TML, UAB, KSA.

THE STORY OF GB3SP

Continued from page 114

E.M.I. Ltd., recording apparatus; *Handy Angle Co. Ltd.*, constructional steelwork; *Hawnt & Co.*, electrical fittings; *J.-Beam Aerials Ltd.*, v.h.f. aerials; *K.W. Electronics Ltd.*, h.f. aerials; *Labgear Ltd.*, LG300 transmitters; *Joseph Lucas Ltd.*, electronic office equipment, etc.; *Marconi Wireless Telegraph Co. Ltd.*, receiving apparatus; *Marconi Instruments Ltd.*, frequency standards; *Panda Radio Co. Ltd.*, PR120V transmitters; *Poles Ltd.*, aerial masts; *Redifon Ltd.*, receiving apparatus; *Stratton & Co. Ltd.*, receiving apparatus; *Telegraph Construction & Maintenance Co. Ltd.*, r.f. and power cables; *C. H. Young Ltd.*, aerial equipment; *Minnesota Mining & Manufacturing Co. Ltd.*, recording tape; *Reosound Electrical Co.*, floodlighting equipment.

It was indeed a wrench to dismantle so fine a station containing, as it did, more than £4,000 worth of apparatus.

The writer would also like to place on record his own thanks to the committee and those other Midlands amateurs who were concerned in the venture for their most willing help and co-operation. Particular mention must be made of the two ladies who assisted so nobly behind the scenes, coping with the secretarial work involved (Mrs. Joyce Symes (G3LNN's wife) and Miss Diana Williams), and Mrs. Mary Follis (Mrs. G3AY) our only lady reporter, who in her spare time seemed to be able to produce cups of tea from out of thin air as well!

Photographs

The copyright of the photographs used to illustrate this article is held by The Holloway Studio, 2 Holloway Head, Birmingham 1, to whom application should be made for copies.

EI Calls

The Honorary Secretary of the Irish Radio Transmitters Society (Mr. S. G. Farrelly, EI9Y) states that calls in the series EI1 have at no time been issued to radio amateurs in Eire. Calls in this series are reserved for the use of commercial stations.

The Transistor

Copies of a new illustrated G.E.C. publication *The Transistor*, are available free of charge from The General Electric Co. Ltd., Valve and Electronics Dept., Magnet House, Kingsway, London, W.C.2. The development, application, manufacture and use of transistors are dealt with briefly in this 16 page booklet.

London Lecture Meeting

Friday, September 27, 1957

"Trends in Aerial Design for the Amateur"

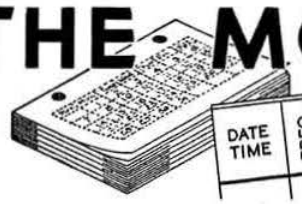
by S. Kharbanda, A.M.Brit.I.R.E., Assoc. I.E.E., G2PU (Labgear (Cambridge) Ltd.)

at the

Institution of Electrical Engineers
Savoy Place, Victoria Embankment

Buffet Tea 6 p.m. **Lecture 6.30 p.m.**

THE MONTH ON THE AIR



BY S. A. HERBERT (G3ATU)*

AUGUST is the time of year when most people in these islands forget the responsibilities of work and take themselves off on holiday, a fact which is brought home to DX scribes by the lightness of their post-bags. August is also usually a month of mediocre conditions, which doesn't help things either. However, this particular August with its cloud bursts and thunder storms must have kept some intending holiday-makers chained to the shack and conditions on the whole turned out to be not so bad. At least there were no more of those super-size solar blasts. One or two Dellinger Fades seem to be the limit of interference and most bands—even ten metres—produced DX from time to time.

Fifteen Metres

Fifteen seems to have aroused most interest this time and certainly it has been good for all kinds of DX, from the Pacific to the Antarctic, if one was lucky enough to be on at the right time.

B.R.S. 20249 (Sutton) thought fifteen was *the* band this month. He logged three new ones—CR4AI and FE8AK (with their attendant QRM) on phone and FQ8AG on c.w. Other notables on phone were VE3AHU/SU, VQ6ST, KH6BX, '6BGE (07.50), FB8BZ, VK1PM (Canberra), VS4JT and BV1US. Malcolm was more than surprised to receive a QSL direct, in an envelope, from UA3EK, while *two* cards from 3W8AA and one from VP8BW arrived through the Bureau to give him 79 confirmed out of 168C heard. Norman Smith, **B.R.S. 20106** (Petts Wood) found an unusual state of affairs on July 28, when, between 03.26 and 03.58 he heard VQ6ST, YS1MS, PJ2, TI2, VP1EE, MP4BBL, KL7, ZL4, ZC4, VP6, all on phone and VK3, VK7, 4X4, K4 and PY on the key. Later, ZL4BK was pouring through on phone and HC, KP4, OA, YN, KZ5 and SV0 were all there until 05.00. More normal openings enabled Norman to gather in phone from VR2AG (07.30), describing the tropical sunset (he was S9, too), KP6AL (09.40), who was working Gs, VK9HO, FS7RT, ZS7C, VS9AL, PJ2MC and FE8AK. On the key were XW8AB (18.30), FE8AH (13.40), XE1VW (08.30), XW8AG, VS1HU (see later), VP2VB and ZC5AL (14.50). VS1BO was heard to say that he would be going to Labuan soon and would perhaps be on as ZC5BO. VR4AC is also known to be on the band on phone.

B.R.S. 21279 (177 McKean Road, Oldbury, Birmingham) has QSLs from ZC6UNJ (Palestine) and CT3AN, who enclosed one also for B.R.S. 18783, who can get it by writing to the above address. Martin logged two new ones on phone, with TG9AD (15.00) and PJ2MC. Bill Wilkinson, **B.R.S. 20317** (Bromley) got VP2VB for a new one, then pulled in CP1CJ, CR7AG, DU7SV, ET3LF (18.30), FE8AH (16.00, '047), FY7YC, KR6BF, OH3QC/0, OY1R, PZ1, VK9AT (13.30), VP8BA, VQ3SS (17.00), XW8AB, '8AG (QSL both to XW8AB via R.E.F.) and ZD6RM, all on c.w. Bill then tried phone and heard VU5AB in QSO with MP4BCC. He said he was in Raul, on the Nicobars, but fingers are being kept well and truly crossed! John Goddard, **B.R.S. 18017** (Warwick) heard XE1PJ for his first XE since 1950 and also logged TF3WVD, VS6KL, VS9AS, VO1DQ/VE8 (Resolution Is.), VE3AHU/SU and KG1JA, while **B.R.S. 20135** (Newport, I.o.W.) managed to log a new one when he copied VR2AG's phone through a roaring, splattering mass of QRM. (Why *will* so many people sit slap on top of a rare DX station they are presumably anxious to work? Apparently for some of us, the penny will never drop.) Having finally sorted out the VR, he turned his attention to HS1B (18.00), 4S7YL, ZD1EO, '3BFC, '4CP, VP5BL, VP8CD (19.45), EL1B, ET3XY and VQ6ST, with ZL, VK, VS6 and VS9 for good measure.

G3CSP (Sheffield) was the first G to work FE8AK, who is ex-ZD4BZ and who is looking for U.K. QSOs between 06.30-08.00 G.M.T. daily. Eric omits to mention the band, but from foregoing reports, fifteen phone is where to look. Final comments on the band are that **VP2GC** is active from Grenada on A3, as is ZD1EO, who requests QSLs via A.P.O., Freetown. VP5BL (Kingston) reveals that **VP5BF**, formerly of the Caicos Is., now radiates from Montego Bay.

Twenty Metres

However bad things are on the bands, twenty usually has its moments and this month is no exception to this state of affairs. **G3FPK** (London, E.10) used the key to work no less than nine new countries, giving him 102 in 34 Zones. The nine are EL1R (P.O. Box 36, Harbel), FM7WR (16.40, '096), PX1FC, with F8FC at the key, LA2JE/P (Hope Is., Svalbard. Odd uses low power as does Arne, LA2HF/P who is on the island with him). '3FPK worked TI2VA for the TI's first G, while 3W8AA, VS9AD (02.00) and VS6DX were other new ones. KX6NB (16.40, '044) could also be new, though Norman was a little suspicious both at his RST578 signal and at being addressed as " dr OM Norm," which sounds slightly *Mittel European*! However, time will tell. Early morning sessions have brought the W.A.S. score to 38, leaving some W5, '7 and '0 to be dealt with. An unusual QSO was with HC7WK, who is one of twenty-five U.S. missionaries who are in the Ecuadorian jungle, translating the Bible into Indian languages, as his QSL card confirms. Norman has been issued with the call-sign **3A2BT**, but for information on this see later.

B.R.S. 20249 spent little time on the band, but he did get two new ones: EA0AB on c.w. at 21.00 was followed by KR6AK at 21.10. **B.R.S. 20135** mentions VK5MS, '5AV, ZL4BX and ZL4IG, heard on phone—07.40 to 08.20 G.M.T. **B.R.S. 18017** picked up OQ5TA, FF8AP and HH5DG on A3, then dug out CX3CF, FB8CC, UG, UL and DM5MM/MM on the key. The DM5 is on board the East German training ship *Wilheim Pieck*, at sea on a world tour, with DM2ACB doing the operating. **B.R.S. 20317** says that although he has so far missed YK, FS7, ZS7, KM6, FP8, etc., this year, his score of 39Z, 206C is already better than for the whole of 1956. On c.w., Bill's latest were EA0AB, FE8AE (18.00), FL8AB (16.40, '021), HI8BE (12.30), KG6AAY (20.00), LA2JE/P, OA4ED (06.40), UA0KUV, UM8, VP8BJ (Falkland Is.), VQ6AB (21.50, '020), XZ2TH (17.00), ZD8JP, VU2 and ZS9O (19.20, '070).

B.R.S. 21279 heard OH0NB (and has QSLs from him) and reports that SM5BL/1 has been on from Faro Is., near

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

Gotland. ZD4CB has been on phone in the mornings, while CP1BZ was logged on c.w. at 06.00. Martin has heard that VR2BC is going to ZM6 and KS6 and will be on 14305 kc/s with s.s.b. W6UOU/KS6 has been active. OK1MB is rumoured (repeat—rumoured, *S.A.H.*) to be going to Albania from October 1 to 14. At present, he is authorized to operate on 3·5 Mc/s only.

B.R.S. 20106 again heard FO8AK and '8AO on c.w., also logging FB8ZZ (16.12), VP2VB (03.30), VK0AB (17.00) and DU7SV (15.30). VK7RX, OA4G, '4A1, HK1JF and PJ2MC came through on phone. Your commentator can vouch for c.w. activity from ZD6DT, XW8AB (19.20, '080), XE1WT (00.00), VK9CK, LA1VC/G (19.00), VP8BO (Shackleton), VP8CI (Halley Bay, 19.00), YK1AK (18.00), VK0AS (Mawson, 08.30, working W6), UA9KCR/P (who called " CQ " and faded out) and UA0KUV (Chita).

Forty Metres

Although the band is largely neglected at present it can reward those who are prepared to dig through the layers of locals and semi-locals to uncover the DX. **B.R.S. 20106** is one of these and he finds VP5CM a consistent phone signal in the early hours, while CM9AA and HP3CC are also there among the Ws. Norman also copied W1TJX on *eighty* (or rather seventy-five) phone. He was S9 at 04.00. **B.R.S. 20317** is another keen searcher and he found CX1KX (23.00), OH0s, PY3ALX (22.20) and UL7DA on forty c.w. **A.1380** (Stockport) sends a welcome first offering and reports W1IUU, '3HFZ, '3NWJ, '3NWW, '3PHL, K4GAW, '4IAN, W8OQY, '8RGB all at good strength on phone between 03.00 and 04.00 G.M.T.

Ten Metres

Ten should be providing DX in quantity when you read these notes, but during August little was doing, although **B.R.S. 20135** was lucky to catch openings to VK6RU, '6TH, '6GU (09.25 to 09.45), ZD3BFC, ZD6RM, ZD8SC (10.00), ZC6UNJ and VQ2 and 5. Ws are also reported to have been heard on occasions already.

DX Television Predictions for October, 1957

Prepared by J. Douglas Kay (G3AAE)

Barbados	1145/1600	Nairobi	0745/1530
Trinidad	1145/1530	Aden	0800/1400
Buenos Aires	1200/1400	Baghdad	0800/1400
Lima	1230/1500	Bahrein	0730/1330
Rio de Janeiro	1130/1330	Teheran	0800/1400
Santiago	1200/1430	Tel Aviv	0900/1300
Cairo	1000/1200	Bombay	0800/1330
Accra	0800/1630	Colombo	0800/1415
Dakar	1100/1630	Karachi	0800/1300
		Singapore	0900/1300

With the approach of autumn the seasonal increase in m.u.f. figures will again occur, and October should again see the beginning of reception of the B.B.C. Channel 1 Television service overseas. The above predictions are based on the sound frequency of 41·5 Mc/s and the times are all G.M.T. The Channel 1 vision frequency is 45 Mc/s.

Last winter brought reports of reception of the B.B.C. Channel 1 Sound transmissions from all six continents. It is hoped that all overseas members possessing receivers covering this part of the spectrum will listen during the times indicated and send reports of their reception to R.S.G.B. Headquarters.

Top Band

The winter season is heralded by news that G3KGM (Chelsea) will be active on 160 metres from Ross-shire as **GM3KGM**, on both phone and c.w., from now until October 9. He will reply to each QSL received. **GM3HKF/A** will be active from Inverness, Ross and Sutherland from now until mid-October.

G3EJF (Tottington) says that for anyone interested in working an amateur station in a boat, he will be cruising on the rivers and canals of the North-East Midlands from

Frequency Predictions for October, 1957

PREPARED BY J. DOUGLAS KAY (G3AAE)

BAND	NORTH AMERICA	CENTRAL AMERICA	SOUTH AMERICA	SOUTH AFRICA	NEAR EAST	MIDDLE EAST	FAR EAST	AUSTRALIA	ANT-ARCTICA
M.U.F.	38 Mc/s 1700	42 Mc/s 1300	43·5 Mc/s 1230	38·5 Mc/s 1530	41·5 Mc/s 1100	44 Mc/s 0900	42·5 Mc/s 1000	33 Mc/s 0800 SP	36·5 Mc/s 1300
28 Mc/s	1130—2000	1000—2130	0930—2145	0800—2000	0700—1800	0700—1600	0700—1700	0700—1100 SP	1000—1800
21 Mc/s	1000—2300	0900—0100	0730—1200 1700—0500	0600—0900 1300—0200	0600—2200	0530—2000	1000—1900	0730—1200 LP 1000—1800 SP 2200—0100 LP	0900—1100 1800—2230
14 Mc/s	0800—1200 2000—0400	2200—1000	2200—0900	1800—0500	1300—1000	1430—0400	1630—2330	0500—1100 LP 1100—2100 SP	2300—0700
7 Mc/s	0400	0800	0400	0000	1830—0500	0000	2000	1800 SP	0400
3·5 Mc/s	0400	0800	0400	0000	0000	0000	2000	1800 SP	0400

These predictions are based on information provided by the Engineer-in-Chief of the Post Office. All times are G.M.T.

During the two and a half years that the frequency prediction tables have been appearing monthly in the BULLETIN every effort has been made to render them as accurate as the available information allowed. Initially the tables were based primarily on figures of maximum usable and optimum working frequencies, and the values of lowest usable frequency were estimated solely from past experience of the behaviour of signals on the various amateur bands. As time has passed it has been possible to improve these estimations, but it has always been felt that they were not quite as accurate as could have been desired. Recently, however, very comprehensive data on lowest usable frequencies has come to hand, and the predictions for October are the first that have been prepared using this new information.

September 21 to October 5 and will be using c.w. on crystal controlled frequencies of 1850, 1870, 1895 kc/s and also on 3·5 and 7 Mc/s. He will use the call-sign G3EJF/P or G3JZP/P.

News from Overseas

Monaco: As we said earlier, G3FPK has been issued officially with the call-sign **3A2BT** and he has hopes of putting it to use later this year. All being well, he will be in Monaco from October 6 to 12 and plans to operate in the 3·5, 14, 21 and 28 Mc/s bands. Norman thinks that operation on 7 Mc/s is not allowed, as there are local services using that band. Most of his equipment is already completed and the p.a. will probably comprise parallel 807s, running at 50 to 100 watts input on c.w. and n.b.f.m. As far as operating is concerned, 3A2BT will concentrate on DX—VK, ZL, W6 and the like—until around 08.00 G.M.T., after which he will be available to Europeans, with U.K. stations especially welcome, but he will not reply to calls on his own frequency. He suggests that stations 10 kc/s or so higher than himself will be contacted first.

Gaza Strip: " Art " Blick (VE3AHU) gives details of the widely worked **VE3AHU/SU**, which is situated in Rafah, in the Gaza Strip and is operated by VE3AHU, VE1ACK, VE6QK and other Canadian members of the U.N. Truce Forces. Their terrific signal on 14 and 21 Mc/s A3 comes from a 500 watt p.a. into arrays such as a terminated Rhombic beamed on Toronto and a Lazy H directed on Alberta, with a multi-band dipole and a 21 Mc/s ground plane also available. Since the station opened last May, 84 countries have been logged. Art says the present station will close down in October, but he expects that their replacements will carry on the good work, using another call. The A.R.R.L., incidentally, have decided that the station will be recognized as being in Egypt for purposes of DX C.C. The gang at Rafah are very interested in aerial theory and design and would like details of the G4OT (G5RV) aerial which is so popular these days.

Liechtenstein: HB9NL, the U.S.K.A. QSL Manager, confirms that HE9LAA and HE9LAB are genuine, as are calls such as HB1RS/FL and other HB1../FL stations, which are Swiss amateurs operating in the principality. Beware, though, of HE1AB or any other HE1. Several are on the air and they are all pirates.

Iraq: Greg Lovelock (ZC4II) was recently on a visit to Iraq, during which he learned that the authorities are now prepared to issue licences, which will bear the prefix HN2. And so another new prefix will presumably be heard on the bands and cause considerable chaos for a week or so, until the novelty wears off. As to **YI2AM**, the sad fact is that

The equipment used by SP5HS includes a BC312 receiver, a home-built double-superhet, a v.f.o. controlled 100 watt transmitter using an RL12P35, a 40m long wire and a 20m dipole for operation on 20m, 40m and 80m c.w. On 2m, the crystal controlled transmitter runs 100 watts input to an 829B. The converter, also crystal controlled, uses an ECC84 and an ECC85. The present aerial is a 4-element Yagi but a 28-element array is almost ready for service.

'2AM is not likely to reappear either in its old or in any other form, as the R.A.F. authorities are not prepared to permit the operation of an Amateur Radio station, at least for the time being. Greg has news of happenings at **Masirah Is.**, where the lads have at last been issued with a licence. They are having some trouble with their equipment, but the snags will be ironed out in due course. ZC4II himself closed down on August 31 and has returned to the U.K., where he can be reached for QSL purposes via G3III, c/o the R.S.G.B. QSL Bureau only.

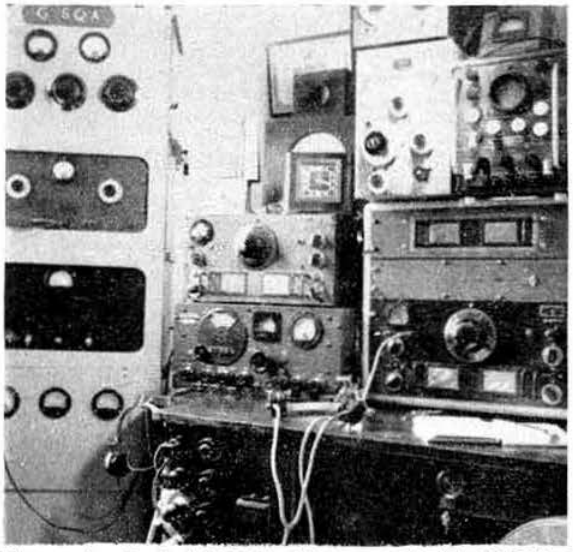
Singapore: Mike Matthews **(G3JFF/VS1HU)** found so much interest aroused by his operation of VS1HU that he was able to form the " Kranji Radio Club," which already boasts 12 members. They are equipped for all bands from 160 to 20 metres and will shortly be on 15 also. A TCS transmitter covers the l.f. bands, while a modified ET4336 is used on 20 metres, the aerials being a 7 Mc/s dipole and a long wire. Since July 4, when the station opened, 69 countries have been worked in all continents and they have qualified for W.B.E. An example of the DX available in Malaya is provided by their 7 Mc/s QSOs. With 30 watts they contacted KR6AK, W6, VS1 and VS2, while the 14 Mc/s tally includes all JA areas, all W areas, all the rarer U.S.S.R. areas, lots of Pacific and Far Eastern DX—in fact, just about everything! Europeans can hear VS1HU most afternoons on 14020 kc/s. Mike talked recently to KV4AA, who told him that Danny Weil (ex-VK9TW, VP2VB, etc.) is due back in the U.K. about now (after a further stay at VP2VB, whence he operated recently for a time). He has the cash for a fresh craft and an American manufacturer has promised him a 1 kW rig. " I'm afraid," remarks Mike, " *Yasme 2* will need to be a bit bigger than her predecessor if she has to house a generator to run a kW plus! " '1HU has talked several times to **VS1FJ**, which hides the identity of Frank Johnstone (G3IDC). Another interesting QSO was with ZL1ADC/MM, on board the N.Z. Cruiser *Royalist*. The current bi-monthly issue of *The Malayan Radio Amateur*, the organ of the Malayan Amateur Radio Transmitter's Society, is once more full of interest. Associate membership of the Society, with the magazine going to members, is world-wide. Full details can be obtained from P.O. Box 777, Kuala Lumpur. From the latest issue, we learn that Eamonn Walsh (**JZ0PC**, ex-PZ0ACK, EI2E, VE2AQQ) has left New Guinea and may be reached c/o The Decca Navigator Co. Ltd., Wymondley House, Little Wymondley, Herts, England. VS4BO is now active as **VS1BO.**

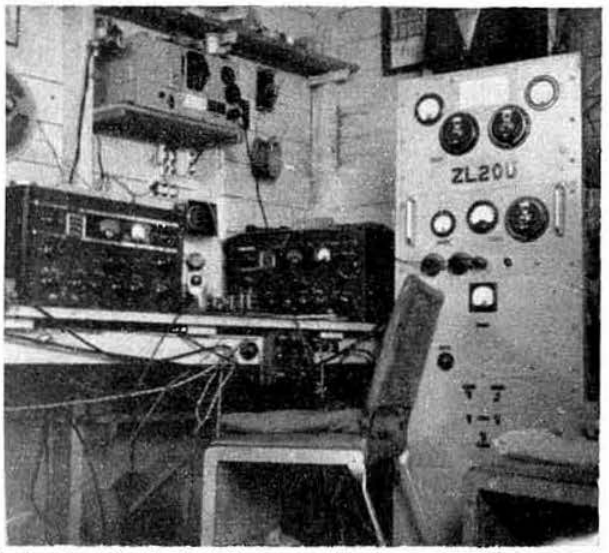
Gibraltar: ZB2V and ZB2R both closed down on August 22. Those still needing ZB2R QSLs should write to G. C. (Wally) Wallis, 91 Swiss Avenue, Chelmsford, Essex.

U.S.A.: K6AXC (Norwalk, Calif.) writes to **G2MI** that he has been hearing 4W8AC, AC4NC, VS4NW, HS1A, XZ and lots of VS. GD2FRV is implored to listen for the W6s as he is usually S9 in that area while working the East Coast Ws. Don, K6AXC, is ex-DL4QH and he passes regards to the old DX gang over here. As to the above-mentioned DX, he says it doesn't approach the countries he could work on short-skip while in Europe!

New Zealand: B.R.S. 10167 (Bristol) has heard from **ZL3IB** (Christchurch) that the latter is receiving cards for alleged QSOs on 14 and 21 Mc/s. The real ZL3IB is active on 3·5 Mc/s only and he wishes it to be widely known that '3IB on any other band is eligible for full membership of the " N.W.H.S.H.I.C.," which, for the benefit of non-members, stands for the *Not Where He Says He Is Club*, an institution containing numerous ZAs, HVs, PXs, countless colourful prefixes ending in " UU " and a gentleman who signs himself 7X7C. The club president is reputed to be the shocking type who, some years ago, equipped himself with a keyed signal generator incorporating infinitely variable voltage control and sat on 80 metres using a VQ1 call and working only the really keen DX men. Ughh!

D-XTRAORDINARY





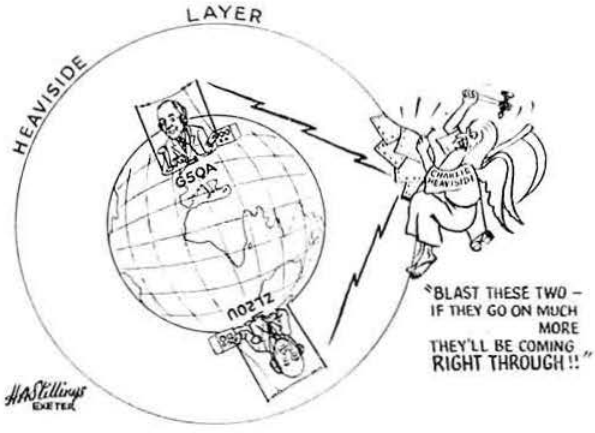
The two rigs. On the left G5QA of Exeter, on the right ZL2OU of Hawkes Bay, New Zealand. Both transmitters were home constructed. For reception Herb. Bartlett favours an HRO and Jack Parminter an AR88.

A FEW weeks ago Past President Herb. Bartlett (G5QA) of Exeter, achieved his 4,000th contact with Jack Parminter (ZL2OU) of Wairoa, Hawkes Bay, New Zealand. QSO No. 1 was made on January 1, 1936, since when the two stations have been in contact almost daily except for the war period, holidays and business engagements. The majority of the contacts have been on telegraphy.

Herb. and Jack have never met but the two sons of ZL2OU have visited England (staying with Mr. and Mrs. Bartlett) and both married Exeter girls. They are now back in New Zealand.

The DX achievement standing to the credit of G5QA and ZL2OU is noteworthy for the fact that neither station uses a beam aerial or a commercial transmitter.

In 1951 Herb. Bartlett was awarded the ROTAB Cup in recognition of his consistent work with ZL2OU. At that time the two stations had been in contact more than 2,000 times. They are now well on the way to their 5,000th QSO. Indeed D-Xtraordinary!



Technical Assumption!

Herb. says: "If you work a given station at the same time with the same transmitter and the same aerial for 4000 times it seems safe to assume that the signal must bounce off the Heaviside Layer at exactly the same spot each time!" Incidentally his transmitter still uses the same T55 valve he won at a pre-war R.S.G.B Convention Dinner at the old Florence Restaurant.

Reciprocal Arrangements

EX-COUNCIL MEMBER Louis Varney (G5RV) who is representing the Marconi Company in Caracas, Venezuela, has been granted a "vacation" licence by the Director of Communications of the Netherlands Antilles. His is the first licence of that type to be issued to a non-resident foreigner under new regulations governing Amateur Radio in the N.A. The licence will allow him to operate an Amateur Radio station anywhere in the N.A. for a period of 14 days during any one year. His call-sign in the N.A. will be PJ5CA.

Mr. Varney expects to operate from the N.A. during the autumn of this year and the spring of next. QSLs should be sent to his home address Apartado 3443 (Private), Caracas.

I.B.C. Exhibition

THE International Broadcasting Company is presenting this month (one week after the B.S.R.A. Convention) an exhibition which should interest professional audio engineers and enthusiasts. The exhibition, which will consist of a display of high quality recording and reproducing equipment and demonstrations of I.B.C. and other recordings taken from discs and from monaural and stereophonic tapes, will be held at the I.B.C. Studios, 35 Portland Place, W.1, on Saturday, September 28, and Sunday, September 29, from 1.30 to 9.30 p.m., with demonstrations at 2.30, 4.30, 6.30 and 8.30 p.m. on both days.

Admission is free by invitation ticket only, obtainable direct from I.B.C. or from Thermionic Products Limited, Hythe, Southampton, or Lockwood & Co., Lowlands Road, Harrow, Middlesex.

FOUR METRES AND DOWN

By F. G. LAMBETH (G2AIW)*

Transatlantic Contacts on Four Metres a Possibility— New European Two Metre Record

FOUR metre enthusiasts will be pleased to know that growing interest is being shown by transatlantic amateurs in the possibility of cross-band 70 Mc/s to 50 Mc/s QSOs during the high M.U.F.s expected this autumn. **W1HDQ**, in a letter to G5KW, mentions that some U.S.A. stations will certainly be set up for 70 Mc/s, as well as 50 Mc/s. As we can only reply to 50 Mc/s signals either on 70 Mc/s or 28 Mc/s there exists here a great chance for the 4m fraternity to get across, the only difficulty on the U.S.A. side being the possibility of interference *from* TV signals. W1HDQ himself will be on 70 Mc/s as well as 28 Mc/s.

The interest is greater this year than last and it is hoped that QSOs will be possible as soon as the conditions are right. We certainly hope so. Predictions from at least one source suggest that the M.U.F. will go high enough to make transatlantic contacts possible later in the year. Members who have yet to build equipment for the band will find the November 1956 and May 1957 issues of the BULLETIN of great help.

G5MR (Hythe, Kent) with a simple dipole in the roof space heard excellent signals from FA9VN (578 c.w.) and FA3JR (47 phone) on July 30, about noon, when both were working French stations. There was fading on both signals, but they were never completely lost. '9VN called QRZ after each contact but '5MR could not call—the outdoor rotary dipole was down and the transmitter was undergoing reconstruction at the time. F8GH and other French stations are frequently heard. On July 31 FA8VN was again heard, peaking to S8.

GM3FYB (Dunfermline) writes that he and **GM6SR** (Edinburgh) are both active on 4m. They first worked on August 8 and believe this to be the first Scottish 4m contact. They are now looking for QSOs from the South. The present '3FYB transmitter has an 832 p.a. running 20 watts to a three-element beam, the receiver being a G2IQ type converter, modified for 4m, feeding an Eddystone 840. A new transmitter with a QY3-65 p.a. is nearly ready.

GM2FHH (Aberdeen) should also be on 4m by now, so there is again scope for a " first ": who will do it? We expect we know, but must await confirmation!

Transatlantic Skeds on 2m

On 2m the recent record contact across the Pacific Ocean has fired the enthusiasm of many for transatlantic QSOs, although the conditions are possibly quite different. However, schemes are afoot—do not be surprised if East Coast U.S. stations and Western Europeans (including Gs) start making skeds! Anyone interested in this possibility is invited to write to G2AIW immediately, giving particulars of equipment, position and available times.

New European 2m Record

Truly there always seems something new for 2m every time the band opens. **GM3HLH**, working /A from Crail (Fife), with a Hamobile and using a " lash-up " slot aerial with reflector (mounted on a 21 ft. clothes pole!) had a QSO with HB1RG (portable) on Chasseral in Switzerland on c.w. on August 4 (GM3HLH's signals were 569 and HB1RG's 579). This is almost certainly a new European record, being somewhat less than 800 miles. GM3HLH also heard F8MX, and worked DL3YBA and DL3IY on c.w. Several PA0s and DLs were heard on phone. At no time were any G stations heard during this period.

G5YV (Leeds) also worked HB1RG at S9 phone each way, and was still hearing him for at least two hours afterwards while HB1RG was working Europeans at a different beam setting. G5YV says that he is almost certain he heard OE2JG (Salzburg) and that ON4BZ reported having heard a station signing thus. The conditions were evidently suitable for that direction, as HB1RG had been raised only 45 minutes earlier. The conditions were very peculiar and exhibited characteristics only rarely noticed before and then only for very brief periods on 2m. About 40 E-DX stations were heard during the day, of which 25 were worked, all taking part in the third Region I (I.A.R.U.) Contest. The strange thing was that they were all approximately the same strength (between S4 and S6) with hardly any fading, but intermittently going up to S9 or S9+ in very short bursts lasting only a second or two. G5YV imagines that meteor reflection might give a similar effect. He thinks that no other station north of him (except Scotland!) was hearing the Continentals until much later that day, neither were the southern G stations. G2AIW ruefully reports that HB1RG was certainly not audible at Twickenham whilst G5YV was working him at S9!

Two Metre Station Reports

Apart from August 4 and 5, the 2m band was relatively quiet during the period, with one burst when LX1SI was heard by nearly all and worked by most. On July 31 **GI3GXP** (Kilkeel) and **F8MX** (St. Valery-en-Caux) made the first GI/F QSO on 2m. These were high spots in an average period. Never very bad, sometimes wide open, but the openings did not seem to last longer than a day or two.

GD3UB (Port Moar, I.o.M.) who has been doing very well lately, reminds us that he is on 2m at 23.00 B.S.T. every night.

B.R.S. 15822 (Clapton, E.5) had an interesting personal QSO with G5MR (Hythe, Kent) and G5BS, who hopes to be on 2m soon. F8MX and PA0EZ have been heard on the indoor beam with a host of others. G5YV was heard on c.w. at 589. **B.R.S. 6327** (Earlsfield) reports again after a lapse. The aerial now being tried is the slotted 2m beam for a room corner by G2QM and this is working out very well, although it is only 30 in. above ground! **B.R.S. 21064** (Thornton Heath) reports for the first time with a list of stations heard with a Labgear converter and Eddystone 750, the aerial being a single slot, 25 ft. up. **B.R.S. 21136** (Ruislip) will probably be moving to North Cornwall soon; we hope he will continue to report, as that part of the country is not very well represented. Most of the stations heard will

* *21 Bridge Way, Whitton, Twickenham, Middlesex.*

doubtless be DX! '21136 found conditions rising from average to good or very good in the last two weeks of July and the first week of August with activity still very low.

B.R.S. 19162 (Dewsbury) says the month has been disappointing with poor weather and much noise. Things appeared above average around July 28 to August 4, although only a few small crumbs reached '19162! On August 5 at 09.00 PE1PL was louder than ever before heard and was having a fine time with the Lancashire stations. **B.R.S. 21034** (Lymington) only had a week's listening but what a week! The opening was on, and the best day (for '21034) was August 2. On July 29 an interesting QSO was heard between G3LOK and G2HCG/M, both on the Isle of Wight. G2HCG/M was fog bound in the hills and G3LOK was very busy giving directions and " talking him in." Conditions were very good to the North, North Midlands and Midlands. F8MX was heard working GI3GXP for the first F/GI 2m contact, G5YV was 59 working G2BMZ (Torquay). G5BD and G3DLU were both S8/9 at Lymington. This state of affairs continued on the 31st and August 1. Highlights of August 2 were DL3NQ at over S9 and LX1SI (Luxemburg), also very strong. ONs, Fs and PA were heard. On August 3 GC3EBK was hearing G5YV enough to " bounce the speaker about " although '21034 could only hear '5YV at about S2. **B.R.S. 20133** (Melton Mowbray) constructed a three-element Yagi which was used for the Second Two Metre Field Day and found things pretty good, conditions not too bad and certainly plenty of activity, with GWs well in evidence. G5YV/P was heard recently in Rutland with G5HB. The QSL puts '20133 up another notch!

G3WW (Wimblington) found 2m at a low ebb " as usual." He could not hear LX1SI but others were working him with ease. PE1PL was 557 at 10.00 B.S.T. on August 13. G5YV/P in Surrey was heard, but not raised at RS56/7. G2DUS/M had a good QSO with G2XV at 59+. G3WW has had a fairly heavy replacement programme, both 8011s in the modulator and the rectifiers in the power pack being replaced. An oscillating 6J5G in the speech amplifier was replaced by a metal 6C5 which cured the trouble. G3WW considers that G3FUR should be the " news boy " now, as he seems always to be on the band from Stamford.

G8VZ (Princes Risborough) had a most interesting 13 days from July 14 to 26 with nightly QSOs with GW3KEQ/P on his Welsh tour. Contact was made in all counties visited with the exception of Anglesey; even then the portable station was heard at RST339 to zero. From July 30 onwards conditions were really excellent, but no E-DX was worked, Europe being a poor direction for G8VZ. Many stations from the north, north-west and west were heard and worked but the only station outside England worked to the south was GC3EBK. G8VZ notices the great increase of activity with good conditions, but thinks it is still hard going when only low power (under 15 watts) is available. However every minute of the struggle was enjoyed. Daily skeds have been made recently with G3JWQ (Ripley, Derbys). The fact that G3GHO, G3AHY and G5YV/P were on holiday at the same time meant several day time QSOs.

G3JGJ (Plympton) has noted quite a lot of activity with several /Ms. G3JTQ/M (Haldon Hills, west of Exeter) was S9+ both ways. Others heard included G3DKF/P at St. Mawgan (Cornwall), G6SN/M at Looe, G3HPC (Plympton) and a mobile near Salcombe and Kingsbridge. G2RY (Bridport) and F8MX were good signals, but QSOs did not result despite repeated calls. GW8SU, whilst working G2ADZ, was coming in S9, but there was no sound of the latter. The sked with GC2FZC continues.

G3JR (Barnes) has worked PE1PL 14 times during the last two months, once on phone. (Remember the indoor aerial!) F8MX was worked on phone for a first French contact. G5YV and G3FIJ (Colchester) were raised on c.w. Contacts with G5SK and G3DLU were also made. G3JR was thrilled to hear (but alas, not to raise) GI3GXP, LX1SI, DL6WU and DL3NQ, all on c.w. **G3KHA** (Knowle, Bristol) found conditions quite good at the beginning of the period, but they have tailed off very much since. Although LX1SI was " S9 + 40 " with G6NB, no sound could be heard farther west; nevertheless some reasonable G-DX was worked. G3KHA thinks the portable and mobile boys have been doing a fine job with their trips to " foreign parts." It is surprising just who comes up on the band when a /P appears in some rare county! G3KHA noticed a " little aurora " on June 30. There were very few signals on the band, but G3KUH was worked at 552 both ways.

A very interesting list of calls worked has been sent by G3JQN/G3KEQ who blossomed out as GW3KEQ/P and gave a lot of rare counties to many 2m operators. The weather and conditions were poor, and on two occasions operation was impossible, but on the whole the tour went well. The outstanding site remains 3m north-east of Aberdaron (Caernarvon) and anyone contemplating /P operation in that county should have a look at it. Ninety-seven contacts were made in all, mainly on c.w., the whole band being tuned whenever possible. The success of the trip was mainly due to the enthusiasm of the stations who followed their progress, in particular G5MA, G3GHO, G8VZ, G3HXS and G3LSI. Apologies are extended to those who heard and called without result.

G3HHY (Bristol 6) has a rig fitted to his Vespa scooter, but apparently works portable rather than mobile! Operating from the Isle of Purbeck (Swanage area) with a very QRP rig (4 watts to a 6AK5) and receiver comprising two r.f. stages, super-regen detector, two transistors and a 12A6 audio stage, F8MX and GC3EBK were both worked. Although sea paths are involved, F8MX 120 miles away was about RS56; GC3EBK (85 miles) was 59. The site for the F contact was 250 ft. up and that for GC 450 ft. up on Swyre Head. For future use a Band III five-element Yagi has been converted for use on the 8 ft. masts carried on the Vespa. Power supplies come from a 24 volt aircraft accumulator, which will run the rig for about 6 hours continuously from a dynamotor supply. Stations heard while in Purbeck were G2BMZ, G3KSR/P (Winchester), G3BM and G3HOW. Conditions were good only on August 3 when F8MX said that he was hearing a GI on c.w. G3HHY will be in Swanage on and off all this year; his frequency is 144·18 Mc/s. Recently many of the well-known portable operators have been in the West notably G8SB, G6OX and G8SC, who are earnestly exhorted to turn their beams " down-west " when they get home, having sampled the heartbreaking effect of hearing the East and London, but failing to raise them.

G2HDR (Bristol 9) found Midland stations at good strength during the Second Two Metre Field Day, on August 18, but nothing exotic was heard from anywhere. Field Day weather, however, if not Field Day conditions! Otherwise conditions were generally poor except July 23 when G2NY and G5YV were heard and July 31 when F8MX, G3JZN, G2FNW, and G5YV were logged, the latter calling G2DKF/P in Cornwall.

G5MA (Great Bookham) had another good month and worked LX1SI for a new country on August 2 as well as HB1RG on Mt. Chasseral the following day. Three more Welsh counties were worked (GW3KEQ/P in Merioneth, Caernarvon and Anglesey), GM3EGW (Dunfermline) gave three QSOs, the last one being the best ever. GD3UB was worked on four successive nights, GI3GXP twice, GI8DV/P twice, GI3CWY once and G2FO once. G3FZL/A at G5BD'S Mablethorpe QTH put G5MA on to HB1RG and made that QSO possible.

G6NB (Brill) found August 8 a good night and 12 countries were worked including LX1SI. OE2JG was working a

DL, but could not or would not take the bait! which was a pity as he was 449 beaming on DL. Whilst on a fishing trip in Suffolk G6NB had a number of contacts with F, ON, PA and DL but only two G stations were worked from the /P location using 4 watts input. G6NB offers sincere congratulations to W6NLZ and KH6UK on their fine DX record, but says he will not be happy until the 2m record is held by a G station!

GM2FHH duly went /P on 144·04 on August 4/8, in Nairn, Inverness-shire and Perthshire at heights from 500 ft. to 1,300 ft., but only heard GM3DDE and '3GAB, neither of whom were worked! What a contrast with two years ago!

GM3EGW (Dunfermline) found conditions during July generally fair, with some improvement towards the end of the month. During the Open Contest on July 6 and 7 conditions were poor but quite a number of GMs were heard. On July 21 and 24 G3BA was coming through at S8 but no QSO resulted. A good spell began on July 29 when many DX stations were heard including G3LIM, but again there was no QSO. Early on July 31 F8MX was heard but he was not worked until August 2. At 01.00 on the same day LX1SI was heard but not contacted. Bedford (G3CGQ) and Hertfordshire (G3HBW) have been worked for the first time.

Second Two Metre Field Day

Reports on this contest held on August 18 are sparse, of course, but from what we have, and from observations made, it appears that conditions were fair, especially between the Midlands and the West. From the Home Counties many portables were heard, ranging from the West Country to Yorkshire, but there was no opening as generally understood. Plenty of activity and good fun seems to be the general conclusion.

The PE1PL Skeds

PE1PL (The Hague), as is well known, has quite a list of skeds and special mention may be made of that with **G2NY** (Preston). This commenced in March 1956, succeeding a previous one with the late G3GPT (who had then fallen ill). The path is 300 miles long, and it has appeared that PE1PL's signals were almost always receivable at RST51/29. The strongest report ever given was RST54/59 on two or three occasions only. For about 80 per cent of the reception it appears that signals are only slightly subject to conditions, contrary to those from G5YV which tend to increase rapidly from 0·2μV to 2μV as conditions improve. However, G2NY's signals are usually around 0·05μV and have only been as strong as 0·25μV a couple of times.

The nature of these signals appears to differ from typical tropospheric propagations as follows:

(1) Only slight alterations in connection with condition.
(2) Slow fading only.
(3) Aircraft flutters few and far between.
(4) No scintillation fading.

One conclusion reached is that these contacts, considering the long path and the position of G2NY behind the Pennines, are made by forward scatter.

PE1PL is always willing to arrange regular skeds with British stations, preferably in the morning at 08.00 G.M.T. and in the afternoon at 15.00 G.M.T. The lunchtime period is already full up, and apologies are offered to those who call in vain. Regular skeds are also operated with DL6EZA, HB9RG, LX1SI, DJ1XX, and DL3VJ, all between 12.20 and 12.50 G.M.T.

News from Europe

We are glad to learn from **SP5FM** and **SP5FD** that the Polish Society is applying for membership of I.A.R.U. Region 1 Bureau. We had certainly hoped for this after meeting 5FM in Paris.

SP5HS (Warsaw), who is a member of R.S.G.B., reports that the Soviet authorities are issuing special v.h.f. licences for 38 to 40 Mc/s, 144 to 146 Mc/s and higher frequency bands. At the moment, the call-signs consist of six figures but no letters. Later this year, however, these Soviet amateurs are to get new call-signs but the prefix will be R instead of U; thus Ukrainian stations will be RB5.

The 144 Mc/s gear at SP5HS comprises a crystal controlled transmitter with an 829 p.a. running about 100 watts; a c.c. converter (ECC84 and ECC85) and a four-element Yagi.

In Rumania **YO2KAC** will shortly be on 2m using an 832 (s.e.o.) with a four-element beam. In Poland a few stations have received special 50 Mc/s licences for the I.G.Y.

Seventy Centimetre News

G5MR (Hythe, Kent) had his first two-way QSO with F8MX (St. Valery-en-Caux) on July 25, signals being S9 both ways; in fact F8MX reported that G5MR's c.w. was suppressing the b.f.o., whilst F8MX's phone was rattling Vernon's speaker at a distance of 81 miles. F8MX was using a 64-element stack whilst G5MR was running 12 watts to an 832 tripler and 6-element stack. Congratulations to G5MR—first to quote his frequency (435·48 Mc/s).

G2XV (Cambridge) had a couple of nice QSOs with F8MX, RS57 both ways—one on August 3 and the other on August 16. G2XV runs a 70cm sked with G2OI (Eccles) every evening (except Saturdays and Sundays) to try to " conquer " the Pennines. There has been no success yet, but G2XV says " there will be." G2OI calls on 433·191 Mc/s from 23.00 to 23.05 B.S.T. and G2XV calls on 435·17 Mc/s from 23.05 to 23.10, G2OI then calls CQ from 23.10 to 23.15 (all c.w.). Several other stations in the North are watching this experiment, and it would be good if more in the South added their interest. **G3HBW** is aleady participating by calling G2OI from 23.15 to 23.20 and it would be particularly interesting to hear from stations midway in the path, for example, the Leicester and Derbyshire areas, as to whether they can hear one or other of the calling stations.

On July 30, **F8MX** (St. Valery-en-Caux) worked **G5BD** (Mablethorpe),

Frequencies of 70cm Stations

The hint in the August issue that 70cm operators were not public spirited enough to make their frequencies known for publication will, it is hoped, be accepted as the goad it was undoubtedly intended to be! At least it has prompted **G5UM** to report that his frequency is 434·37 Mc/s. He in turn passes on the assessed frequencies of several other 70cm operators, and if these are not precisely right no doubt this in turn will prod *them* to report their exact frequencies.

G2FCA	Edgware	435·2 Mc/s
G2FMJ	Potters Bar	434·14 Mc/s
G2WJ	Dunmow	436·05 Mc/s
G2XV	Cambridge	435·05 Mc/s
G3EYV	Clapham	434·86 Mc/s
G3FP	Thornton Heath	435·02 Mc/s
G3IRW	Hoddesdon	434·38 Mc/s
G5CD	Hendon	435·66 Mc/s
G5DT	Wallington	434·88 Mc/s
G5MR	Hythe	435·48 Mc/s
G5UM	Knebworth	434·37 Mc/s
G8SK	Waltham Abbey	435 Mc/s

Perhaps the above " guessology," read off from the dial of the BC348 at G5UM, will have the desired effect of further notifications or corrections!

Valve Life

How long do valves last at u.h.f.? During the course of a 435 Mc/s contact, G5UM elicited from G5DT some statistics on this point, which are of more than usual interest in view of the fact that G5DT, as one of the pioneer users of the

70cm band, has had probably more opportunity than most members to amass data about it.

G5DT informed G5UM that the QSO was being conducted with a five-year-old QQV03/20 in the p.a., which was one of the very first of this type to be used in Britain. During those five years it had operated 4,600 hours and given G5DT more than 9,000 contacts, "and, touching wood, is still going strong," observed Clem.

It is worth mentioning that a Variac is in use at G5DT to ensure that the supply voltage remains constant. Great care is taken to maintain the heater at a steady 12·6 volts.

A few pounds spent on the right valve for the job is more than adequate investment: this seems to be the conclusion to be drawn.

Aurora Again!

Following yet another solar outburst which caused widespread disruption of short wave communications, auroral propagation became evident on 2m. on September 4-5. It is understood that G3KHA (Bristol) was the first to observe auroral effects around 17.00 G.M.T. but no further details are yet available. Later, however, at 22.51 G3FZL (Forest Hill, London) worked GM3EGW (Dunfermline), reports being RST563 and RST543 respectively. The aurora then faded out but at 23.41 GM2FHH (Aberdeen) was heard weakly. Signals rapidly built up again and contacts were made by G3FZL with GM2FHH, GM3BOC/A (Brora, Sutherland) and, at 01.00, with SM6ANR (Gothenburg). The latter's signals were RST553 and G3FZL's RST455, with QRM from DL3VJ, who also worked the SM and the GMs via the aurora.

G8AL (Chingford, London) worked the GMs and EI6A as did G3HBW (Bushey Heath). No other stations appeared to be on the band. G3HBW reported that the aurora was just visible to the north in the form of a white glow. The beam direction from the London area was a little east of north.

The following interesting auroral notes are taken from *PRP News*, issued by the A.R.R.L. IGY Supervisor, W1VLH.

On June 30, W2BLV checked WWV and heard evidence of aurora, but 2m showed nothing. Nevertheless, he decided to try again later. From 22.56 to 23.20 E.S.T., he heard the auroral signals of W1AJR, W3RUE, W9EGH, and W4VVE. About the same time, W4VVE heard W4IKZ by means of auroral propagation. W4IKZ was 12 miles away and his auroral signal blotted out the direct one! Also on June 30, W8KAY reports that he heard 19 states via the aurora! W9KIR sent in a long report with the comment, "Many, many more stations not logged." At 22.30 C.S.T. he noted, "Aurora still going strong . . . and *very* visible, E., N., and W. and overhead." W0SMJ started to hear auroral signals as early as 12 noon C.S.T. on June 30.

* * *

PLEASE note and try to adhere to the new deadline, the *18th* of the month, otherwise your copy may be left over. Thanks to those who report regularly, but what about the others? Many good QSOs are worked but we don't always hear about them quickly enough. Good Hunting.

Syracuse V.H.F. Round-up

THE third annual Syracuse V.h.f. Round-Up will be held on October 12, 1957, at Martin's, Liverpool, New York. This event has become known as the outstanding yearly gathering of top v.h.f. radio amateurs from the eastern half of the United States and Canada. Guests this year will include Ed. Tilton, W1HDQ (V.h.f. Editor of *QST*) and Sam Harris, W1FZJ (V.h.f. Editor of *CQ*).

The Programme Director is Charles Sellwood (W2RHQ), 129 Dell Street, Syracuse, N.Y., who will be pleased to hear from any European amateur who expects to be in the neighbourhood of New York on the date of the Round-Up.

Worked and Heard on Two Metres

B.R.S.15822 (Clapton, E.5).
Heard: DJ1XX, DL1LB, 3YBA, G2AHP, 2ANT/P, 2CIW, 2FMJ, 2HDY, 2JF, 2WJ, 2XV, 2YB, 3AEX, 3ANB, 3BFP/A, 3BII, 3BLP, 3CGQ, 3CO, 3CZY, 3EMU, 3EYV, 3FCQ, 3FD, 3GDR, 3GFN, 3GHI, 3GHO, 3GOZ, 3GTH, 3HBW, 3IAM, 3IIT, 3IJB, 3IRS, 3ISA, 3JMA/M, 3JQN, 3JWQ, 3KEQ, 3KFX, 3KQC, 3LCK, 3LIM, 3LOK, 3LTF, 4DC, 4HQ, 5BD, 5DS, 5KG, 5MA, 5MR, 5OX, 5YV, 6AG, 6JP, 6LL, 6NB, 6OX/P, 6RH, 6XM, 6YP, 8AL, 8KW/M, 8LN, 8RW, 8SC, 8SK, ON4DW, 4HN, 4ZK, PA0BL, 0FB, 0NO, 0TP.

B.R.S.16075 (Shirley, Southampton). June 17-July 15.
Heard: DL3IY, 3VJ, G2BMZ, 2JF, 3AUS, 3ARL, 3FIH, 3GHO, 3GHI, 3ION/P (Oxon), 3IRS, 3KEQ/P (Dorset), 3LIM, 3XC, 4DC, 5DW, 5MA, 5UF, 6AG, 6NB, GC3EBK, GW8UH.

B.R.S.19162 (Dewsbury).
Heard: DJ1XX, DL0HH, 3VJ, G2CVD, 2FNW, 2JF, 2XV, 3FAN, 3GHI, 3GHO, 3KEF, 3WW, 4DC, 5BM, 5KG 5MA, GI3GXP, GM2FHH, GW2ANT/P, ON4ZK, PA0BL, 0NO, PE1PL.

B.R.S.20133 (Melton Mowbray) June 12-July 12.
Heard: G2ATK, 2BVW, 2FJR, 2FNW, 2FNW/P, 2FMO, 2HCG, 2HCJ/M, 2HCJ/P, 2NY, 2XV/P, 3BA, 3BU, 3CCH, 3DLU, 3EKX, 3FUR, 3FUW, 3GHO, 3GSO, 3GUD, 3IVF, 3JMA/M, 3JWQ, 3JWQ/P, 3JXN, 3JZG, 3KQF, 3LHW, 4JJ, 4MK, 5KG, 5MA, 5ML, 5YV, 6XM, 8CZ, GW3GWA/P.

B.R.S. 20162 (Selsdon) June 19-July 9.
Heard: G2AHP, 2AJS, 2ANT, 2ANT/P (Norfolk), 2BDP, 2BMZ, 2CD, 2CIW, 2CPX, 2CZS, 2DVD, 2FMJ, 2HDY, 2JF, 2KF, 2MV, 2QY/P, 2RD, 2UJ, 2WJ, 2XV, 2YB, 3AAZ, 3AEX, 3ALC, 3ANB, 3BLP, 3CGQ, 3CNF, 3CO, 3CRD, 3DF, 3DOR, 3EMU, 3EOH, 3EYV, 3FAN, 3FCQ, 3FD, 3FEX, 3FMP, 3FPV, 3FQS, 3FUR, 3FVG, 3FZL, 3GDR, 3GFN, 3GHI, 3GHO, 3GOZ, 3GSE, 3GTH, 3HBW, 3HWJ, 3HXS, 3HZJ, 3IAM, 3IIT, 3IJB, 3INU, 3IRA, 3IRP/A, 3IRS, 3ISA, 3IUE, 3IUL, 3JMA, 3JMA/M, 3JMA/P, 3JQN, 3JR, 3JTQ, 3JWQ, 3JZW/P, 3KBS/P, 3KEQ, 3KEQ/P (Dorset), 3KFX, 3KHA, 3KLI, 3KQC, 3KQR, 3LCK/P, 3LHA, 3LIM, 3LOA, 3LOK, 3PV, 3WS, 3WW, 3XC, 3XC/M, 4DC, 4IB, 4KD, 4WK, 5BD, 5DF, 5DS, 5DW, 5KG, 5KW, 5MA, 5NF, 5NF/P, 5OX, 5TZ, 5UM, 5WW, 5YH, 5YV, 6AG, 6JI, 6LL, 6LL/A, 6NB, 6NW, 6OU, 6OX, 6OX/M, 6OX/P, 6RH, 6XM, 6YP, 8AL, 8LM, 8RW, 8SC, 8SC/P, 8SK, 8UG/A, 8VZ, GC3EBK, GW8UH/P, DJ1XX, 1YS, DJ2NT, DL1CK, IUK, 3VJ, 3YBA, 6AH, 6SV, 7FU, F9EA/P, ON4BZ, ON4DW, ON4HN, ON4OZ, ON4ZK, PA0AFN, 0ADJ, 0AGJ, 0BL, 0BU, 0DEK, 0FA, 0FB, 0FP, 0GEP, 0GU, 0HA, 0HP, 0JMS, 0LAM, 0MA, 0NO, 0PFW, 0QC, 0WAR, 0WQ, PE1PL.

B.R.S.21136 (Ruislip) June 13-July 8.
Heard: G2AHL/M, 2AHP, 2AHY, 2ANT, 2DDD, 2DTO/P, 2FM, 2GG, 2HDY, 2HDZ, 2JF, 2MV, 2QY/P, 2RD, 2TP, 2YB, 3ABA, 3BFP/A, 3BII, 3BLP, 3CO, 3CZY, 3DF, 3EYV, 3FAN, 3FQC, 3FQS, 3FUH, 3GHI, 3GHO, 3GNR/P, 3GSE, 3GTH, 3HBW, 3HWJ, 3IAM, 3ISA, 3IUE, 3IUL, 3JQO, 3JQN, 3JR, 3JTF, 3JTQ/M, 3KSB/P, 3KEQ, 3KQC, 3KQR, 3LIM, 3LOA, 3LOK, 3LTF, 3PV, 3XC, 4DC, 4KD, 4PS/P, 5DS, 5DW, 5MA, 5NF, 5RD, 5WW, 6AG, 6JP, 6NB, 6OX/P, 6RH, 6YP, 8AL, 8RW, 8SC/P, 8SK, 8UG/A, F9EA/P.

G2QY/P (near Winterton-on-Sea, Norfolk) June 16, 17 and 21.
Worked: DJ1XX/DJ2NT, DL0HH, G5KG, 5YV. *Heard:* DL3IY, 3YBA, G2FJR, 2FNW, 3ANB, 3FUR, 3IJB, 5BD, 5LL, 6LI, 6NB, PA0BU, 0NO, OZ7BB.

G2HCJ (Herefordshire) July 6.
Worked: G2CDB, 2CVD, 2FJR, 2HDF, 2XV/P, 3WW, 3FIH, 3GSO, 3IUD, 3JWQ, 3JZG, 3JGY/P, 3KHA, 3LAY, 3LHA, 5DW, 5MA, 6PC, GW3GWA/P.

G3WW (Wimblington) June 27-July 9.
Worked: G2ANT/P (Norfolk), 2ATK, 2CIW, 2CZS, 2FNW/P, 2HCG, 2HCJ/P (Hereford), 2HOP, 2HQ/P, 2JF, 2XV, 2XV/P (Derby), 3ALC, 3BGW, 3CGQ, 3DLU, 3FAN, 3FCQ, 3FEX, 3FJR, 3FUR, 3GGJ, 3GSO, 3IAM, 3IIT, 3IRA, 3KEQ, 3KHA, 3KQC, 3LCK/P (Beds), 3LEK, 3LHA, 3PV, 3XC, 5BD, 5BQ, 5DW, 5JO, 5YV, 6XM/A, GW2ANT/P (Denbigh), GW3GWA/P (Denbigh), ON4ZK. *Heard:* G2MV, 3BA, 3GHI, 3GHO, 3HBW, 3ICK, 3IJB, 3JZW, 4DC, 4MK, 5MA, 6LL, 6NB, 6RH, 6YU, 8SK, 8VZ, GI3GXP/P.

G3EMU (Canterbury) June 15-July 15.
Worked: G3GNR/P, 3KFX, PA0AFN, 0BO, 0BZH, 0CJP, 0CO, 0DEK, 0FA, 0HA, 0JMS, 0KT, 0LAM, 0MA, 0MAI, 0MF, 0PFW, 0TP, 0WO, DJ1XX, DJ2NW, 3HX, DL0HH, DL1UW. *Heard:* DJ2DS, DL1KM, 3RX, 6AH, 6FX.

GW2HCJ (Radnorshire) July 6-7.
Worked: G2ANT/P, 2CVD, 2OL, 2NY, 2HGR, 3AYT/M, 3CCH, 3DKF, 3GHI, 3HII/M, 3HXN, 3IRA, 3IUD, 3IWJ, 3KHA, 3LHA, 4DC, 5BD, 5DW, 5MA, 5YV, 8SB/P, 8SB/M, GW3GWA/P.

G2CZS (Chelmsford) June 18-July 8.
Worked: DL0HH, F9LD, G2ANT, 2ANT/P, 2FJR, 2JF, 2XV, 2YB, 3ANB, 3FIJ, 3FUR, 3GGJ, 3IIT, 3IJB, 3INU, 3JMA/M, 3JWQ, 3WW, 8SK, ON4ZK, PA0DEK, 0FB, 0FP, 0GST, 0JMS, 0MA, 0MA, 0NO, 0PFW, 0WAR.
Heard: G2XV/P, GW2ANT/P.

Silent Key

JOHN EDWARD STEPHENSON (VQ2JS)

The death is announced of Mr. J. S. Stephenson, of Kapiri Muwandika, Northern Rhodesia. Affectionately known as "Chirupula," John Stephenson became an amateur two years ago at the age of 79 since when he had worked a number of DX stations. Having been trained as a telegraphist, he was able to copy Morse at high speeds.

His passing is mourned by his many Amateur Radio friends.

VQ2RR

National Field Day 1957 Results

N.F.D. Shield	Slough (G6NA/P and G6CJ/P)	1398	points
Runners-up	Bristol (G2IK/P and G6GN/P)	1393	points
Bristol Trophy	Port Talbot (GW2AVV/P)	676	points
Best 1·8 Mc/s	Wirral (G2AMV/P)	238	points
Best 3·5 Mc/s	Gloucester (G3MA/P)	316	points
Best 7 Mc/s	Gravesend (G6BQ/P)	367	points
Best 14 Mc/s	Croydon (G6LX/P)	478	points
Best 21 Mc/s	Stamford and District (G3FUR/P)	641	points
Best 28 Mc/s	High Wycombe (G5WW/P)	63	points
Scottish N.F.D. Trophy	Aberdeen (GM6IZ/P and GM3EOJ/P)	864	points

Overseas station contributing most points: ZC4CK/P

SURELY the closest and hardest fought National Field Day yet! With the first four groups separated by only 22 points, and no less than eight groups within 75 points of the all-time record score, the Contests Committee scrutineers faced a difficult problem before it became clear that the Slough Group had used the glorious weather of June 1-2 to gain, for the first time, the N.F.D. Shield. They beat, by five points only, the so often successful Bristol Group who thus, also for the first time, occupy the position of "runners-up." Hard on the leaders' heels were Stourbridge and then Stamford, who made the phenomenal total of 641 points on 21 Mc/s alone (better, incidentally, than the all-band winning score in 1947!).

This was undoubtedly a DX man's field-day. Contacts with American stations on 14 and 21 Mc/s ("more like a W/VE contest than N.F.D.") accounted for a large percentage of the very high scores on these bands. With stations spending more time on the higher frequencies, the 1·8 and 3·5 Mc/s scores fell appreciably, and 7 Mc/s—wide open again for inter-G working—carried most of the semi-local contacts. The 3db gain provided by the extra power this year seemed to give just the extra punch needed on the high frequency bands, without seriously increasing interference on the lower frequencies (and many groups comment that interference on these bands would have been much reduced if more stations would spread out beyond the first few kilocycles of each band).

Both 14 and 21 Mc/s were open during the night to all districts of the United States. Other countries worked on 14 Mc/s included KL7, VS1, YV5, CR6, OA, FG7, PZ, VE7, VK and many others. VE6, 7, VS1, 6, JA, XE, ZL, ZE, CE and 3W8 appeared in the 21 Mc/s logs. Even 28 Mc/s though "dead" much of the time provided contacts with all continents except Oceania. A few American stations were worked on 7 Mc/s. Conditions deteriorated considerably during the Sunday but even so many long-haul contacts continued to be made.

Leading Stations

Slough Group operating at Taplow Court, Taplow, made their 1398 points from 464 scoring contacts: 56 on 1·8; 105 on 3·5; 108 on 7; 88 on 14; 94 on 21; and 13 on 28. Using the key at G6NA/P (1·8/3·5/28) were '2HOX, '3GYD and '6NA whilst '3XH, '3COJ and '6CJ on the duty roster at G6CJ/P (7/14/21) accounted for over 900 points. G6NA/P used two transmitters: Z77 (v.f.o.)—Z77 (b.a./f.d.)—807 (p.a.) on 1·8 and 3·5; and Z77 (v.f.o.)—12AT7 (f.ds.)—5763 (p.a.) on 28. Aerials were a 328 ft. long wire and a

WINNING STATIONS

G3GYD (left) and G2HOX operating the Slough station, G6NA/P, during National Field Day, 1957

G6CJ at the key with G3LQM keeping the log at Slough Group's station, G6CJ/P.

3·5 Mc/s dipole. A 12AT7 (Clapp v.f.o./b.a.)—N78 (f.ds.)—807 (p.a.) rig generated the power at G6CJ/P to be sent on its way by a 420 ft. long wire, or by dipoles on each band. Incoming signals found AR88 receivers waiting at both stations, while the necessary wherewithal came from a petrol-electric generator. Slough, with becoming modesty, attribute their high scores to persuading the farmer to exclude cows from the operating field, thus eliminating the usual "static" generated by the animals contentedly scratching themselves against guy ropes and masts (and—as other groups discovered—from entangling themselves with the guys and bringing down masts at the most critical moments).

The Bristol Group found weather conditions perfect at their usual hill-top site at Dundry. They chose the 1·8/7/21 bands for G2IK/P (operators '2IK, '2FYT, '3CTN, '3JMP, '3JMY) and 3·5/14/28 for G6GN/P where the "fists" belonged to '3RQ, '6GN, '2HDR, '3CHW and '3KUL. The division by bands of their 461 scoring contacts was 54/95/96/149/57/10. The equipment this year included two completely new transmitters, both made in short time around Geloso v.f.o. units, in one case driving an 807 (G6GN/P) and in the other a QV06/20. These were used on all bands except 1·8 Mc/s where the well-known 6L6 (e.c.o.)—807 (p.a.) did duty once again. Here also AR88 receivers looked after incoming microvolts. Horizontal or vertical dipoles were used on all bands. A 1½ kW diesel-electric generator provided an ample supply of 230 volts a.c. to both stations. The only panic this year was when first one, and then the other wire supplying the lights came adrift, twice plunging the site into darkness until, with the aid of torches, tools and forceful language, the faults were cleared.

Best on the Bands

Looking over the list of Band Winners we find several new groups appearing as well as the more familiar ones such as Croydon and Gravesend.

On 1·8 Mc/s, Wirral (operators '2AMV, '3CSG, '3CSZ, '3ERB and '3IIH) made 96 contacts on G2AMV/P using a 6C4 (Clapp)—6C4 (cathode follower)—6AG5 (b.a.)—6AG7 (p.a.) transmitter with a half-wave dipole. The receiver was an HRO and power came from a petrol-electric generator.

Gloucester made 126 contacts at G3MA/P with '2HX, '3MA, '5BM and '3GEN at the key. The equipment was a 6J5 (v.f.o.)—6F12 (f.d./b.a.)—807 (p.a.) with two coax-fed dipoles (E/W and N/S), and an HRO receiver. Power came from a vibrator and rotary converter from 12 volt car batteries.

Gravesend again turned in the best 7 Mc/s score, with '3IEW and '6BQ making 132 contacts at G6BQ/P. The equipment included a 6AM6 (e.c.o.)—6AM6 (b.a.)—6V6 (f.d.)—807 (p.a.) with an interesting aerial arrangement of three radial 10 metre wires spaced at 120 deg. with triangular tuned feeders any two of which could be selected by a three-pole switch at the aerial tuner. The receiver was an Eddystone 888 with power derived from a petrol-electric generator providing 240 volts at 60 c/s.

With 151 contacts, Croydon stays on top of the 14 Mc/s list, with '4QK, '6LX, '3BFP and '3JXQ taking care of the operating at G6LX/P. The aerial array is basically similar to the Gravesend 7 Mc/s arrangement; three 138 ft. radial wires being used as "vees" when connected to the output end of the EF80 (v.f.o.)—EF42 (b.a.)—6AG7 (f.d.)—½ by 815 (the other half forming a neutralizing capacitor). The power (25 mA at 400 volts) came from a rotary generator, while a vibrator unit was used to feed the AR88D receiver.

Stamford and District's magnificent 189 contacts (including more than 140 with North American stations) on 21 Mc/s were made by '5HB, '3FUR and '3HES operating G3FUR/P. The rig was a crystal mixer v.f.o.—6C4 (wide-band doublers)—QV04-7 (p.a.) feeding either a 66 ft. or a 132 ft. centre-fed aerial. An Eddystone 640 with an RF24 converter did duty on the receiving side, with a petrol-electric generator looking after the power supply. From 1700 until after 0300 contacts were made at the rate of about 15 an hour, and a high scoring rate was also achieved after about 1100 on the Sunday.

Despite the difficult conditions on 28 Mc/s, High Wycombe made 21 contacts (mostly British and European) with a Geloso v.f.o. unit driving an 807 and found the band great fun during the short periods on which it was open. Their aerials included a quad beam and a dipole. At the receiver (converter with CG46II6) were '5WW, '3DQC, '3HCL and '3IFAS. A genemotor and accumulators gave the necessary power.

NATIONAL FIELD DAY 1957—COMPLETE RESULTS

Psn.	Group	Call-sign(s)		1·8 Mc/s	3·5 Mc/s	7 Mc/s	14 Mc/s	21 Mc/s	28 Mc/s	Total Score
1	Slough	G6NA	G6CJ	148*	277*	304	284	347	38*	1398
2	Bristol	G2IK	G6GN	142*	238	265*	474	230*	44	1393
3	Cambridge	G8PB	G5DQ	139*	289	243*	374	330*	3	1378
4	Stourbridge & Dist.	G8GF	G3BMY	193*	301	272*	300	310*	0	1376
5	Stamford & Dist.	G3ARS	G3FUR	189*	204	203*	120*	641	0	1357
6	Gravesend	G6VC	G6BQ	215*	263*	367	310	175*	23	1353
7	Weston-super-Mare	G5TN	G6PZ	222*	208	349*	280	266	—	1325
8	Cheltenham	G3CGD	G3YZ	179*	249*	241*	37	485	11	1202
9	Pontefract	G6MF	G3US	36*	302	300*	412	89*	—	1139
10	Medway	G2ZP	G2BP	204*	215	330*	283	77*	16	1125
11	Hove & Dist.	G3CUY	G3FXB	218*	298	281*	119	194	13*	1123
12	East Molesey	G6MB	G8SM	197*	241*	308	199	105*	11	1061
13	Scarborough	G8KU	G2YS	134*	302	201*	94	311*	0	1042
14	Norwood & South London	G3IIR	G8GP	184*	275*	215	205	120	27*	1026
15	Derby	G2OU	G8QZ	161*	296	207*	198	122	—	984
16	Croydon	G3IRP	G6LX	146*	187	61*	478	79*	23	974
17	Lincoln	G4BU	G3EBH	136*	174*	194*	131	292	0	927
18	Sheffield	G8NN	G5TO	235*	139*	253	290	4*	—	921
19	Liverpool	G8DI	G6YQ	153*	284*	281	108	94	—	920
20	Oxford	G8PX	G2DU	152*	252*	209*	55	192	53	913
21	Edgware & Hendon	G5FG	G2IM	115*	252	228*	149	159*	0	903
22	Wirral	G2AMV	G8BM	238*	274	263*	96	22	—	893
23	Coulsdon & Dist.	G2DN	G3GKF	221*	185	262*	115	53	51*	887
24	Hexham	G5RI	G3JEG	186*	159	270*	92	177*	—	884
25	Norwich	G4KO	G2YU	145*	53*	212*	248	219	4	881
26	Scunthorpe	G3KSG	G3CCH	14*	264	310*	133	146*	0	867
27	Aberdeen	GM6IZ	GM3EOJ	168*	151	223	242*	70	10*	864
28	Gloucester	G3MA	G2RT	27*	316*	307	212	—	—	862
29	Hull	G2CPS	G2FS	186*	179	293*	200	0	0*	858
30	Blackpool	G8GG	G5ND	178*	172*	154*	223	128	0	855
31	Sutton & Cheam	G4DH	G8DF	176*	242*	274	157	—	—	849
32	Barnsley & Dist.	G3ABS	G5IV	177*	227	227*	125	71*	18	845
33	Ilford	G3HIW	G3KRZ	166*	311	327*	40	—	—	844
34	Reigate & Redhill	G5LK	G2AJS	104*	259*	365	114	0*	0	842
35	Bury	G2GA	G3KMM	188*	250*	307	94	—	—	839
36	Mitcham	G3ANW	G3HQX	228*	235	296	66*	0	0*	825
37	Chelmsford	G3ABB	G4VF	103*	271	291*	134	6*	16	821
38	Stroud	G5HC	G3CBH	177*	258*	233	105	45	—	818
39	Bath	G2ZR	G6UR	124*	252	237	153*	47	0*	813
40	York	G3DTA	G3FYP	175*	278	280*	70	0*	8	811
41	East Ham	G2ZZ	G4CM	197*	221*	327	61	—	—	806
42	Isle of Thanet	G2JF	G2IC	140*	307*	305	39	—	—	791
43	Grimsby & Cleethorpes	G2FT	G4XC	154*	266	233*	86	51*	—	790
44	Cannock & Lichfield	G3KNB	G4CP	161*	174*	310	127	—	—	772
45	Exeter	G2FP	G3ID	153*	219	263*	40	87	4*	766
46	Stockport	G3BY	G3AUB	161*	270	312*	12	—	—	755
47	South Birmingham	G3JAO	G3ITH	157*	198	194*	154	44*	0	747
48	Chester	G3HPM	G3ATZ	145*	260	303*	38	0*	0	746
49	Kingston-upon-Thames	G2NG	G3IEE	138*	119	249	166*	39	32*	743
50	Torbay	G3GDW	G4RJ	168*	147*	151*	109	166	0	741
51	Gt. Yarmouth & Gorleston with Lowestoft & Beccles	G6ZG	G2UK	132*	266	259	28*	49*	0	734
52	Enfield & Dist. with Welwyn Garden City	G3FD	G5UM	96*	218	292*	55	39	0*	700
53	Port Talbot	GW2AVV	—	213*	198*	265*	—	—	—	676
54	Edinburgh & Lothians	GM8FM	GM3UM	178*	119*	224	147	6*	0	674
55	Tunbridge Wells & Tonbridge	G2UJ	G4IB	102*	236	159*	163	0*	13	673
56	Boston	G6GH	—	186*	257*	203*	—	—	—	646
57	Southampton	G5LR	—	177*	205*	259*	—	—	—	641
58	Coventry	G5PP	—	237*	—	334*	—	59*	—	630
59	West Hartlepool with Middlesbrough	G3TO	G3KBM	86*	276	144*	91	20*	—	617
60	Chingford	G8JM	—	123*	236*	257*	—	—	—	616
61	Peterborough	G2NJ	G3EPT	183*	260	52*	107	—	—	602
61	Prestatyn & Dist.	GW3CF	GW3JGA	102*	83	241	139*	37*	0	602
63	Southport & Formby	G2CUZ	G2ART	165*	129*	248	53	0	0*	595
64	Danbury	G3IIS	G3VI	203*	288	77*	22	0*	3	593
64	Portsmouth & Dist.	G6NZ	G6WS	52*	211*	240	9*	81	0	593
66	Glasgow	GM6IS	GM3CSM	124*	45	169*	114	132*	0	584
67	Belfast	GI5UR	GI3GAL	17*	179	235*	88	54*	0	573
67	Harlow & Dist.	G3ERN	G6UT	179*	173*	91*	83	44	3	573
69	Guildford & Woking	G6BZ	—	207*	279*	—	62*	—	—	548
70	Slaitwaite	G8NF	—	188*	228*	90*	—	—	—	506
71	Southgate, Finchley & Dist.	G3DGN	—	—	189	263	—	—	48	501
72	High Wycombe	G5WW	—	199*	235*	—	—	—	63*	497
73	Shefford & Bedford	G4OL	G2DPQ	91*	239	69*	90	—	—	489
74	Leicester	G3AWM	G8RY	173*	92*	71*	119	4	—	459
75	Bradford	G3KEP	—	232*	211*	—	—	—	0*	443
76	Plymouth	G3KFN	G3JYB	8*	143*	145	144	—	—	440
77	Nottingham	G3DUL	G2FRY	87*	128*	191	26*	—	—	432
78	South Shields	G3ELP	G3KZZ	105*	167*	128	27	—	—	427
79	Retford	G3BTU	—	114*	—	291*	—	—	0*	405
80	Rotherham	G2LG	—	—	128	263	—	9	—	400
81	Stevenage & Dist.	G3FAU	—	175*	218*	—	—	—	—	393
82	Dundee	GM3IMU	GM4HR	37*	64*	126*	81	81	—	389
83	Newark	G3ELJ	—	—	156	228	—	—	—	384
84	Bexley Dist.	G2ATD	—	175*	117*	90*	—	—	—	382
85	Acton, Brentford & Chiswick	G5LQ	—	128*	228*	—	—	13*	—	369
86	Cardiff	GW4FW	—	—	—	222	136	—	—	358
87	Pontypool	GW3LDC	—	61*	72*	159*	—	—	—	292
88	Lewisham	G3IGZ	—	—	166	—	87	32	—	285
89	Maidstone	G8LZ	—	98*	145*	—	—	—	—	243
90	Finsbury Park	G8QU	—	131*	99*	—	—	—	—	230
91	Dunfermline	GM3GQQ	—	—	93	0	8	—	—	101

* Indicates grouping of bands.

Overseas Stations

Overseas participation was at a most welcome level, and many portables were out in HB, DL, ON4 and EI. Thanks are also due to many American stations for co-operating by giving quick contacts and then leaving the frequency clear. Twelve-pointers included ZC4CA/P, VS1GV/P (who due to a faulty transmitter was unfortunately not able to come on before the Sunday morning), ZE1JSY/P, VP7NI/P and VE2LI/P. ZC4CA/P who gave most points to competing stations was at sea-level at Davlos on the north coast of Cyprus with an enthusiastic crew of five. They ran 30 watts, using a dipole on 7 Mc/s and a ground plane on 14/21/2 (sections removed for higher frequencies, common radials with "jumpers"). What N.F.D. means to exiles overseas is best summed up by VP7NI (formerly GW6AA) who was operating—this year for only a short period—some 60 ft. from the water's edge at Elerthera Island in the Bahamas: "Brought back memories to hear British N.F.D. stations coming in so well down here . . . with closed eyes I could see the lighted tents in the darkness of an English summer night and almost smell the familiar countryside . . . how wonderful to hear G5LI as VE2LI/2 in Canada and G6ZO as CE3ZO down in Chile, all calling CQ N.F.D."

Comments

Generally, the new bands and power limit were warmly welcomed, though with some reservations by the smaller groups. The rising serial number proved almost universally popular—not least with the Committee scrutineers who found the serial number a tremendous aid in checking. A few groups went wrong in operating the system, starting afresh on each band but no points have been deducted from their scores on this account.

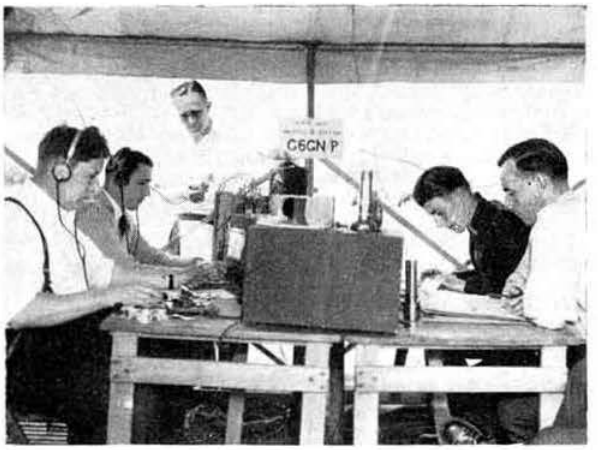
Entries from 91 groups showed a very slight decline on last year when 96 groups took part, and are substantially below the numbers recorded about five years ago when there was a field of 128 groups. This decline seems to reflect on amateur group activity as a whole rather than on N.F.D. which still appears to retain its popularity. Placing two stations in the field simultaneously does seem to strain the resources of the smaller groups, particularly where good c.w. operators are at a premium, and there appears to be some support for the suggestion of either splitting N.F.D. into two parts (one event for the l.f. bands, another for DX on the h.f. bands) or alternatively allowing each station to compete individually, operating at will on any of the six bands, with larger groups submitting two entries.

It must be recorded that some groups are still concerned about the use of valves capable of considerably more than 10 watts, and we may well be starting a new field for discussion by mentioning that this year several groups were using commercially-manufactured transmitters such as the Panda Cub.

A few of your Comments

"Tilley lamps provided useful warmth as well as excellent illuminations . . . scouts provided first class tea supply and cooked breakfasts."—**Bath.** "Why is it equipment decides to go haywire on Field Day?"—**Edinburgh and Lothians.** "Hold N.F.D. near Midsummer's day to avoid the examinations that affect the younger members."—**Lewisham.** "Very agreeably surprised by and thoroughly enjoyed operating on 21 Mc/s."—**Stourbridge.** "Pity the regional listings were not given in the BULLETIN."—**Isle of Thanet.** "Cows brought down one 45 ft. mast."—**Bury.** "Headache caused by introduction of paraffin into batteries in place of distilled water!"—**Mitcham.** "Additional bands gave greater activity and more interest . . . some conveniently "fast" clocks at the beginning were noticed to be running "slow" at the end of the contest."—**Exeter.** "Why reduce N.F.D. to anonymous scramble—please full station listing next year."—**Cambridge.** "Top section of our 1·8 Mc/s mast snapped off by bullocks . . . 28 Mc/s quad connected and contacts continued uninterrupted."—**High Wycombe.** "Stipulated valve should be used in p.a., say TT11 or 6BW6."—**Nottingham.** "Why not permit the use of a self-supporting rod ground-plane (a very portable aerial) . . . more time to fill in logs . . . disqualify stations who use BK without call-signs."—**Pontefract.** "Hope the six-band contest will be continued."—**Edgware.** "List of stations proved a great help."—**Tunbridge Wells.** "Warm even at 1,000 ft. . . . visited by fox at dawn."—**Bury.** "'Live' key assisted in keeping operators alert."—**Mitcham.** "Any G station operating portable should count for full points."—**Scarborough.** "Should be made European portable contest . . . contacts on 14/21/28 with non-portable

Roy Poeton (G3CTN) operates G2IK/P, closely watched by other members of the Bristol Group including Richard Prior (B.R.S. 18963), Ken Creamer (B.R.S.10167), Ted Halliday (G3JMY) and Dave Collins (B.R.S.19638).
(Photo by "The Western Daily Press"—Bristol

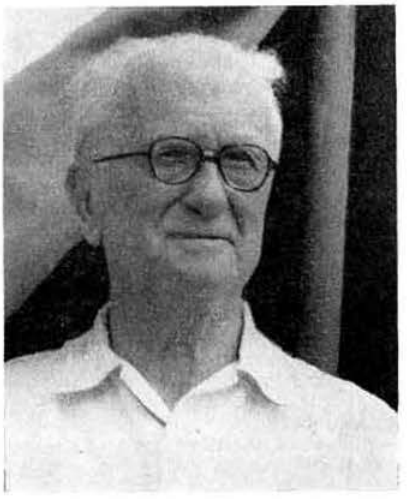


"Three more points!" Harry Gratton (G6GN) and Doug. Stephenson (G3KUL) operate G6GN/P watched by the T.R., Eric Chambers (G2FYT). On the right are two of the Bristol log-keepers, Maurice Stevens (A.1376) and Arthur Rawlings (B.R.S.6841).
(Photo by "Evening Post"—Bristol

Mal Geddes (ZE3JO), of Salisbury, Southern Rhodesia, operating the local group's transmitter during N.F.D.

G3FBA operating the Bath Group's station G6UR/P.
(Photo by G3LLM

G6GB (left) and G3AIU winkle out a weak one at G6MB/P, one of the East Molesey Group stations at Blackmoor Farm, Ockham, Surrey, during N.F.D.



R.S.G.B. Vice-President T. A. St. Johnson (G6UT) is usually known as Uncle Tom, but an equally appropriate name would be "The Father of N.F.D." for it was he who suggested the idea of a nation-wide portable contest between R.S.G.B. groups in the 1930s.

Band Winners

1·8 Mc/s

1.	Wirral	G2AMV/P	238
2.	Coventry	G5PP/P	237
3.	Sheffield	G8NN/P	235
4.	Bradford	G3KEP/P	232
5.	Mitcham	G3ANW/P	228

3·5 Mc/s

1.	Gloucester	G3MA/P	316
2.	Ilford	G3KRZ/P	311
3.	Isle of Thanet	G2JF/P	307
4.	Pontefract	G3US/P	302
	Scarborough	G2YS/P	302

7 Mc/s

1.	Gravesend	G6BQ/P	367
2.	Reigate	G2AJS/P	365
3.	Weston-super-Mare	G5TH/P	349
4.	Coventry	G5PP/P	334
5.	Medway	G2ZP/P	330

14 Mc/s

1.	Croydon	G6LX/P	478
2.	Bristol	G6GN/P	474
3.	Pontefract	G3US/P	412
4.	Cambridge	G5DQ/P	374
5.	Gravesend	G6BQ/P	310

21 Mc/s

1.	Stamford & District	G3FUR/P	641
2.	Cheltenham	G3YZ/P	485
3.	Slough	G6CJ/P	347
4.	Cambridge	G6PB/P	330
5.	Scarborough	G8KU/P	311

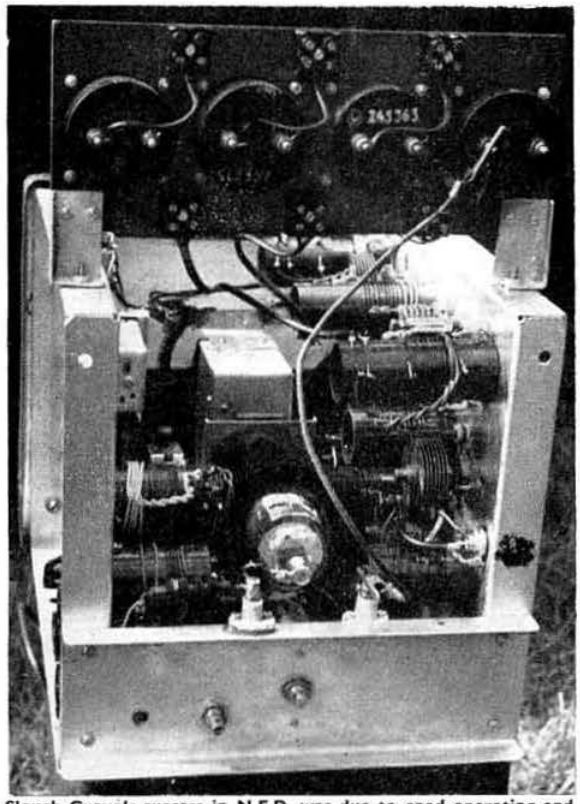
28 Mc/s

1.	High Wycombe	G5WW/P	63
2.	Oxford	G2DU/P	53
3.	Coulsdon & District	G2DN/P	51
4.	Southgate, Finchley & District	G3DGN/P	48
5.	Bristol	G6GN/P	44

stations should not count for points."—**Weston-super-Mare.** " No increase in interference with the extra power . . . six bands too much for a small group."—**Peterborough.** " Interference between 3510 and 3540 kc/s must have kept the scoring rate down."—**Stamford.** " In general we approve the new rules . . . how few operators can send an oblique stroke correctly in the wee small hours."—**Southgate.** " Why not have N.F.D. as one station on 160/80/40 with another 'DX Band' Field Day on 20/15/10 on another date?"—**York.** " The best N.F.D. yet . . . but, dare we say it, why not 150 watts."—**Gravesend.**

"Bristol Trophy"
Single Station Leaders

Psn.	Group	Call-sign	Pts.
1.	Port Talbot	GW2AVV/P	676
2.	Boston	G6GH/P	646
3.	Southampton	G5LR/P	641
4.	Coventry	G5PP/P	630
5.	Chingford	G8JM/P	616
6.	Guildford & Woking	G6BZ/P	548
7.	Slaithwaite	G8NF/P	506
8.	Southgate, Finchley & District	G3DGN/P	501
9.	High Wycombe	G5WW/P	497
10.	Bradford	G3KEP/P	443



Slough Group's success in N F.D. was due to good operating and excellent equipment. This transmitter, nicknamed The Mayflower because it was put into operation the day the ship sailed, was used at G6CJ/P.

Check Logs

Check logs from the following are gratefully acknowledged: G2VV, '2HDU, '3GUP, '3IHH, '4KS, '5AO, '8AB, GI5TK, GW3IHL, MP4BBL, OK1AEH, PA0PLM, SM5AHJ, '6BDS, VP7NI/P, VS1GV/P, ZB1CKJ, '1DC, '1HKO and ZC4CA/P.

R.S.G.B. members operated GM3BCX/A at the Dundee Model Engineers' Exhibition recently. Equipment on show included an 80 metre mobile rig, Elizabethan transmitter, low pass filter and grid dip oscillator (all made by GM4AR), as well as QSL cards and copies of the R.S.G.B. Bulletin. The receiver used was an AR77. The stand aroused considerable public interest in Amateur Radio.

The Top Band 'Special'

By H. S. CHADWICK (G8ON)*

THE plans discussed on the return journey from Sark (R.S.G.B. BULLETIN, August, 1956) left no doubt that GC3KAV and the writer must remain in communication fairly consistently. Since the only transmitter in service at the northern end was an old N.F.D. rig, telephony on 1·8 Mc/s was chosen as the medium. With a well spotted sun, a 300 mile circuit, and conditions varying from summer's evening to winter's night (to say nothing of QRM) it was obvious that the aerial system at G8ON must be as efficient as possible. The first few c.w. contacts showed clearly that the live 44 ft. feeder and 68 ft. top of an antique Zepp tuned against ground (Section ABC in Fig. 1) had had their day, and in a period of rumination a new approach was formed.

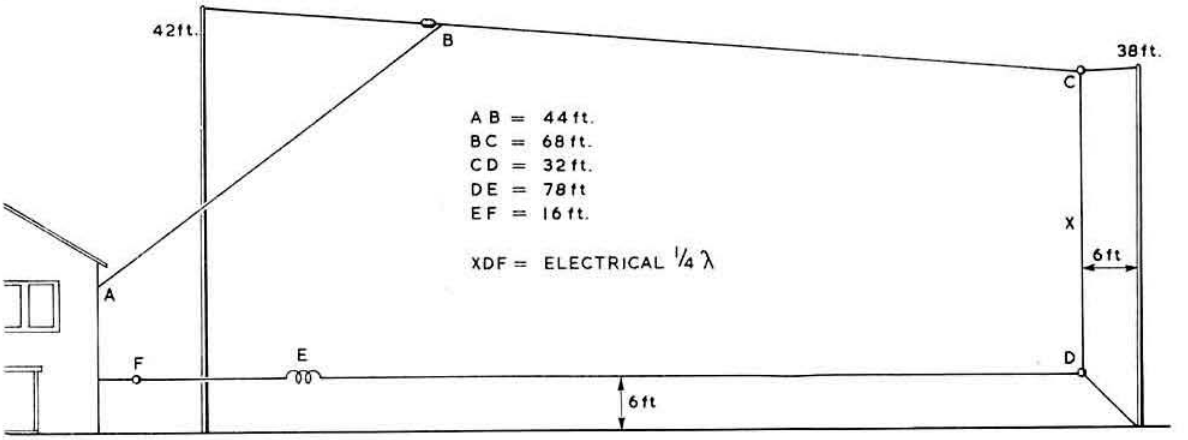


Fig. 1. The G8ON Top Band Special.

Design

The design was based on three premises: (1) that r.f. current in the house is uselessly radiated, and in the earth lead (unless resistance is ideally low) it is converted into heat; (2) that current in a vertical wire produced a more fade-free radiation than that in a horizontal aerial, and that (3) the " middle cut " out of a half wave aerial would do nicely if it could be detached, hung on a remote pole and properly excited.

The first consideration requires that at the transmitter-earthlead end the current into the aerial should be as small as is convenient. This implies a system either somewhat short of, or somewhat in excess of, a half-wave. Such an aerial, fed at a point of very low current, would require a high impedance matching circuit. The pi-network would be suitable provided the output impedance, though high, is appreciably lower than that of the valve to which it is matched.

By encroaching on neighbouring gardens no doubt a half-wave would have been feasible, but it would not have been vertical at the centre. A so-called dipole would have been possible, but there are few real ones on Top Band. The fact that the centre has an impedance far below 40 ohms at any reasonable mast height causes a mis-match at the feeder junction which, in the writer's opinion, causes them to become capacity coupled T aerials instead of link coupled dipoles in the majority of cases. Past experiments at G8ON had painfully pointed this out, for at a centre 38ft. from the ground an impedance of the order of *seven* ohms was measured, fed by a 52 ohm cable! The dipole, then, was out.

It then occurred to the writer that if the section ABC in Fig. 1 were continued down the remote mast and back up the garden under the original top until the correct amount of wire were laid out, a near half-wave could be accommodated within his own premises (Fig. 1). By suitable choice of lengths the region carrying the maximum current would be the vertical section CD descending from the original aerial at its remote end. From the time this alteration was made fairly regular S7 to S9 phone signals were reported from Guernsey, the first occasion being before dark on an August evening.

The originally rather hopeful assumption that most radiation would take place from the vertical portion appears to be borne out by the facts that (a) the local signal is not particularly strong and it sometimes fades, (b) the signal at 150 miles plus is usually reported as either fading less than most stations of like distance heard by the reporting station, or not fading at all. This suggested that the angle of maximum radiation had been reduced below that normally attainable with a pole height of only 40 ft.

Theoretical Considerations

An examination of the theoretical current distribution around the wire shows that the two horizontal portions are excited approximately in antiphase.

In view of the small r.f. current at the transmitter (on the " design centre " frequency of 1835 kc/s it is well below 100 mA) and the relatively small output capacity of the pi-network feeding it (80 to 200pF according to frequency) the writer suggests that this small tuning capacity, the aerial self inductance, and the capacity of the aerial to earth, may well form a second pi-network in which a rather efficient energy transfer takes place (Fig 2). As it is difficult to measure separately the self-inductance of an aerial, the capacitance to earth was measured to see whether the above theory could

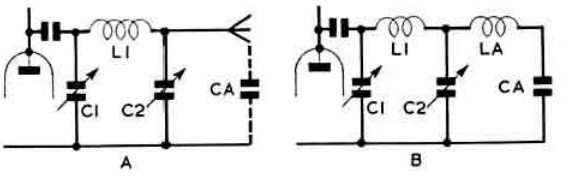


Fig. 2. Pi-network equivalent circuits of the aerial inductance and capacitance.

* 25 Raines Avenue, Worksop, Notts.

possibly be correct. A measurement made by the substitution method using a dynatron oscillator, an r.f. choke (as inductor) and a calibrated condenser, suggested an aerial-earth capacitance around 470pF. (In using this method care must be taken to use a low r.f. to eliminate in some degree the effect of the aerial inductance, and when setting up the oscillator to ensure that the swing of the calibrated condenser from which the difference readings are taken does not produce beats in the i.f. stages which can be confused with the wanted signal). A check was applied by using an RC bridge connected between aerial and earth, which gave a rather broad reading around 510pF. Any reading of this order would of course make the theory of the second coupled circuit at least not untenable.

It is also noted that shifting the transmitter frequency to 1980 kc/s (a) diminishes somewhat the " DX " signal, (b) increases the local signal and (c) increases the aerial current to about 200 mA at the transmitter. It has been shown that rather better results are obtained by the use of a somewhat larger value of inductance in the pi-network than is normal in Top Band circuits, but the optimum value must be found experimentally, as no formula for calculating the increased value of inductance in the general case has manifested itself to the writer.

At most frequencies between 1·8 Mc/s and 2 Mc/s the ratio of the capacitances C1:C2 lies between 2:1 and 3:1. Allowing for the increased loading effect at the design frequency this indicates an aerial impedance at the transmitter of about 2·5K ohms to 3·3K ohms throughout the frequency band.

At this stage in the theoretical appreciation the writer felt the need of a second opinion as to whether the good results being consistently obtained could be adduced to any other cause than the layout adopted, and it was with no small pleasure that G6CJ's confirmation was received. He pointed out that the horizontal sections would not only act as open circuited feeders of about $\lambda/16$, but that the radiation from the electric field would behave much as if a " current sheet " were re-inforcing the radiation from the vertical section. Further, the need for a good earth was greatly reduced by the presence of the lower horizontal section, which had the result of raising the effective height of the vertical section further above ground. Since the greater proportion of the energy was radiated from the vertical section a low wave angle would be attained, resulting not only in better signal strength at a distance, but also reducing fading. However, G6CJ pointed out that an output impedance of a few hundred ohms was sufficient to reduce losses in the earth connection to a worthwhile extent, and would normally make an aerial system easier to feed. This would require, at the writer's station, a somewhat shorter section replacing ABC (Fig. 1) and in some locations this may well be convenient, though not possible in the writer's case.

Another suggestion by G6CJ was that the lower horizontal section should be converted to a multi-wire fan, which should reduce ground losses even further. This has not yet been tried.

Layout

The dimensions of Fig. 1 (which do not seem to be very critical) indicate that this design fits into a normal suburban garden, and hangs from poles of normal height. An analysis of the current distribution, however, shows that over mast heights likely to be met in amateur practice, radiation is nearly proportional to the length of the vertical section CD, i.e. the signal is proportional to pole height minus six feet. The centre X of this section is to be the region of maximum current at the design frequency and should therefore be $\frac{1}{4}\lambda$ distant from the " loose " end, F. Since the effect of ground a few feet below it will have some effect on its length however, it may be cut to $\frac{1}{4}\lambda$ and then pruned, watching an ammeter in the centre of the vertical section, for maximum current.

At the writer's station the lower leg could not well be made long enough and a loading coil E (32 turns, 2 × 3½ in.) was incorporated. This, too, is not very critical. There seems no reason why a larger coil, along with a smaller " counter-balance " in the top section, should not permit of use in a much shorter garden. These coils should of course be trimmed with a view to maximum current at the centre of the vertical section—the theme-song with this type of aerial.

Presumably, by transposing those wires above and below the current centre (that is, by installing it upside down) the system could be fed from a ground floor location, but the " feed " horizontal would now have greater capacity to earth than the " return " horizontal, which would apparently require the former to be shortened and the latter, perhaps, loaded. Presumably, also ,the effect of increasing the length of each horizontal by $\lambda/2$, if space were available, would be beneficial. The writer has had no opportunity to try out these presumptions.

Results

The original objective (the link with Guernsey) has been maintained for nearly twelve months, principally on phone, resort to c.w. normally being necessary only on account of non-amateur QRM. Signal reports vary between S7 and S9 plus 20db. All British prefixes and five continental countries have been contacted every time they have been called, with a minimum report of RST559 outside the British Isles, but more usually S7 or better, even when the path was not dark. Less than two per cent of all stations called failed to reply first time, whether British or overseas. The writer is quite aware that others can claim equal or better results, but thinks that very few are able to do so with the space restriction here imposed, and the aerial seems to compete with systems needing twice its length and height on at least equal terms. Neither the geology nor the topography of the district could reasonably be said to assist; rather the contrary.

Use on 3·5 Mc/s

Quite in what way the array behaves on this frequency is a mystery to its owner, but it certainly does. Originally, a 3·5 Mc/s coil plugged in in place of the 1·8 Mc/s pi-tank (the ratio of capacitances being nearly unaltered) converted the 10 watt p.a. (6L6G) to a doubler. With this not very efficient set up, a (c.w.) " CQ DX " at 0700 one Sunday morning raised W1BCN for a first attempt.

Since then, several British phone stations have been worked on 3·5 Mc/s, and reports have generally been very satisfactory in view of a power disparity usually of around ten to one, most reports being S7 or better, and usually little if any worse than the report given. Again fading seems to be reduced.

BCI—A Warning

For some reason this curious set-up produces BCI with a smaller percentage of modulation than its owner had previously experienced, and in the initial tests G8ON was heard by his neighbours for the first time.

* * *

Finally, the writer gratefully acknowledges the assistance and encouragement given by " Dud " Charman (G6CJ), with whose kind permission liberal quotations from his notes have been included.

Classification of Electronic Tubes

MULLARD LTD. have recently issued a new coloured wall chart *Classification of Electronic Tubes* which replaces the earlier *Relationships* chart. The presentation is clearer and more interesting.

The chart covers high vacuum tubes, such as magnetrons and picture tubes, and gas filled tubes such as thyratrons and trigger tubes.

A copy of the chart can be obtained on application to Mullard Educational Service, Mullard House, Torrington Place, London, W.C.1.

Mobile Column

BY JOHN A. ROUSE (G2AHL)*

EARLY in 1957 it looked as though mobile rallies which had proved so popular in the previous two years would disappear from the Amateur Radio scene owing to the rationing of petrol. However, the highly successful New Forest Rally, soon after rationing ended, proved that the idea was still popular but with only the West Kent Amateur Radio Society's rally at Tunbridge Wells on September 15 on the calendar it showed little sign of spreading.

It was on the return trip from the New Forest that the idea of holding a rally at one of the stately homes was first conceived but before Woburn Abbey could be visited to make the necessary arrangements, G4DC telephoned Headquarters to say that Harlow and District Amateur Radio Society had arranged to hold its first Grand Mobile Rally and Hamfest on September 1. Suddenly the programme looked very full indeed but the chance to hold a meeting in such perfect surroundings as Woburn Park seemed too good to miss. *Flash!* The Harlow Rally was the largest ever.

Those of us who live in the South East and the South Midlands have little to complain about in the way of activities this month. But one question seems to stand out a mile: why is it that mobile rallies do not seem to have caught on in the North? Is it that mobile enthusiasts live only in the Midlands and South? Or is there some other reason?

B.R.S. 20332 says that a mobile meeting is held on Highgate Common, 10 miles from Dudley and 13 from Wolverhampton *every* Sunday evening, weather permitting. Those who attend include G3LGL, G6WF, G3BJF, G8SF and B.R.S. 21178. This seems an excellent idea and we wonder whether there are any similar regular meetings in other parts of the country.

A Word of Warning

G2BCX, who has just completed 6,000 miles of mobile operating in a 1934 Morris Minor, recently pulled into a filling station with his transmitter on. The aerial current suddenly disappeared, a grim reminder that the car body, being insulated from ground, could quite well be " hot " with r.f., especially at the higher frequencies. As he so rightly points out, there is therefore every possibility of sparks occurring when the earthed petrol filling pipe makes contact with the car. The danger is obvious, the remedy simple: switch off all radio equipment when getting petrol just as you do the engine. *Switch to safety!*

Still on the subject of safety, how many users of long whips have checked them to see that they do not sway dangerously? Even a thin aerial moving at speed could do considerable harm to pedestrians or other vehicles if it hit them. In one case recently reported, a 16 ft. whip not only sloped backward but swayed from side to side well beyond the limits of the car's width! So far as is known it caused no damage but it could clearly act rather like a scythe in a crowded street.

Mobile Aerials

On 2m G8KW/M uses a half-wave horizontal dipole a half-wave above the roof of the car and believes that it is considerably more effective than the quarter-wave vertical or half-wave halo. As proof of his contention he quotes the following contacts made from high ground near Weymouth, Dorset: G3DLU (Sheffield), G3JWQ (Derbyshire), GC3EBK (Guernsey), GW8UH (Cardiff), G3JXN (Leicester) and G6OX (Hampton Court). An impressive list which certainly seems to support G8KW's views. G2AHL/M concedes that the ordinary half-wave horizontal dipole has considerable advantages over the 19 in. vertical but is finding the halo highly satisfactory. The views of other 2m mobileers on the subject of the most suitable aerials would be useful.

An interesting possibility is a roof-mounted Yagi which would provide a fair amount of gain. The obvious disadvantage of this type of array is its sharp directivity, resulting in the beam having to be turned every time the car changes direction or goes round a corner, an impossible task for the operator to carry out himself. The ideal is some arrangement whereby once the aerial is set up for a particular direction it stays on the same bearing irrespective of the way the car is travelling. Ex-government gyroscopes suitable for the job are available quite cheaply from Proops Bros. Ltd., and it is believed that some aerials controlled by them are already in use.

Yet another interesting idea is put forward by B.R.S. 20960, who would like to know whether any member has tried applying positive feedback to a loading coil to improve its Q, somewhat on the principle of the Q multiplier.

Woburn Abbey Mobile Rally

Arrangements for this rally to be held on Sunday September 29 are now complete and details will be found elsewhere in this issue. The control stations will be G3BZG/P on 1·8 Mc/s (operated by Douglas Findlay, G3BZG, and Bob Newland, G3VW) and G3FZL/P on 144 Mc/s (operated by members of the Crystal Palace and District Radio Society).

An innovation on the distaff side will be a number of " hostesses " who will be ready to welcome YLs, XYLs and Junior Ops. and to provide them with information on everything there is to do and see including the magnificent State apartments, the Chinese Dairy, the Sculpture Gallery, and the park in which roam more than 2,000 animals, including deer, European and American bison and wallabies. Rain or shine there will be plenty to do.

No prior notification is required of members' intention to attend the rally of course but if sufficient people like to book their lunches in advance by sending a remittance to the writer, for the total cost of the meals ordered (at 6/- per person), it will be possible to arrange for a private room. In any case, those who care to book will have seats reserved for them with the rally party.

When members arrive at Woburn Park, they will find that the roads are sign-posted so that cars travel one way only but in front of the Abbey itself members should turn left off the main (park) road, following the A.A. signs up the drive to the Abbey (i.e. past the " No Entry " and " Private Area " signs), turning sharp left up the hill to the rally area before reaching the main building. Failure to follow the special signs will result in travelling several extra miles!

On arrival members are asked to leave their QSL cards (with details of their mobile equipment, if any, written on the back) at " Reception."

* * *

With interest in mobile work on the upswing again and the possibility of plenty of DX on the higher frequency bands, notes and news for the next *Mobile Column* will be greatly appreciated. As always, technical tips, descriptions of gear and advice on how to get better results are particularly required. See you at Tunbridge Wells on the 15th and at Woburn on the 29th.

* *Deputy General Secretary.*

Models Controlled by Radio

THE Post Office has announced that 2,000 licences have now been issued in the United Kingdom for radio controlled models such as aircraft, boats and cars, etc. These licences, which cost £1, remain in force for a period of 5 years.

Radiations from Outer Space

BY G. ELLIOTT, B.Sc., A.R.I.C. (G3FMO)*

WITH the current interest in the I.G.Y., it is interesting to discuss other ways in which the radio amateur can participate in present day work on geophysics and astrophysics. An obvious field is that of Radio Astronomy. Since Jansky first detected the radio noise from outer space, a large number of discoveries have been made and observations taken on many different wavelengths, ranging from 600 metre waves at one end of the scale, to the 21 centimetre hydrogen emissions at the other end. Both the stars and the planets of the solar system have been found to provide sources of noise on various frequencies.

By analogy with the situation in the field of radio communication, it would not be right to expect the amateur to compete with the big laboratories and their giant radio telescopes in their own particular field of work, but undoubtedly there are certain limited and specialised observations which can be made. The past history of Amateur Radio contains many examples of pioneering communication on higher frequencies, new ideas in circuitry and ingenious new aerial systems. Likewise, amateur astronomers have made original observations of comets, and of changes on the surface of the Moon and planets. A notable example was the first observation of a new spot on Saturn by the late Will Hay.

Stellar Sources

Considering the limitations in the size of aerial systems, it will be best to concentrate on the more powerful noise sources. Three notable sources among the stars are listed as Cassiopeia A, Cygnus A and Sagittarius A and are found in the constellations with those names. These sources are subject to irregular fluctuations which are not fully understood, although some variations are believed to be produced by the ionosphere. The radiations usually cover a very wide band, and so the frequency used for observation is not critical. 250 Mc/s has frequently been used, and Kraus and Ko [1] have prepared a map of the sky at this frequency. Priester [2] has observed the Sagittarius region on both 250 Mc/s and 400 Mc/s. The Sagittarius source is believed to be the nucleus of our own galaxy, of which the Sun is a component star. The Cygnus A source has been identified by the 200 inch reflector telescope at Mount Palomar as being two distant galaxies in collision. The radio frequency energy emitted by this source is very much greater than the energy emitted in the form of light. The frequencies used for observation are largely determined by the equipment available and on individual ideas on aerial design or the space available for aerial erection. Many observations have been made in the 70 to 90 Mc/s region.

From the published values of the energy arriving from a source such as Cassiopeia, one can calculate the field strength available at various frequencies, and this ranges from about 2·5 microvolts per metre at 2 metres (150 Mc/s.) to about 3 microvolts per metre at 15 metres (20 Mc/s), for this source. Assuming the receiver has an r.f. stage with a bandwidth of about 2 Mc/s and a fairly good noise factor of about 4db, there will be a receiver noise level in the region of 2·5 microvolts. If the aerial gain is 10db, a signal of 9 microvolts will be available. It should therefore be fairly easy to observe such a source on a good v.h.f. receiver.

Planetary Sources

To return nearer home, some very interesting radiations have recently been observed from the planets Jupiter and Venus. A number of observers have reported on the Jupiter source. Shain [3], working on 18·3 Mc/s, observed bursts of noise with durations of one minute or less. These appeared to vary with the rotation of the planet and were probably being radiated from a small area on the surface. The Carnegie Institution of Washington [4] reported bursts, resembling static, on 22 Mc/s, which were emitted on about one day in every three. Burke and Franklin [5] found no correlation with rotation period or solar activity, and decided that most of the radio energy was concentrated on frequencies lower than 38 Mc/s. There appears to be no significance in the exact frequencies quoted and the observers have simply chosen convenient frequencies, which were as low as possible to receive the maximum amount of energy. The concentration of the energy from this source on Jupiter at low frequencies suggests that it is some sort of electrical storm radiation.

A more mysterious radiation was picked up from Venus by Kraus [6] on 11 metres. He first observed burst-like signals, with durations of one second or less, lasting for periods up to 12 hours, and decided that lightning discharges might be responsible. Later [7], however, he observed a second class of signal of a more sustained nature, lasting more than one second. These signals had a bandwidth of only 2 Mc/s and had superimposed a.f. modulation. Modulation frequencies of 15, 60, 125 and 150 c/s were noted. While the observers at that stage did not wish to suggest that such signals were not of natural origin, they admitted that a very complicated mechanism would be needed to explain their generation. The signals had little resemblance to those originating from a lightning discharge, and when first heard were nearly mistaken for an interfering radio-telegraph station. More observations by Kraus [8] showed that the phenomenon was even more complex, but gave little help in deciding the exact origin or mechanism of the radiations. It was noted that the signals followed after large solar eruptions or flares. At one period similar signals were obtained from the direction of the Moon, but not coinciding exactly with its position, and it was thought possible that these were being reflected or refracted by a large ion cloud associated with the lunar body. It was suggested that a cloud of ionised particles, ejected from the Sun, may have been responsible for initiating the signals from Venus and later caused the signals associated with the Moon. Obviously, much more study is required to enable these strange radiations to be explained.

It should not be difficult to pick up these planetary signals on a good communication receiver and a directional beam. The very strange nature of the signals from Venus makes them an ideal subject for amateur observation and study. The wavelength is also convenient, and an average 10 metre beam will probably work sufficiently well for preliminary observations. Venus is normally very close to the horizon when visible, which is favourable for normally mounted beams, and requires no tilting of the assembly.

When observing on the lower frequencies one has, of course, to bear in mind the possible interfering effects of the ionosphere, and in the range 20 to 30 Mc/s observations should be made when the 21 Mc/s and 28 Mc/s bands appear to be dead for communication purposes. For this reason, the peak of the sunspot cycle is not the ideal time for observations, but no doubt useful work can be done by a careful choice of times.

Radio Echoes of Long Delay

There seem to have been few reports of radio echoes of long delay in recent years, but these aroused great interest when they were first observed by Hals in 1927. The investigations of Störmer [9], in collaboration with many other workers, showed that echoes might be delayed up to 30 seconds from the time of transmission of the original signal,

* *3 Sandgate Avenue, Tilehurst, Reading, Berks.*

corresponding to reflection at a distance of about 3 million miles. The intensities of the echoes were sometimes as great as one third of the intensities of the directly received signals, but more commonly were about one tenth as strong. Störmer showed that these echoes were most readily received during the period of the equinoxes, when the Sun stood over the equator of the Earth. He suggested that the signals were reflected from an electron shell, which extended around the Earth, far out into space, in the shape of a toroidal ring. The period during which most of this work was done was around the time of the sunspot maximum of 1928, which, however, was a less intense maximum than those of 1937 or 1947. An interesting summary of the early work is given in Stetson's book [10]. So far as the author is aware, no correlation between the occurence of echoes and the sunspot cycle is known, and it seems that the present time would be a suitable period to keep watch for this phenomenon of Störmer echoes. The original work was done on frequencies of 10 to 12 Mc/s, and observations on the 14 Mc/s or 21 Mc/s bands might produce interesting data.

In this work, close co-operation with interested amateur astronomers would be a great advantage. For locating the constellations, a number of books on popular astronomy are available. The author has found the Philips " Planisphere " a very useful little device for showing the position of the main stars at any time of the day during the year. Ex-service Star Identifiers are still available from the surplus stores. The positions of the planets each month are given in Whitaker's Almanack and information is also published monthly in *Nature*.

It has not been possible to cover any of the topics in great detail in this short article, but it is hoped that it may arouse some interest in the strange radiations from outer space. A few references are given, for those interested in reading more about the subject from the original reports.

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[3] Shain, C. A. *Nature*, Vol. 176, p. 836 (1955).
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[6] Kraus, J. D. *Nature*, Vol. 178, p. 33 (1956).
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[7] Kraus, J. D. *Nature*, Vol. 178, p. 159 (1956).
[8] Kraus, J. D. *Nature*, Vol. 179, p. 371 (1957).
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[10] Stetson, H. T. "*Earth, Radio and the Stars*," McGraw-Hill.

New R.I.C. Secretary

MR. G. R. Campbell has been appointed Secretary of the Radio Industry Council in succession to Mr. R. P. Browne who has retired through ill-health. Mr. Browne was awarded the O.B.E. for his work in connection with the training of technical personnel during World War II. His successor became assistant secretary in 1940 of the Radio Manufacturers' Association (an organisation which was succeeded by the R.I.C.), after a number of years in industry.

Representation

THE following is an addition to the list of County Representatives published in the December, 1956, issue.

Region 9—Devonshire B. C. Munro (G3FLK), 43 Prospect Park, Exeter.

Council Proceedings

Résumé of the Minutes of the Proceedings at a Meeting of the Council of the Radio Society of Great Britain, held at New Ruskin House, Little Russell Street, London, W.C.1, on Monday, July 22, 1957, at 6 p.m.

Present: The President (Mr. D. A. Findlay, in the Chair), Messrs. W. H. Allen, C. H. L. Edwards, K. E. S. Ellis, J. H. Hum, W. H. Matthews, W. R. Metcalfe, A. O. Milne, L. E. Newnham, John Clarricoats (General Secretary) and John A. Rouse (Deputy General Secretary).

Apologies: Apologies for absence were submitted on behalf of Messrs. H. A. Bartlett, F. Hicks-Arnold and W. A. Scarr.

Absent: Messrs. R. H. Hammans and H. W. Mitchell.

* * *

Reports of Committees

Exhibition

Resolved to accept recommendations of the Committee with respect to (*a*) the Society's participation in the National Radio Show, Earls Court, (*b*) the appointment of Mr. F. F. Ruth (G2BRH) as Manager of the Society's stand at the National Radio Show and at the Radio Hobbies Exhibition.

Technical Committee

Resolved to accept recommendations of the Committee in respect to the Norman Keith Adams Prize, the Bevan Swift Memorial Premium and the Louis Varney Trophy (the Technical Committee's recommendations were referred to on page 81 of the August 1957 issue—EDITOR).

Concern was expressed at the statement made in the Report that it would be quite impossible to publish the *Amateur Radio Handbook* in December, 1957. It was explained that up to June 20, 1957, drafts of six chapters had been received but some would require extensive editing. Partial drafts of seven further chapters had been received. Drafts of the remaining ten chapters had not been received.

It was agreed that the President and Mr. Hum should arrange to meet the General Editor of the *Handbook* (Mr. S. K. Lewer) at an early date to discuss the reasons which have caused the delays.

Contests

It was reported that the National Field Day event had been won by the Slough Group with Bristol in second and Cambridge in third place.

R.A.E.N.

It was agreed to authorize the Committee to organize a Rally on September 8, 1957.

V.H.F.

Resolved to accept recommendations of the Committee with respect to (*a*) decisions reached at the recent Conference of Region I V.H.F. Managers, (*b*) the holding of an International V.H.F./U.H.F. Convention in London during May 1958, (*c*) I.G.Y. activities.

It was agreed that the I.G.Y. Co-ordinator (Mr. G. M. C. Stone) should have a direct line of communication with the Council.

(The decisions reached at the recent Conference of Region I V.H.F. Managers were referred to by the Society's V.H.F. Manager (Mr. F. G. Lambeth), on page 79 of the August 1957 issue—EDITOR).

Report of the General Secretary

Membership

Resolved (i) to elect 47 Corporate Members and nine Associates; (ii) to grant Corporate Membership to one Associate who had applied for transfer.

It was reported that 56 of the 587 members whose subscription became due on April 1, 1957, became three months overdue on June 30, 1957, and that 13 of the 56 members had written to resign.

It was reported that Mr. J. D. Kay (G3AAE) had, during the 12 months ended June 30, 1957, sent BULLETINS and Society literature to 431 overseas amateurs. In that period a total of 80 applications and subscriptions collected by Mr. Kay had been received at Headquarters.

The Secretary was instructed to thank Mr. Kay for his report and to congratulate him on the success of his drive for new members.

The Secretary submitted a comprehensive report on the membership of the Society as at June 30, 1957. (The information set out in the Report will be published in the Annual Report of the Council—EDITOR.)

R.S.G.B. Certificates and Awards

Further to the matter raised at the previous meeting of the Council the Secretary reported that he had been advised by the Society's Bankers that (*a*) foreign amateurs should experience no difficulty in transferring small sums of money to the Society to pay for the cost of R.S.G.B. certificates and awards provided they make their applications through a bank, (*b*) most banks will render this service even if the applicant has no account.

A.G.M. Venue

Resolved to hold the forthcoming Annual General Meeting of the Society at the Kingsway Hall, Kingsway, London, W.C.2, at 6.30 p.m., Friday, December 13, 1957.

It was considered unlikely that buffet refreshments could be provided.

V.H.F. Managers

Resolved to supply the Society's Journal free of charge to 12 V.H.F. Managers in Region I. (This decision is in accord with a recommendation to National Societies adopted at the recent Conference of V.H.F. Managers—EDITOR.)

Regional Representatives

Resolved to invite all present Regional Representatives to serve for a further period of two years as from January 1, 1958, if elected.

International Meetings

The Secretary reported that the next I.T.U. Radio Conference will open in Geneva on July 1, 1959, and that prior to that date there will be a European V.H.F. Broadcast Conference towards the end of 1958 and a C.C.I.R. Conference somewhere in the western part of the U.S.A. in April, 1959.

The Secretary expressed the opinion that the Society should endeavour to be represented at the European V.H.F. Conference as he anticipated that the whole V.H.F. spectrum will be under consideration at that Conference. He pointed out that the question of I.A.R.U. Representation at the I.T.U. Conference will, presumably, be considered by the Region I Committee.

The information given by the Secretary was noted.

R.F. Allocation Committee

The Secretary reported that on July 3, 1957, the Postmaster General announced in the House of Commons that he had decided to set up a Committee to advise him on the broad aspects of frequency allocation.

The Society had applied to the G.P.O. to be represented on this new Committee.

"*Race for Life*"

Consideration was given to a suggestion put forward by the Kingston and District Amateur Radio Society that the

Society should purchase a copy of the film *Race for Life* and loan it to Groups and Clubs.

After considering an offer from the distributors of the film it was agreed to take no action on the suggestion.

Region 9 Representative's Report

A report from the Region 9 Representative (Mr. W. J. Green) covering the quarter ended June 30, 1957, was submitted and the contents noted.

National Convention

A letter from the Region 2 Representative (Mr. J. R. Petty) was submitted in which it was stated that members of the Scarborough R.S.G.B. Group were prepared to organize a National Convention in that town during 1958.

Mr. Metcalfe agreed to invite the Group to submit a more detailed proposition for consideration at the August meeting.

The meeting closed at 8.35 p.m.

Society News

Election of Council 1958

IN accordance with Article 55 of the Society's Articles of Association the Council have nominated the following Corporate Members to fill the vacancies in the Governing Body which will occur on December 31, 1957:

President:	Mr. L. E. Newnham, B.Sc. (G6NZ).
Executive Vice-President:	Mr. W. R. Metcalfe (G3DQ).
Honorary Treasurer:	Mr. K. E. S. Ellis (G5KW).
Ordinary Member:	Mr. F. G. Lambeth (G2AIW).

Not later than October 24, 1957, any 10 Corporate Members may nominate any other Corporate Member to serve on the Council by delivering their nomination in writing in a single document to the Secretary, together with the written consent of such nominee to accept office if elected but each such nominator shall be debarred from nominating any other person for this election.

Zonal Representatives

NOT later than October 24, 1957, any 10 Corporate Members resident in Zones C, D, E and F may nominate any other duly qualified Corporate Member to serve as a Zonal Representative on the Council by delivering their nomination in writing in a single document to the Secretary, together with the written consent of such nominee to accept office if elected, but each such nominator shall be debarred from nominating any other person for this election. Candidates for Zonal Representative must be resident within the Zone for which they are nominated and the nominators must be resident in that Zone.

The Zones concerned in the forthcoming election comprise the following Regions:

Zone	Regions
C	5, 7, 8
D	6, 9
E	10, 11
F	12, 13, 14, 15

The present Zone C Representative (Mr. W. H. Matthews, G2CD), the present Zone D Representative (Mr. W. J. Green, G3FBA) and the present Zone F Representative (Mr. E. G. Ingram, GM6IZ) are eligible for re-election. The office of Zone E Representative is at present vacant.

Council Ballot

NOTICE is hereby given that at the Ordinary Meeting of the Society to be held at the Institution of Electrical Engineers, London, on Friday, November 1, 1957, the members present will be asked to choose two or more scrutineers for the purposes of the Council ballot, should a ballot become necessary.

Radio Hobbies Exhibition

MEMBERS are invited to submit all types of home-built equipment for display on the Society's stands at the Radio Hobbies Exhibition to be held in London from October 23 to 26, 1957. A Silver Plaque will again be offered for the best example of home constructed equipment exhibited.

As an encouragement to members living outside the London area, three members of the Exhibition Committee are offering prizes of £10, £5 and £2 10s., for the best items shown by members resident outside Region 7. The Committee know that a great deal of fine equipment exists in the provinces which has not been seen at Amateur Radio exhibitions in the past but they hope that there will be considerable response from members on this occasion.

Offers of equipment for display should be sent to the Exhibition Committee, Radio Society of Great Britain, New Ruskin House, Little Russell Street, London, W.C.1, as soon as possible.

All equipment loaned will be insured by the Society while at the Exhibition and in transit to and from the Exhibition.

Volunteers to man the Society's stands are also required. Offers should state the days and times available.

GB2RS—New Schedule

FROM September 29, 1957, the R.S.G.B. News Bulletin will be radiated on frequencies in the 7 and 144 Mc/s bands in addition to the present 3·5 Mc/s transmission.

The new schedule will be as follows:

3600 kc/s	Sundays, 10 a.m. and 12 noon.
7100 kc/s	Sundays, 10.15 a.m. and 12 noon.
145·5 Mc/s	Sundays, 12 noon (beaming north from Well Hill, Kent).
	Sundays, 12.15 p.m. (beaming west from Well Hill, Kent).

It is hoped that the new transmissions will enable considerably more members to hear the News Bulletin satisfactorily. The call-sign will be GB2RS in all cases.

High Power V.h.f. Licences for the I.G.Y.

THE response to the notice in the June issue regarding the possibility of a limited number of high power licences being issued for v.h.f. experiments during the I.G.Y. has been extremely poor.

The scheme to be put forward to the Post Office for consideration is for the investigation of tropospheric scatter requiring stations at a considerable distance from one another. For this reason it is important that the stations should not all be in one area. As the volunteers who have so far come forward are all within about 100 miles of London, further volunteers living in Northern, West and South-west England, Scotland and Northern Ireland are required to enable the scheme to operate satisfactorily. Applications are therefore invited from members resident in those areas who wish to be considered for high power licences, and should be addressed to the I.G.Y. Co-ordinators, Radio Society of Great Britain, New Ruskin House Little Russell Street, London, W.C.1.

Civil Defence in Devon

IN a letter to the President, the County Civil Defence Officer for Devon, Brigadier L. A. Spencer, O.B.E., states that volunteers are required to join the appropriate section of the Civil Defence Corps where knowledge of radio maintenance work would be of value. The Corps is being issued with static and mobile wireless sets by the Home Office. Volunteers are also required to help man the signals offices which are part and parcel of all control centres.

Members living in Devon who are interested in joining Civil Defence should write direct to Brigadier Spencer at Civil Defence Headquarters, Middlemoor, Exeter.

London Meetings

THE following programme of meetings and lecture meetings has been arranged:

September 27, 1957	"Trends in Aerial Design for the Amateur," by S. Kharbanda, A.M.Brit.I.R.E., Assoc.I.E.E. (G2PU), Labgear (Cambridge) Ltd.
November 1, 1957	"Microwave Link Equipment," by S. Korytko, Transmission Division, Standard Telephones & Cables Ltd.
November 29, 1957	"Some Aspects of Atmospheric Radio Noise," by F. Horner, M.Sc., A.M.I.E.E. (D.S.I.R. Radio Research Station).
December 13, 1957	Annual General Meeting at Kingsway Hall, Kingsway, London, W.C.2.
January 24, 1958	Presidential Address followed by a lecture "The Human Machine as a Radio Operator," by F. J. H. Charman, B.E.M. (G6CJ).
February 14, 1958	"The TVI Problem," by G. A. Bird, G4ZU (Radio Group, London Regional Headquarters, G.P.O.).
March 21, 1958	"The Junction Transistor and its application to Short-wave Radio," by E. Wolfindale, B.Sc., A.M.I.E.E. and L. E. Jansson (Mullard Radio Valve Co. Ltd., Southampton).

The meeting on September 27 will be held in the E.L.M.A. Lecture Theatre, which is reached by lift from the Institution of Electrical Engineers: all other meetings, except the A.G.M. will be held in the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2. Meetings will commence at 6.30 p.m. Buffet tea from 6 p.m.

Radio Amateurs' Examination

THE question paper set by the City and Guilds of London Institute for the Radio Amateurs' Examination on May 10, 1957, was as follows:

***Eight** questions in all are to be attempted, as under:*
***All four** in Part 1 (which carry higher marks) and **four** others from Part 2.*

Part 1

All four questions to be attempted from this part.

1. Licence conditions.
   (*a*) State the requirements in respect of the following:
   (i) Log-keeping. What entries should be made?
   (ii) Frequency control and measurement.
   (*b*) (i) What is meant by "shared" bands?
   (ii) Which bands are shared? (*15 marks*)

2. With the aid of a diagram describe an "artificial" aerial. How can an "artificial" aerial be used to measure the power output of a transmitter? (*15 marks*)

3. Describe, with the aid of a circuit diagram, a frequency-stabilized c.w. telegraph transmitter. Comment on the method of keying. (*15 marks*)

4. List various types of interference that can be caused by an amateur transmitter. Describe methods of abating the interference in each case. (*15 marks*

Part 2

Four questions only to be attempted from this part.

5. Describe the construction of a half-wave dipole aerial and indicate a method of coupling it to the transmitter. Show the voltage and current distribution in the aerial and the radiation pattern. (*10 marks*)

6. Describe any one method of checking that a telephony transmitter is not over-modulated. (*10 marks*)

7. Define *thermionic emission* and explain in simple terms how this effect is used in radio valves. (*10 marks*)

8. With reference to wave propagation describe briefly:
   (*a*) skip distance,
   (*b*) ground wave,
   (*c*) the causes of fading. (*10 marks*)

9. What is capacitive reactance? How does it affect the current flow in an a.c. circuit?
   Calculate the reactance of a 200 pico-farad capacitor at a frequency of 7 Mc/s. (*10 marks*)

10. What losses are encountered in inductors carrying high frequency currents?
    State how the losses are kept to a minimum in:
    (*a*) an air-cored inductor,
    and (*b*) an inductor with a core of magnetic material. (*10 marks*)

In his report, the Examiner said that the general standard of the candidates' work was rather lower than in the preceding year. A report on each question follows:

Question 1
Parts *a*(i) and *b*(ii) were satisfactorily answered by the majority of the candidates. In part *a*(ii) an appreciable number of the candidates quoted the old instead of the revised licensing conditions which came into force in June, 1954. In part *b*(ii) few candidates gave a complete list of the frequency bands shared, but it was encouraging to find that most were familiar with the fact that certain bands are shared.

Question 2
The majority of the candidates instead of describing the artificial aerial as a tuned circuit showed it as an untuned circuit consisting of an inductor and a resistor (in some cases only the latter). Under these conditions maximum transference of power would not be obtained. Also in a number of answers the artificial aerial was shown incorrectly connected to the output stage. The second part of the question dealing with the actual measurement of power was satisfactorily answered by most of the candidates.

Question 3
This question was fairly well answered by the majority of the candidates. An appreciable number gave a diagram of only the oscillator stage and omitted the rest of the transmitter circuit. Also a fair number of the candidates who gave the complete circuit diagram did not describe the function of each stage. Many candidates gave incorrect circuit diagrams. The second part of the question dealing with the keying of the transmitter was treated satisfactorily by most candidates.

Question 4
A large number of the candidates, while giving a list of the various types of interference, treated the abatement of the interference in general terms rather than in detail. It was noted that very few gave overloading of the stages as a prevalent source of harmonic generation.

Questions 5 and 8
Well done by practically all candidates.

Questions 6 and 7
Fairly well done by most of the candidates.

Question 9
The first part of the question was satisfactorily answered by the majority of the candidates. This also applies to the formula for reactance in the second part of the question. Quite an appreciable number of the candidates were unable to give a correct numerical solution, while in a number of cases the solution would have been correct if the decimal point had been inserted in the right place!

Question 10
Very few candidates attempted this question and of those who did only a small number gave a satisfactory answer.

Australian Call Book

THE June 1957 edition of the *Australian Radio Amateur Call Book* published by the Wireless Institute of Australia lists the calls of all Australian amateurs licensed up to May 15, 1957. The calls of stations located in Antarctica are listed for the first time under the new VK0 prefix, VK1 now being allotted to Australian Capital Territory (Canberra). The calls of amateur stations in Papua, New Guinea and other islands are also listed.

The Call Book can be obtained from W.I.A. (Victorian Division), C.O.R. House, 191 Queen Street, Melbourne C.1, price 5/-.

Radio Tape Measure

AVELEY Electric Ltd., Ayron Road, Aveley Industrial Estate, South Ockendon, Essex, have produced a pocket tape measure calibrated in inches, centimetres and frequency, corresponding with quarter-wavelengths.

The tape measure was produced first for use with Aveley field strength meters and telescopic aerials but because of demand the company are now offering it generally. The tape measures up to 200 cm. (approx 78¾ in.) and is available from R.S.G.B. Headquarters, price 5/9 post free.

Wireless World Guide to Broadcasting Stations

THE 1957/8 edition contains many hundreds of amendments to information published previously. The tabulated data, checked against measurements made at Tatsfield, gives frequency, wavelength and power of more than 2,000 short-wave stations. In addition 750 long- and medium-wave stations in Europe are listed geographically and in order of frequency.

Guide to Broadcasting Stations 1957-58 can be obtained from R.S.G.B. Headquarters, price 2s. 10d. post free.

The 4OT/5RV Special

GROUP CAPTAIN H. W. Evens (G6CH) suggests that the aerial known as the G5RV Special was, in fact, devised by Mr. H. Kemp (G4OT), of Woodham Walter, near Maldon, Essex.

According to G6CH the top is 102 ft. long, the dipole consists of two 32 ft. lengths of 14 s.w.g. spaced 6 in. apart with polythene spreaders, connected to 52 ft. of 80 ohm co-ax.

Mr. Kemp was first licensed in 1908 as KXH.

Panda Radio Co. Ltd., London Office

THE Panda Radio Co. Ltd. announce that they have removed from Redcliffe Gardens, Kensington, and until other premises are obtained all business will be dealt with by their works at 16-18 Heywood Road, Castleton, near Rochdale, Lancs.

Sunday, September 29, 1957

WOBURN ABBEY MOBILE RALLY AND HAMFEST

Woburn Abbey, Bletchley, Buckinghamshire

(by permission of His Grace the Duke of Bedford)

★ Concours d'Elegance for the most attractive mobile installation.

★ Tours of the Woburn Abbey State Apartments and the Zoo Park (3,000 acres, 7 miles of roads, more than 2,000 animals).

★ Childrens' Playground and Pets Corner.

★ Luncheons*, Teas†, Milk Bar, Picnic Grounds.

RALLY STATIONS

on 1·8 Mc/s—G3BZG/P and 144 Mc/s—G3FZL/P will be on the air from 11.30 a.m.

Entrance to Woburn Abbey and Park—Adults 2/6, Children 1/-. No charge for parking in the special Rally area.

Although no booking is necessary, members intending to be present are asked to write to *Mobile Column*, R.S.G.B. Headquarters, stating the number in their party. In return they will receive further information and a map showing how to get to Woburn Abbey.

The A.A. is erecting special signs within the park and members should follow them carefully.

* Lunch 6/-, † Tea 2/6 and 5/-.

Slow Morse Practice Transmissions

B.S.T.	Call	kc/s	Town
Sundays			
09.00	G3GYV	1900	Hartford, near Northwich
09.30	G3BKE	1900	Newcastle-on-Tyne
10.15	G3FBA	1910	Bath
10.30†	G3DGN / G3GZB	1930	North London
11.00	G2FXA	1900	Stockton-on-Tees
12.00	G3LP	1850	Cheltenham
12.00	G3KAN	1850	Northampton
12.00	G15UR	1860	Belfast
20.30	G3HTA	1850	Exeter
21.00	G2FIX	1812	near Salisbury
22.00	G3ARM	1919	Guildford
Mondays			
18.30	G3NC	1825	Swindon
19.00	G3LMT	1850	Exeter
20.30	G3LSF	1900	Southport
Tuesdays			
18.30	G2FXA	1900	Stockton-on-Tees
20.00	G2FCI	1850	Exeter
20.30	G3GDZ	1905	Kingsbury, N.W.9
21.00	G3EFA	1855	Southport
21.45 †	G3ETP	1875	Lowestoft
Wednesdays			
18.30	G3GCY	1830	R.A.F., Dishforth
19.00	G3HUB/A	1902	Chelmsford
21.00	G3HWI	1987	Blackburn, Lancs
Thursdays			
18.30	G3NC	1825	Swindon
20.00–†...	G2ABR / G3FCY	1919	Hull, Yorks
21.00	G3GWT / G3KTO		
20.30	G3JQM	1878	Barwick, Yeovil
21.30	G3HMY	1850	Exeter
Fridays			
20.00 †	G2FNI / G3EGX / G3ERB	1875	Wirral
20.30	G3ICX	1915	Sutton Coldfield
21.30 †	G3KLZ	1860	Bradford
	G3INW (or G3KSS)		Bradford
	G3KEP		Bingley
22.00	G3KYU	1859	Bournemouth
Saturdays			
13.00	G2FXA	1900	Stockton-on-Tees
21.00	G3HWI	1987	Blackburn, Lancs

† *Alternately.*

Contests Diary

1957-8

September 15	-	D/F National Final[4]
October 5-6	-	Low Power Contest[2]
October 5-6	-	VK-ZL DX Contest (phone)[1]
October 12-13	-	VK-ZL DX Contest (c.w.)[1]
October 26-28	-	*CQ* World Wide DX Contest (phone)[1]
November 9-10	-	Second Top Band Contest
November 16-17	-	Second 70 Mc/s Contest[3]
November 23-24	-	21-28 Mc/s Telephony Contest[5]
November 30 to December 2	-	*CQ* World Wide DX Contest (c.w.)[1]
January 25-26	-	B.E.R.U. Contest

[1] See page 145
[2] See page 144
[3] See page 145
[4] See page 29, July, and page 84, August, 1957.
[5] See page 516, R.S.G.B. Bulletin, May, 1957.

Radio Amateur Emergency Network

BY C. L. FENTON (G3ABB)*

BY the time this appears in print, the 1957 R.A.E.N. Rally will be past, but we are already thinking of the 1958 event, and must shortly be deciding upon a suitable date. The Hon. Secretary will be pleased to hear from those who have ideas for improving it next year.

County Controllers

Slowly, but surely, more County Controllers are being appointed. It is proving a slow task, for few volunteers are coming forward, with the result that individuals are having to be approached one by one, and asked to take on the vacancies. The help which is being given is appreciated, and the committee are grateful to those who have taken on the duties of County or Area Controller, but there are vacancies for many more.

Interest continues to grow amongst the B.R.C.S. County Directors, and more and more requests are being received from them for the names of local County or Area Controllers. All R.A.E.N. officers will by now be aware of the address of their local B.R.C.S. H.Q. It is hoped, in the next few weeks, to distribute a list of addresses of Commissioners of the St. John Ambulance Brigade, thus providing a further contact for future co-operation.

Listening on Top Band, it is most pleasing to note the increasing number of mobiles around, many of whom appear to have their equipment peaked on 1980 kc/s. Before too many become set on this frequency, limited to it by both crystal and fixed loading coil characteristics, it is perhaps as well to mention that 1980 kc/s has been designated an R.A.E.N. *calling frequency*, and it has always been intended that stations should move to an adjacent frequency once contact has been established.

News from the Groups

North-East Scotland. A net is in operation each Monday evening on 3510 kc/s at 19.30 B.S.T. Four mobiles and six fixed stations are now in operation, covering eight counties. More members are required, particularly in Aberdeenshire and Sutherland.

Middlesbrough. A local exercise was held recently, communication being maintained on Top Band phone over the whole area north of Cleveland Hills and as far west as Northallerton. It is hoped to invite the local B.R.C.S. officials to witness an exercise, early in September.

Ilford group is being re-organized under the leadership of Fred Judd (G2BCX) and it is hoped to arrange a meeting in the near future to discuss details.

Derbyshire have been approached by the B.R.C.S. to demonstrate available facilities. Whilst Derby itself and the centre of the county are covered, more assistance is required throughout the other parts of the county, particularly in the Chesterfield and northern areas. Offers of assistance to G3FGY, please.

Wolverton, Bucks, are making further efforts to establish an active group.

Essex held a large-scale exercise, in conjunction with B.R.C.S., on Sunday, August 25. Members throughout the county co-operated in the exercise, which was organized by the County Controller, G8TL, in conjunction with B.R.C.S. Divisional H.Q.

Cannock held a demonstration exercise for B.R.C.S. recently, handling 18 messages plus service messages. Red Cross Cadets assisted. B.R.C.S. officials observing appeared pleased with the results. Participating stations were G2YV (organizer), G2HKS, G3ABG, G3KNB, B. Gallear (all at Cannock); G2HNA, G3ESW, and several others at Stafford; G3DZT, Lichfield A.C., visited.

A **Staffordshire** County Committee has been formed, comprising county officers plus two ordinary members from each group. Meetings will be held every three months.

Norfolk held another exercise with B.R.C.S. and S.J.A.B. at Snetterton Racecourse on July 14. G3LFU/A functioned as Control, assisted by Jim Sutton, with G3HRK/M assisted by G3JNR. The exercise was repeated on July 28 by the combined resources of the Norfolk and North Suffolk members. The following stations participated: G3LFU/A, with Jim Sutton, acted as Control, alongside the S.J.A.B. Mobile Hospital; G3JMU/P, assisted by G3JMX and G3KYH, was located on one of the more tricky bends; G3JYG/M, assisted by a S.W.L., was alongside the B.R.C.S. Mobile Hospital at another bend; whilst G3HRK/M, assisted by G3JNR and Colin Denmark were at the hairpin. G3LKI/M stood by outside the circuit, whilst G3WW/M arrived as a spectator, and offered the use of his equipment if necessary. All stations maintained listening watch throughout, with checks by Control at fifteen-minute intervals, except when actual racing was taking place, when strict radio silence was maintained. The operation lasted for 7½ hours. Numerous messages were passed relating to the disposition of ambulances, personnel, etc. Two accidents during the afternoon's racing involved a further number of messages re-positioning ambulances and personnel, and enabled medical assistance to be provided much more rapidly than would have been the case had not R.A.E.N. facilities been available. During this exercise, which was conducted on 1980 kc/s, G3JHL/A, situated at Chelmsford B.R.C.S. H.Q., was heard by G3HRK/M at R5 and S6/7.

Maidstone report a membership of twenty, and the Area Controller, having completed his move to a new QTH, is preparing to resume his regular nets.

Cambridge. The absence of members in this county is causing some embarrassment, as the B.R.C.S. are anxious for co-operation. The Society's Regional Representative is in touch with B.R.C.S. officials, and it is hoped some progress will soon be made.

Appointments and Resignations

The following have been appointed Area Controllers: J. Speakman (G3GYV), 41 Hodge Lane, Hartford, near Northwich, East Cheshire. R. R. Parsons (GI3HXV), 134 Benmore Drive, Finaghy, Belfast. F. C. Judd (G2BCX), 152a Maybank Road, South Woodford, E.18.

The following have been appointed County Controllers: E. W. Yeomanson (G3IIR), 9 Trewsbury Road, Sydenham, London, S.E.26. J. Wilkie (GD5SF), 10a Finch Road, Douglas, I.o.M. G. A. Partridge (G3CED), 17 Ethel Road, Broadstairs, Kent.

Mr. M. D. Holmes (G3JMC) has resigned as Area Controller for Tankerton, Kent.

* * *

Items for inclusion in the October column should reach the writer not later than September 16, 1957.

CQ RAYNET

ACTING on a suggestion put forward by the R.A.E.N. Committee the G.P.O. have agreed to the use of the prefix " RAYNET " by members of the Radio Amateur Emergency Network.

In order to avoid any confusion with existing calls or possible misunderstanding the G.P.O. suggest that the following procedure should be adopted:

When using radio telephony

" Hello all Raynet stations (repeated) this is G. . . ."

When using radio telegraphy

" CQ Raynet (repeated) de G. . . ."

* *Niarbyl, Gay Bowers Road, Gay Bowers, Danbury, Chelmsford, Essex*

Regional and Town Representation 1958/9

Regional Representatives

THE undermentioned Corporate Members have accepted an invitation from the Council to serve, if elected, in the office of Regional Representative for the period January 1, 1958 to December 31, 1959:

Region	*Name and Call-sign*	
1	B. O'Brien	G2AMV
2	J. R. Petty	G4JW
3	W. A. Higgins	G8GF
4	E. S. G. K. Vance, M.B.	G8SA
5	T. A. T. Davies	G2ALL
6	N. F. O'Brien, F.B.I., A.C.C.S.	G3LP
7	F. G. Lambeth	G2AIW
9	W. J. Green	G3FBA
10	C. H. Parsons	GW8NP
11	F. G. Southworth	GW2CCU

Messrs. L. Hardie, GM2FHH (Region 12), D. R. Macadie, GM6MD (Region 14), and J. W. Douglas, GI3IWD (Region 15), were invited to accept nomination but had to decline for various reasons.

Mr. Davies accepted re-nomination as Region 5 Representation on the understanding that the Council would constitute a new Region (No. 16) comprising the counties of Essex (Outside the London Region), Norfolk and Suffolk, as from January 1, 1958. This the Council has agreed to do. The office of Regional Representative in Regions 8 and 13 is currently vacant.

Not later than October 31 next, any five Corporate Members resident in a particular Region may nominate any other duly qualified Corporate Member resident in that Region for the office of Regional Representative, by delivering their nomination in writing to the General Secretary, together with the written consent of such person to accept office if elected. Each such nominator shall be debarred from nominating any other person for the current election of Regional Representatives.

Town and Area Representatives

Not later than October 31 next, any five Corporate Members resident in a particular Town or Area may nominate any duly qualified Corporate Member resident in the particular Town or Area for the office of Town or Area Representative, by delivering their nomination in writing to the General Secretary, together with the written consent of such person to accept office if elected.

In the case of the City and County of London, Area Representatives may be nominated for groups of Postal Districts. In the case of certain other large towns, Area Representatives may be nominated on a geographical basis, viz.: North Birmingham, South-East Manchester.

Town or Area Representatives will only be confirmed in their appointment if the total membership in the Town or Area they propose to represent is at least 10.

Vacancies

In the event of no nomination being received prior to November 1, 1957, from the Corporate Members resident in any Region, Town or Area, the Council reserves the right to make an appointment.

Ballots

In the event of more than one person being nominated for a particular office a Ballot will be conducted, details of which will be published in the November, 1957, issue of the R.S.G.B. BULLETIN.

Resignations

If for any reason an elected Representative wishes to resign his office he should notify Headquarters who will advertise the vacancy. *Local Members cannot automatically appoint another member to undertake the duties of a Representative who has resigned.*

The Council reserves the right to call upon any Representative to resign his office if, in their opinion, he is considered to be unsuitable or unsatisfactory.

Period of Office

Regional, Town and Area Representatives will hold office for a period of two years as from January 1, 1958.

Regions and Counties

The following is a list of the Regions and Counties (or Districts) forming them:

Region 1 (North Western).—Cheshire; Cumberland; Lancashire (East); Lancashire (West) and the Isle of Man, Westmorland.

Region 2 (North Eastern).—Durham; Northumberland; Yorkshire (East); Yorkshire (North); Yorkshire (West).

Region 3 (West Midlands).—Herefordshire; Shropshire; Staffordshire; Warwickshire; Worcestershire; Birmingham (Postal Area).

Region 4 (East Midlands).—Derbyshire; Leicestershire and Rutland; Lincolnshire; Northamptonshire; Nottinghamshire.

Region 5 (Eastern).—Bedfordshire; Cambridgeshire; Hertfordshire (outside London Region); Huntingdonshire.

Region 6 (South Central).—Berkshire (outside London Region); Buckinghamshire (outside London Region); Gloucestershire (excluding the Bristol Area); Hampshire; Oxfordshire; Wiltshire; the Channel Islands.

Region 7 (London).—London North; London South; London South-East; London South-West; London East; London West.

Notes.—(1) In the London Region the six Representatives concerned are known as District Representatives.

(2) The London Region covers the whole of Middlesex and Surrey and all other territory within 25 miles radius of Charing Cross.

Region 8 (South Eastern).—Kent (outside London Region); Sussex.

Region 9 (South Western).—Bristol; Cornwall; Devonshire; Dorset; Somerset.

Region 10 (South Wales).—Brecknockshire; Carmarthenshire; Pembrokeshire and Cardiganshire; Glamorgan; Monmouthshire and Radnorshire.

Region 11 (North Wales).—Anglesey and Caernarvonshire; Denbighshire; Flintshire; Merionethshire and Montgomeryshire.

Region 12 (North Scotland).—Aberdeen, Banff and Kincardine; Angus and Perth; Moray and Nairn; Inverness, Ross, Sutherland, Caithness, Orkney and Shetland.

Region 13 (East Scotland).—Berwick; Peebles; Roxburgh and Selkirk; East, Mid- and West Lothian; Fife and Kinross.

Region 14 (West Scotland).—Argyll and Dumbarton; Ayr, Bute, Dumfries, Kirkcudbright and Wigtown; Clackmannan and Stirling; City of Glasgow (Postal Area), Lanark and Renfrew.

Region 15 (Northern Ireland).—Antrim; Armagh; Down; Fermanagh; Londonderry, Tyrone.

Region 16 (East Anglia).—Essex (outside London Region); Norfolk; Suffolk.

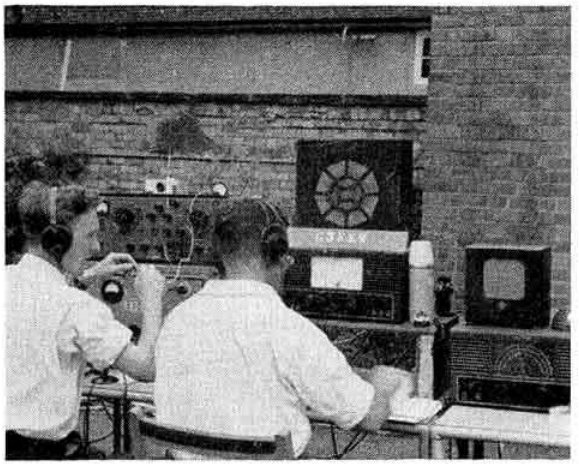
Affiliated Society Representatives, 1958

IN accordance with the announcement published on page 418 of the March 1957 issue of the R.S.G.B. BULLETIN, every society affiliated to the R.S.G.B. is invited to nominate one of its members to serve as an Affiliated Societies' Representative for the year 1958.

Societies who wish to take advantage of this arrangement are requested to forward a nomination paper, duly signed by five members of the society, who are themselves Corporate Members of the R.S.G.B., to the General Secretary so that it arrives not later than October 31, 1957. In the event of more than one person being nominated as the representative of a particular society a ballot will be conducted, details of which will be published in the November 1957 issue of the R.S.G.B. BULLETIN.

Members are reminded that as from 1958 any affiliated Society which has an elected A.S.R. will be permitted to enter for the National Field Day event organized by the R.S.G.B. provided the election of the A.S.R. shall have taken place prior to April 1 in any particular year.

Nominees for the office of A.S.R. must be Corporate Members of the R.S.G.B. A.S.R.s will enjoy the same privileges, and have the same status, as T.R.s.



The station operated by the Amateur Radio Club of Nottingham at Sherwood Community Association's recent garden party aroused considerable interest.

Kilmarnock Hobbies Exhibition

THE Ayrshire Group of the R.S.G.B. are to take part in a Hobbies Exhibition which is to be sponsored by the Rotary Club of Kilmarnock from October 15-19, 1957. An Amateur Radio station will be in operation and R.S.G.B. literature will be available. Further details can be obtained from Mr. Thomas Elliott (B.R.S.10053), 6 Eglinton Drive, Troon, Ayrshire, Scotland.

A Caracas Meeting

PETER NAISH (G3EIX) who recently arrived in Venezuela to install the Radio Valentia television station was met at the airport by Louis Varney (G5RV). After showing him the sights of Caracas, G5RV took him to Valentia which is the centre of the cattle industry on the edge of the great central plains of Venezuela.

Peter Naish is now a television engineer with the Marconi Company. In past years he assisted the Society at the Amateur Radio Exhibition.

South Wales Regional Meeting

SATURDAY, SEPTEMBER 21, 1957

AT THE

PARK HOTEL, PARK PLACE, CARDIFF

Programme

Assemble	**2 p.m.**
Meeting	**2.45 p.m.**
High Tea	**5 p.m.**
Lecture and Raffle Period	**6 p.m.**

Tickets, price 12/6 per head (which includes high tea with alternative menus), available from Mr. E. White, GW3LAD, 41 St. Alban Avenue, Heath, Cardiff. Council will be represented by Messrs. D. A. Findlay, D.F.C., G3BZG (President), W. R. Metcalfe, G3DQ (Honorary Treasurer) and John A. Rouse, G2AHL (Deputy General Secretary).

North Wales Regional Meeting

SUNDAY, SEPTEMBER 29, 1957

AT THE

NANT HALL HOTEL, PRESTATYN

Programme

Assemble	**12 noon**
Luncheon	**1 p.m.**
Photograph	**2.15 p.m.**
Meeting	**2.30 p.m.**
Tea and Draw	**4.30 p.m.**
Disperse	**5.30 p.m.**

Tickets, price 12/6 per head, available from Mr. F. Southworth, GW2CCU, Samlesbury, Bagilt Road, Holywell, Flintshire, not later than September 24, 1957. Council will be represented by Messrs. L. E. Newnham, G6NZ (Executive Vice-President), F. Hicks-Arnold, G6MB (Member of Council) and John Clarricoats, O.B.E., G6CL (General Secretary).

Can You Help?

● J. S. Page (B.R.S. 19944), "Fairhaven," Ashley Drive, Walton-on-Thames, Surrey, who urgently requires a number of tuning variometers of the type fitted to old-fashioned radio receivers?

● K. B. Walker (Associate), 307 Longbridge Lane, Northfield, Birmingham 31, who wishes to know how to build an oscilloscope using a VCR97 tube?

Tests and Contests

Low Power Contest, 1957

THE rules for this event, to be held on October 5 and 6, are the same as for last year except that they are printed in a new sequence which will be used in future for all R.S.G.B. contests.

Rules

1. The contest is open to all fully paid up members of the R.S.G.B. resident in Europe.

2. The contest will run from 18.00 G.M.T. to 23.00 G.M.T. on October 5, 1957, and from 08.00 G.M.T. to 20.00 G.M.T. on October 6, 1957.

3. Contacts with unlicensed stations will not be permitted to count for points. Proof of contact may be required.

4. Entrants must operate in accordance with the terms of their licences. Full details at the top of the entry form must be filled in and the declaration signed, otherwise the entry may be disqualified.

5. Entries must be addressed to the R.S.G.B. Contests Committee, Radio Society of Great Britain, New Ruskin House, Little Russell Street, London, W.C.1, and must bear a postmark not later than October 16, 1957.

6. Entries must be written or typed on **one side only of foolscap** or quarto paper, and must be set out as shown in the example below:

LOW POWER CONTEST, OCTOBER 5-6, 1957

Claimed score.....

Call-sign .....

Name .....

Address .....

County Code Number.....

Transmitter.....Power Input.....watts

Receiver .....

Aerials .....

Declaration: I declare that this station was operated strictly in accordance with the rules and spirit of the Contest, and I agree that the decision of the Council of the R.S.G.B. shall be final in all cases of dispute. I certify that the maximum input power to the final stage of the transmitter was .....watts.

Date ..... Signed.....

Date Time G.M.T.	Input Power	Call-sign of station worked	Report and Serial No. SENT	Report and Serial No. RECEIVED	County Code No.	Points Claimed
5/10						
18.10	0·5	G3XYZ	589001	559002	12	20
18.17	0·5	G3ZYX	449002	449001	17	20
18.24	1·0	G5ZZZ	569003	449005	20	10

Total.....

.....Code areas worked X 20.....

Total claimed score.....

7. An exchange of RST reports and a self-assigned three-figure serial number starting between 001 and 100 and increasing by one for each successive contact plus the county code number will be required before points may be claimed, e.g. 559001 Nr 17. All reports must be acknowledged. Where non-competitors do not give a county code number, this may be inserted provided this fact is indicated on the log sheet.

8. Only one contact may be made with a specific station whether fixed, portable, mobile or alternative address. Duplicate contacts should be logged and clearly marked as duplicates. Cross-band contacts may not be claimed.

9. The system of scoring will be as follows:

Watts input to the p.a. stage	Up to 0·5	To 1	To 2	To 3	To 4	To 5 watts
Points per contact	20	10	5	3	2	1

A bonus of 20 points may be claimed for the first contact with each different county code area, as listed at the end of these rules.

10. Contacts are confined to telegraphy (A1) and only the entrant may operate his station during the contest.

11. At the discretion of the Council of the R.S.G.B., the 1930 Committee Trophy will be awarded to the winner and a certificate of merit to the runner-up.

12. The power input to the transmitter shall not be intentionally varied during any contact. Power input, in watts to the p.a. stage (see also Rule 13) must be recorded in the second column of the entry form at the time of the contact. No preceding stage may have a power input in excess of that to the p.a. If different power is used at various times during the contest, the scoring must be altered accordingly. For the purposes of calculating power input to the p.a., competitors using grounded grid p.a. stages must add 50 per cent of the input power to the stage driving the p.a.

13. A circuit diagram of the transmitter and power supply must be given on a separate sheet, signed by the entrant.

14. All contacts must be made between 3500 and 3600 kc/s.

County Code Numbers

A list of Code Numbers is set out below.

England (G).

1. Bedford	15. Hereford	28. Nottingham
2. Berkshire	16. Hertford	29. Oxford
3. Bucks	17. Huntingdon	30. Rutland
4. Cambridge	18. Kent	31. Shropshire
5. Cheshire	19. Lancashire	32. Somerset
6. Cornwall	20. Leicester	33. Stafford
7. Cumberland	21. Lincoln	34. Suffolk
8. Derby	22. London (Postal Districts)	35. Surrey
9. Devon		36. Sussex
10. Dorset	23. Middlesex	37. Warwick
11. Durham	24. Monmouth	38. Westmorland
12. Essex	25. Norfolk	39. Wiltshire
13. Gloucester	26. Northampton	40. Worcester
14. Hampshire	27. Northumberland	41. Yorkshire

Scotland (GM).

42. Aberdeen	54. Fife	66. Renfrew
43. Angus	55. Inverness	67. Ross & Cromarty
44. Argyll	56. Kincardine	68. Roxburgh
45. Ayr	57. Kinross	69. Selkirk
46. Banff	58. Kirkcudbright	70. Shetland
47. Berwick	59. Lanark	71. Stirling
48. Bute	60. Mid-Lothian	72. Sutherland
49. Caithness	61. Moray	73. West Lothian
50. Clackmannan	62. Nairn	74. Wigtown
51. Dumbarton	63. Orkney	
52. Dumfries	64. Peebles	
53. East Lothian	65. Perth	

Wales (GW).

75. Anglesey	79. Caernarvon	83. Merioneth
76. Brecknock	80. Denbigh	84. Montgomery
77. Cardigan	81. Flint	85. Pembroke
78. Carmarthen	82. Glamorgan	86. Radnor

Northern Ireland (GI).

87. Antrim	89. Down	91. Londonderry
88. Armagh	90. Fermanagh	92. Tyrone

Channel Islands (GC).

93. Alderney	95. Jersey	96. Sark
94. Guernsey		

97. Isle of Man (GD). 98. All Stations outside the United Kingdom.

144 Mc/s Open Contest

CONDITIONS for this year's contest were not good, but even so there were more than 25 QSOs in excess of 150 miles. The result was a thrilling finish by N. H. R. Munday (G5MA) who, with 1768 points from 72 contacts, was only 7 points ahead of P. W. Winsford (G4DC) who had 79. GC3EBK provided a number of stations with a good DX contact, and GI3GXP was worked by GW3GWA/P. Seventeen GM, eight GW, and two F stations were also amongst the 260 known to be on during the contest. The fact that only 30 entered was rather disappointing, and it is to be hoped that more will try their luck next time.

The new scoring system met with mixed reception, some feeling that it was good to break away from the " point per mile," others that it penalized remote stations. Had conditions been better, the scheme might have met with more approval, but all criticism and suggestions will be considered carefully when drawing up the rules for the next event.

The changes this time were made as a result of opposition from some stations to working out the distances for each contact, but if stations in remote areas are to be given a chance it would seem that some bonus for long distance work must be given—and back we come to the cry that the

calculations will reduce entries! If the scheme is to be acceptable to the majority, the Contests Committee must know entrants' views. A few brief remarks with entries—whether you are satisfied or otherwise—would assist considerably. The Committee are grateful for the comments received this time, and hope for more next time.

There was some confusion over the county and country bonuses, as a result of which all entries were re-scored on the same basis, and the final scores may therefore vary considerably from those claimed. The logging of call-signs and reports appeared to be extremely accurate, but the timing of QSOs was most inconsistent, differences varying between a few minutes and over an hour! Some of these may have been due to confusion over B.S.T. and G.M.T., but in many cases it seemed to be just poor guesswork!

G5MR was unfortunate in having a break in his transmission line, whilst GM4HR/P missed the opening to Northern England whilst being entertained by a local ham Most seem to have had an enjoyable contest—so here's to next time!

G2CD, G2UJ, G3GTH, G3WW and G8SK are thanked for sending in check logs.

Results—144 Mc/s Open Contest, July 6-7, 1957

Posn.	Call-sign	Points	Posn.	Call-sign	Points
1.	G5MA	1768	16.	G5DW	1030
2.	G4DC	1761	17.	G2JF	940
3.	G3GHI	1745	18.	G2FJR	893
4.	G2MV	1733	19.	G2RD	843
5.	G2XV/P	1600	20.	G3FD	781
6.	G5YV	1581	21.	G3LCK/P	758
7.	G3IWQ	1506	22.	G3ENY	725
8.	G5DS	1391	23.	G3LOA	693
9.	GW3GWA	1370	24.	GW8UH	510
10.	G3LHA	1353	25.	G8SC/P	463
11.	G6OX/P	1329	26.	G3IIT	420
12.	G2FNW/P	1263	27.	GM3EGW	370
13.	G3CGQ	1128	28.	G3BII	281
14.	G3IRA	1127	29.	GM4HR/P	280
15.	G3FUR	1033	30.	G5MR	220

70 Mc/s Contests 1957

AS only one entry was submitted for the first 70 Mc/s Contest held on June 22 and 23, 1957, the Council has accepted a recommendation from the Contests Committee to declare " no contest."

Mr. N. G. Hyde (G2AIH) had contacts with G5KW, G5DS, G2DD, G3IUL and G6NB using a transmitter comprising an EF91, EL91 and QV04/7 driving a QQV06/40 to 45 watts input. The aerial was a half-wave dipole while a crystal controlled converter feeding into an RME69 tuning 6·54 to 6·74 Mc/s was used for reception.

Although the first contest proved so disappointing, the Second 70 Mc/s Contest will be held as arranged on November 16 and 17, 1957. It is hoped that the possibility of extremely high M.U.F.s at that time will encourage many more members to take part and *submit entries*. The rules will be the same as those for the first event published on page 421 of the March, 1957 issue of the BULLETIN, apart from the necessary changes to the dates in Rules 8 and 9. Entries should be addressed as set out in Rule 12 and must bear a postmark not later than Monday, November 25, 1957.

The German EYM Award and Contest

ON the occasion of the Munich 800 Year Anniversary Festival, the Munich branch of the D.A.R.C., the German National Society, is arranging a contest from October 1 to December 31, 1957, to encourage amateurs throughout the world to work as many stations in Munich as possible on the 3·5, 7, 14, 21 and 28 Mc/s bands. A certificate will also be issued.

Full details may be obtained from D.A.R.C., OV München, Post Office Box 4, Munich 40, Germany.

VK/ZL DX Contest, 1957

THE New Zealand Association of Radio Transmitters and the Wireless Institute of Australia invite all amateurs to participate in this year's VK/ZL contest. Rules for overseas stations may be summarized as follows:

1. **Sections. Phone:** 24 hours from 10.00 G.M.T. Saturday, October 5 to 10.00 G.M.T., Sunday, October 6.
C.w.: 24 hours from 10.00 G.M.T., Saturday, October 12, to 10.00 G.M.T., Sunday, October 13.

2. **Scoring.** Five points will be scored for each contact on a specific band with a VK or ZL call area (ZL1, 2, 3, and 4; VK0(zero), 1, 2, 3, 4, 5, 6, 7 and 9); in addition, for each new call area worked on that band a bonus of 50 points will be added.

3. **Serial Numbers** will consist of six figures (five for phone), made up of the RST report plus three figures which should commence with any number between 001 and 100 for the first contact and increase by one for each successive QSO, e.g. 002, 003, etc.

4. **Logs.** (*a*) Must show in this order: date, band in Mc/s, time in G.M.T., call-sign of station contacted, serial number sent, serial number received, points claimed, bonus points. A blank column should be left on the extreme right. Please use one side of the paper only.
(*b*) The cover sheet should show the section of the Contest, Name, Address and Call-sign, Total Claimed Score, Claimed Scores on each band (3·5, 7, 14, 21, 28 Mc/s), Transmitter Input Power and details of the aerials used. A signed declaration must be given that the entrant operated his station in accordance with the rules and spirit of the contest.

5. **Awards.** Attractive certificates to the highest scorer in each country, and to each call area in the VE, W and ZS. Other certificates will be awarded depending upon the number of logs received from each country and the activity on each band.

6. **Listeners' Section.** To count for points, the following details must be noted in the log—date, time in G.M.T., call-sign of the station heard, call-sign of the station being called, RS(T) of station heard, serial number sent by the calling station, band. Scoring is on the same basis as for the transmitting section and the log should be similarly set out.

7. Entries must be posted not later than October 31, 1957, and must be addressed to the **Federal Contest Committee, Wireless Institute of Australia, Box 1234K, G.P.O., Adelaide, South Australia.**

CQ World-wide DX Contest

THE operating periods for the *CQ* World-wide DX Contest are as follows:

Phone Section: 02.00 G.M.T., October 26, to 02.00 G.M.T., October 28.
C.w. Section: 02.00 G.M.T., November 30, to 02.00 G.M.T., December 2.
Serial numbers to be exchanged will consist of the RST (or RS) report followed by the number of the Zone in which the competitor is located. Stations in Zones 1 to 9 will prefix their Zone numbers with zero, i.e., 01, 02, etc.

Contacts may be made in any band from 1·8 to 28 Mc/s. Three points will be scored for contacts between stations in different continents and one point for contacts with stations in the same continent. Contacts between stations in the same country score no contact points but may be made for the purpose of Zone and/or country multipliers. Only one contact with the same station on one band counts for points. A multiplier of one is allowed for each Zone contacted on each band and a multiplier of one for each country worked on each band.

The contest will be divided into the following sections: (*a*) Single operator phone; (*b*) Multi-operator phone; (*c*) Single operator c.w.; (*d*) Multi-operator c.w.; (*e*) Novice c.w. There will also be an inter-club competition in which the club scores will be the combined scores of members participating.

Entries, which must be postmarked not later than December 1, 1957, for the Phone Section and January 15, 1958, for the C.w. Section, should be sent to the Contest Committee, *CQ Magazine*, 300 West 43rd Street, New York 36, N.Y., U.S.A.

The Keystone Award

THE Harrisburg Radio Amateurs Club will issue the Keystone Award to any amateur who contacts 100 different Pennsylvania Amateur Radio stations after January 1, 1956. For the basic certificate, applicants should send 100 QSL cards together with a list showing the stations worked (preferably in alphabetical order), date, band and type of emission, to the Awards Manager, W3BQA, Dillsburg, Penna., U.S.A. Outside the United States and Possessions, one International Reply Coupon should be enclosed plus sufficient I.R.C.s to cover the cost of return postage for the QSLs.

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.

Support for QRO

DEAR SIR,—I am in favour of a 500 watt, or more, licensed input to the final stage of the transmitter. High power does not cause the QRM on the bands. Excessive band width, over-modulation and key clicks are the worst offenders.

There are not many amateurs in this country who have got either the means or ability to run high power. In fact I will go so far as to say that a large percentage of the low power stations (150 watts and below) are not operated as well as they might be. Listen to the f.m. on some of the phone stations and operators bemoaning the fact that the condensers are burning out in their low pass filters. Obvious evidence that they do not know their subject. Try and operate a high power transmitter with a large standing wave ratio on the feeders and see what happens. Fat wallets and deep pockets will not save the output tube and associated equipment. There is sufficient gear still available from various sources for a high power transmitter to be built by those people who have the knowledge but lack the finances.

None of us wants another September 1939 but if from the ranks of the amateurs we can draw a number of technically trained radiomen who can go straight into the various Services with the ability to handle high power radio equipment we should at least be prepared. No one can convince me that if there should be another war the enemy will go QRP.

I strongly advocate that the present input should be raised up to a kilowatt if necessary and let those of us who are prepared to give our time and technical knowledge to the good of our country use our amateur gear to keep ourselves up to date with the technique of high power radio transmitter operation. In defence of high power transmitters let me again say they do not cause the QRM and local interference if they are efficiently operated. It is the low power, 25 watt or so, transmitter with parasitics working into an aerial with standing waves on the feeders which cause the BCI and TVI. Filters in the proper places will prevent blocking, etc. It is up to every amateur to suppress interference at the source and doubtless the true amateur would take the necessary steps to ensure that his own transmitter is operating correctly.

Why do we in the U.K. operate our transmitters with less input than our former enemies? Are we not supposed to have won the war with our knowledge of radio and radar and were not a number of high power radio stations installed, serviced and operated by members of the R.A.F. Civilian Wireless Reserve—a prewar organisation recruited from the ranks of the amateurs?

I should welcome comments from old amateur members of the C.W.R. who are still active.

Yours faithfully,

FRANK E. WYER (G8RY).

Glenfield, Leicester. TR for Leicester

Licence Matters

DEAR SIR,—I was pleased to read that the Council has decided to take no action regarding approaching the Post Office on the possible issue of Novice or Technician Licences. I agree with the remarks in the May *Current Comment* that the standard at present obtaining for getting an amateur licence is quite low enough. From comments from A.R.R.L. members published in recent issues of *QST*, one gathers that the novices in the States are a source of trouble to the F.C.C., especially with harmonic radiation outside their authorized bands. To me it seems that this particular nuisance is a direct result of insufficient understanding of fairly elementary radio theory and techniques: I am sure that none of us wish for this sort of thing in this country.

Now regarding the suggestion of increasing the proficiency of licences I am wholeheartedly in favour of this. There is already the First Class Operators Club but of course this doesn't bestow any extra privileges. 500 watts maximum input for Extra Class licences would be a suitable power and, lest there be howls of protest about more QRM, etc., I would point out that other things being equal, the difference between a 500 watt and a 150 watt signal is only about one "S" point.

I shall be interested to learn the views of other members on Extra Class Licences.

Yours faithfully,

London, E.10. N. A. S. FITCH (G3FPK).

Council Meetings, Headquarters . . .

DEAR SIR,—In response to *Current Comment* in the June issue of the BULLETIN, referring to the proposal to re-arrange the Council Meetings, I consider that anything to ensure more efficient management of the Society, and to effect reasonable economies, should be welcomed. I am quite sure, however, that members who have any interest in the running of the Society will want to know more of the details, in particular, the proposed formation of the Committee of Council, and in what way it is suggested that the business for the monthly and quarterly meetings should be divided.

The suggestion that a house should be purchased for use as Headquarters for the Society (April Council Minutes) also calls for comment. We are all aware that the existing premises are very inadequate and expenses high. A move away from the City might be the means of attracting the much needed clerical staff, and the purchase of the house should be considered as an investment, weighed against the possible future rental for the present HQ. One thing is certain, the rent of the existing Headquarters offices is unlikely to decrease!

. . . and Amateur Radio

The letters to the Editor (June issue), by G6GD and G6IF, are interesting and must voice the views of many members. First of all what is an amateur? I quote from an article in the "Wireless Annual" for 1924, by Dr. W. H. Eccles [a past president of the R.S.G.B.—Editor]. "An amateur is, according to the dictionaries, a person who is fond of a subject for its own sake." This statement was made when radio amateurs used some truly wonderful "hook-ups," and in many cases improvisation was the order of the day. Even in those days, however, there were those who could afford to buy much of their apparatus ready-made. In fact in the book referred to above, there is a definite similarity in two photographs, one of 2DY (no "G" then), and the 25kw valve transmitter at Ongar.

It follows that many amateurs must be better off, financially, than others; some are more technically minded; some are mainly operators, and some have the creative urge, and the time and ability to exercise it. When it comes to the question of contests, I doubt seriously whether commercially-built equipment really is a deciding factor, except possibly in the matter of receivers. Given a choice of QTH, and the time and ability to assemble and erect the equipment, there is not much to choose between properly constructed home-built gear and that bought "off the hook." If special awards could be arranged for stations using home-constructed gear in contests, I hope that some consideration will be given to the suggestion.

I certainly cannot afford to buy commercially-built equipment. In any case I consider that I can build it better myself than any manufacturer could afford to do. We must not forget, however, that the manufacturers of amateur equipment in this country are very few in number and were it not for them some amateurs would probably never get on the air. This is apart from the fact that there is an export market for British-built Amateur Radio equipment, and some home support is very necessary.

Finally, I wish that I had not 300 feet of hill immediately to the south and east!

Yours faithfully,

W. J. GREEN (G3FBA).

Bath, Somerset. Region 9 Representative.

Are You An ex-ZD4?

DEAR SIR,—I am holding a number of QSL cards addressed to amateurs, who are no longer operating in Ghana, and I should appreciate the medium of your BULLETIN to ask those who might read this letter to let me know their present address, in order that I may post their cards to them. I hold cards for the following: ZD4AC, 4AD, 4AH, 4AL, 4AM, 4AO, 4AP, 4AU, 4AW, 4AX, 4BA, 4BC, 4BD, 4BG, 4BH, 4BI, 4BS.

Yours faithfully,

P.O. Box 565, Kumasi, Ghana, West Africa. EDWIN LLOYD. (QSL Manager for Ghana.)

7 Mc/s Operation

DEAR SIR,—I wonder whether those members of the amateur fraternity who use radio telephony in the c.w. portion of the 7 Mc/s band realise they are causing a tremendous amount of interference to those of us who are endeavouring to work c.w. in a normally congested band?

As the telephony portion of 7 Mc/s is much larger than the c.w. portion why is it necessary for these people to operate below 7050 kc/s, thus rendering large portions of the band unworkable?

The offenders are not so much, as one would believe, the newer licensed amateurs, but people who have had years of experience on the air.

I plead with you phone operators to give the c.w. enthusiasts a break, for you can cause us much more interference than we can cause to you!

One final comment: Radio Paris broadcasts on 7050 kc/s, the phone band is above this station while the c.w. band is below this point.

Yours faithfully,

Hexham-on-Tyne, Northumberland. G. B. MARSTON (G3JEG).

N.F.D. Operators

DEAR SIR,—With reference to the letter from G3HKX (July issue) the lack of N.F.D. operators may be due to younger members, both licensed and listeners, receiving too little encouragement. This happens locally, and as a result, a new N.F.D. group was formed at Danbury. The younger operators and listeners seem to prefer it, for it considers them, as well as the older operators.

The " Lack of attention being paid to Morse " is belied by our list of operators which included G3KPJ, G3KTF, G3KWD, G3LJM and G3LMH. This list covers nearly all who have obtained a licence in the last two years in this area. Incidentally we ran two stations for the first time this year; the oldest call to operate was G3HMK!!

For many of us N.F.D. has now become " Just another contest " with the serial number instead of the first three letters of the operator's name. It was this " personal touch " which made N.F.D. so enjoyable.

For example " 579012 " is just hard fact, but " 579 SMI " means that your friend Bill Smith is on the key, and one can say " GE BILL " instead of " GE OM." A small point, but it makes all the difference.

Yours faithfully,

West Hanningfield, near Chelmsford. A. W. BUTCHER (G3KPJ).

I.G.Y. Investigations—Taking Visible Bearing and Elevation on the Sun

DEAR EDITOR,—I am sure that all members will be grateful to Mr. G. W. Slack (G5KG) for his extremely interesting article entitled " Propagation and the International Geophysical Year " which appears in the July issue of the BULLETIN.

In connection with the paragraph " Reception Observation of Solar Noise in v.h.f. and u.h.f. bands," he and other readers may be relieved to know that Item (e) (" Some method of taking a visible bearing and elevation on the Sun.") can be dispensed with in an exceedingly simple manner.

It is only necessary for the observer to supply the latitude and longitude of his station (the true meaning of QTH), together with the GMT of the observation.

With this information and with the aid of either the Nautical or Air Almanac and the Sight Reduction Tables, it is an easy matter to look up the altitude and azimuth of the Sun at a given instant of time from any part of the Earth's surface.

Readers who wish to do this for themselves can obtain all the information they require from AP.3270 (obtainable from Her Majesty's Stationery Office): Vol. 2 if they live between latitudes 0-39, Vol. 3 for latitudes 40-89. From this publication the altitude and azimuth of the Sun from any place in the world can be determined between now and the year 2000.

Yours faithfully,

Leamington Spa. J. J. PARKES (G8QK).

Ham Spirit

DEAR SIR,—One aspect of " Ham Spirit," or rather lack of it, has caused me considerable annoyance. Quite recently, in the " *Can You Help?* " section, a request appeared for some information on a German military valve. Having had a great deal to do with such equipment, I was able to answer in some detail. *I have had no word of thanks at all.* Eighteen months ago I wrote to the author of a constructional article for further details of a part of the circuit which was not clear to me. *Although I enclosed a stamped addressed envelope, I am still waiting for a reply.* In the current (July) BULLETIN there is a further appeal for information on a German military receiver. I could easily supply it, but I am not going to do so in view of the treatment meted out on the two occasions mentioned.

Yours faithfully,

Pontefract, Yorkshire. W. FARRAR (G3ESP).

Amateur v. Commercial

DEAR SIR,—Having read with interest the various letters for and against the use of commercial equipment, there are one or two comments which I should like to pass.

Firstly, I agree that a newly licensed operator who uses a commercially made transmitter can hardly be called an amateur. The R.A.E. only covers the basic theory of radio and the owner of such equipment, cannot possibly understand fully the working of it, whereas the builder of a transmitter similar to The Elizabethan is bound to gain knowledge from its construction. Even the modification of Government surplus equipment calls for a certain amount of skill.

The remarks about good operating have been made by other readers and the ownership of a commercial high power rig by a bad operator does nothing to improve conditions on the crowded bands as a spell on 80m will show.

One comment passed by Mr. Stokes (B.R.S.21136) needs comment and that concerns academic qualifications. A.M.I.E.E. is a professional *not* an academic qualification. As a member of the staff of the University of London I should like to state that the subjects taken for the B.Sc. degree are many and varied and do not necessarily cover the radio field at all. Even the Electronics syllabus of the B.Sc. (Eng.) hardly covers the subject of Radio Theory necessary for the amateur. In my opinion an amateur with some experience is more qualified to take the B.Sc. examination than the other way round.

Whilst on the subject of examinations I have noticed recently a drop in the standard of the R.A.E. Furthermore the Service exemptions from it judging by the remarks one hears over the air seem to be inadequate as far as radio knowledge is concerned.

Yours faithfully,

Tolworth, Surrey D. W. ROBINSON (G3FMT).

The only true amateur!

DEAR SIR,—As one who has mined, smelted and drawn his own copper, and who grew a tree to provide his own mast, may I claim to be the world's only true amateur?

I wish also to repudiate the lie that the crystal I dug up in Brazil was processed by carborundum which had been prepared commercially.

Yours imaginatively,

Worksop. H. S. CHADWICK (G8ON).

Is N.F.D. Outdated?

DEAR SIR,—Reference G3HKX's letter in the July BULLETIN has not R.A.E.N. completely outdated N.F.D.?

I seem to remember that the original idea of N.F.D. was to prove ability to organize communication under emergency conditions . . .

Or is N.F.D. now just another competition?

Yours sincerely,

School House, Martin, Lincoln. C. B. RAITHBY (G8GI).

LONDON MEMBERS' LUNCHEON CLUB

will meet at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road,

at 12.30 p.m. on Fridays, September 20 and October 18, 1957.

Telephone table reservations to HOL 7373 prior to day of luncheon. Visiting amateurs especially welcome.

LONDON U.H.F. GROUP

will meet at the Bedford Corner Hotel, at 7.30 p.m., October 3, 1957.

All u.h.f. enthusiasts welcome.

Regional and Club News

Aldershot and District Amateur Radio Society—Meetings are held at "The Cannon," Aldershot, on Wednesdays at 7.30 p.m. *Hon. Secretary:* S. E. Hume, 25 Kingsway, Aldershot.

Brighton and District Radio Club—The club meets at the Eagle Inn, Gloucester Road, Brighton, on Tuesdays at 7.30 p.m. The club station (G3EVE) is active. The Annual General Meeting has been arranged for September 29, at 8 p.m. *Hon. Secretary:* J. C. Trangmar, 33 Lennox Street, Brighton 7.

Bristol—A talk on "The International Aspect of Amateur Radio" was given at the August meeting by Past President Arthur O. Milne (G2MI) who also gave an account, illustrated with colour slides, of his visit to Italy last year for the Stresa Conference. On September 20, Jerry Walker (G5JU) will be describing and demonstrating the Eddystone 888 Communications Receiver. It is also hoped to show a short colour film taken during this year's N.F.D. Doug. Stephenson (G3KUL) has been elected to the local committee in place of G3KPT who has moved to Birmingham. *Hon. Secretary:* D. F. Davies (G3RQ), 51 Theresa Avenue, Bishopston, Bristol 7.

Bury Radio Society—Forthcoming meetings at the George Hotel, Kay Gardens, Bury, have been arranged for October 8 ("Matching Matters," by R. H. Hammans, G2IG) and November 12 ("An Old-timer Looks Back," T. C. Platt, G2GA). *Hon. Secretary:* L. Robinson, 56 Avondale Avenue, Bury, Lancs.

Chelmsford Amateur Radio Club—The local R.S.G.B. group has recently been reorganized and now operates under the title of this new club. The Town Representative, H. Lawe (G2HPF) is Hon. Secretary. Meetings are held at Marconi College, Arbour Lane, Chelmsford, on the first Tuesday in each month. In October there will be an illustrated talk on Hi-fi Sound Reproduction.

Cornish Radio and Television Club—The August meeting was well attended, not only by members from all parts of the county but also by G2BMI of Uxbridge, G3DKF from Coventry and G3DXL from Southall. Bill Lock (G.P.O.) gave an interesting demonstration with a Television Detector Van. All licensed amateurs and short wave listeners are cordially invited to attend meetings which are held at the Y.M.C.A., Falmouth. Details may be obtained from the *Hon. Secretary:* J. Brown (G3LPB), Waterworks, Penryn.

Crystal Palace and District Radio Club—On September 21, C. E. Newton (G2FKZ) will give a talk on Receiver Design and will describe his specialized i.f. strip. On October 2, G2FKZ will give the second of a new series of lectures designed to lead up to R.A.E. standard. The subject will be "Condensers." Meetings are held at Windemere House, Westow Street, Crystal Palace, S.E.19, commencing at 7.30 p.m. *Hon. Secretary:* G. M. C. Stone (G3FZL), 10 Liphook Crescent, Forest Hill, S.E.23.

London Members' Luncheon Club—In the absence of the Chairman, the August meeting was presided over by Alec Gilding (G3KSH), Vice-President of the R.A.F. Amateur Radio Society, who welcomed Les Hibbert (EL1P) and Mrs. Hibbert, Peter Bailey (VQ4KPB), Maurice Chopin (VP1MC) and Jim Kirk (CE3ZO and now G6ZO again). The club will meet again at 12.30 for lunch at 1 p.m. on September 20, at the Bedford Corner Hotel, Bailey Street, Tottenham Court Road, W.C.1. All amateurs visiting London are invited to come along. If possible, reservations should be made at least 24 hours in advance by telephoning G2FUX on Ruislip 2763 or R.S.G.B. Headquarters, Holborn 7373. *Hon. Secretary:* Frank Fletcher (G2FUX), Brendon, 11A Ickenham Road, Ruislip.

North Kent Radio Society—Recent meetings have included a demonstration of the Geloso range of amateur equipment by Rowley Shears (G8KW). Local R.S.G.B. members took part in N.F.D. using the call-sign G2ATD/P. Meetings have been arranged for September 26 (Junk Sale), October 10 ("Filters made Easy," E. Hasted, G3BHF) and October 24 (Brains Trust). Visitors will be welcome at all these meetings which are held in the Congregational Hall opposite Bexleyheath Clock Tower, commencing at 8 p.m. *Hon. Secretary:* D. W. Wooderson (G3HKX), 39 Woolwich Road, Bexleyheath.

Nottingham Amateur Radio Club—The club meets on Tuesdays and Thursdays at 7.15 p.m. at Woodthorpe House, Mansfield Road. The autumn programme includes lectures and visits to places of interest. Short Morse sessions are held at all meetings. Visitors and prospective members will be most welcome. *Hon. Secretary:* F. V. Farnsworth, 32 Harrow Road, West Bridgford, Nottingham.

Nottingham and District Amateur Radio Society—The Society will meet at the Basford Hall Miners' Welfare, Nuthall Road, Cinderhill, at 7.30 p.m. on September 20. Prospective members are cordially invited to attend. *Hon. Secretary:* H. H. Pickering (G3DUL), 43 Plains Road, Mapperley, Nottingham.

Reading Amateur Radio Club—A meeting of this newly formed club will take place at the Palmer Hall, West Street, Reading, at 7.30 p.m. on September 28, when G5TP will give a talk and demonstration entitled "A Table Top 150 watt Transmitter." All interested in Amateur Radio, whether as licensed amateurs or short wave listeners, are invited to attend. Further information may be obtained from the *Hon. Secretary:* L. R. Mitchell (G3BHK), 965 Oxford Road, Reading.

Torbay Amateur Radio Society—At the August meeting, Don Willoughby (DL2YU) was the guest speaker. Meetings are held at the Y.M.C.A., Castle Road, Torquay. *Hon. Secretary:* G. Western (G3LFL), 118 Salisbury Avenue, Barton, Torquay.

REGIONAL REPRESENTATIVES

Region 1.—North Western. B. O'Brien (G2AMV), 1 Waterpark Road, Prenton, Birkenhead, Cheshire.

Region 2.—North Eastern. J. R. Petty (G4JW), 580 Redmires Road, Sheffield, 10, Yorkshire.

Region 3.—West Midlands. W. A. Higgins (G8GF), 28 Kingsley Road, Kingswinford, nr. Brierley Hill, Staffs.

Region 4.—East Midland. E. S. G. K. Vance, M.B. (G8SA), 43 Blackwell Road, Huthwaite, Sutton-in-Ashfield, Notts.

Region 5.—Eastern. T. A. T. Davies (G2ALL), Meadow Side, Comberton, Cambridge.

Region 6.—South Central. N. F. O'Brien, F.B.I., A.C.C.S. (G3LP), 143 Brunswick Street, Cheltenham, Gloucestershire.

Region 7.—London. F. G. Lambeth (G2AIW), 21 Bridge Way, Whitton, Twickenham, Middlesex.

Region 8.—South Eastern. Office Vacant.

Region 9.—South Western. W. J. Green (G3FBA), 82 Bloomfield Avenue, Bath, Somerset.

Region 10.—South Wales. C. Parsons (GW8NP), 90 Maesycoed Road, Heath, Cardiff, Glam.

Region 11.—North Wales. F. G. Southworth (GW2CCU), Samlesbury, Bagillt Road, Holywell, Flintshire.

Region 12.—East Scotland. L. Hardie (GM2FHH), 91 Inchbrae Drive, Garthdee, Aberdeen.

Region 13.—South-East Scotland. Office Vacant.

Region 14.—West Scotland. D. R. Macadie (GM6MD), 154 Kingsacre Road, Glasgow, S.4.

Region 15.—Northern Ireland. J. W. Douglas (GI3IWD), 54 Kingsway Park, Cherry Valley, Belfast.

R.S.G.B. QSL BUREAU: G2MI, BROMLEY, KENT

Wedding Bells

CONGRATULATIONS are offered to Harold Crane (G2AVC) and Ann Walford (G3GOX), who were married on July 6, 1957, at Mere, Wiltshire, home town of the bride. They plan to set up a joint station at Hanworth, Middlesex.

* * *

In Bristol recently Old Timer Harry Gratton (G6GN), gave away his youngest daughter Anita, in marriage, to Chris. Spackman (G3GYQ) of Swindon. The best man was John Harper-Bill (G3IZM).

Harold and Ann Crane — a wedding day photograph

Don Davies (G3RQ) and Vic Newport (G3CHW) represented the local R.S.G.B. group.

New Members

THE following were elected to Membership at the July, 1957 Meeting of the Council:—

Corporate Members, Home (Licensed)

G2SG V. F. B. DUNK, "Casanina," Soldridge Road, Medstead, near Alton, Hants.
G3FWC †T. F. RETALLACK, "Tremayne," North Street, Marazion, Cornwall.
G3JFL †H. TONKS, 131 Warstock Road, Kings Heath, Birmingham 14.
G3KFE †E. P. ESSERY, 11 Tudor Way, Southgate, London, N.14.
G3LJZ C. L. HAGON, 3 Brookfield Close, Hutton, Brentwood, Essex.
G3LPN J. P. HUNT, 9 Station Road, Lapworth, Solihull, Warwicks.
G3LSD E. DIGGLE, Collingwood House, Stoke Damerel, Plymouth, Devon.
G3LST P. F. L. CLARKE, Redroofs, Thorndon Gate, Herongate, Brentwood, Essex.
G3LTG J. H. MATTHEWS, 106 Silchester Road, Kinloss, Forres, Morayshire, Scotland.
G3LUJ J. CARWARDINE, 42A Downleaze, Stoke Bishop, Bristol 9.
G5JJ D. C. HALL, 12 Sunbury Gardens, Mill Hill, London, N.W.7.
GM3LTW A. F. HUNTER, Sgts. Mess, R.A.F. North Kensington, London, W.10.

Corporate Members, Overseas (Licensed)

DL1YA HANS SCHLEIFENBAUM, Hirschbergstr. 13, Munich 19, Germany.
DL2BJ Sgt. D. LEESE, Block 10, Flat 3, The Royal Dragoons, British Forces Post Office 38.
K4CLT R. D. GREEN, 5408, Connell Street, Chattanooga 11, Tennessee, U.S.A.
K8ANV H. R. HABIG, 1700, Shroyer Road, Dayton 9, Ohio, U.S.A.
VP1MC M. K. CHOPIN, c/o Lloyds Bank Ltd., High Street, Hounslow Middx.
VP2LB B. M. AUGUSTE, 75 St. Louis Street, Castries, St. Lucia, B.W.I.
VQ3GH G. C. THOM, P.O. Box 73, Mbula, via Arusha, Tanganyika, B.E.A.
VQ5GJ F. N. COLE, Box 355, Police Radio H.Q., Kampala, Uganda, B.E.A.
W4IKM H. N. BAILEY, 3917 Hilton Drive, Mobile, Alabama, U.S.A.
W6YMD Willard Guimont, 15917, Northfield Street, Pacific Palisades, Calif., U.S.A.
W8WJL Dr. SHEEMON A. WOLFE, 902 Porter Avenue, Dayton, Ohio, U.S.A.
YU2JH Z. Hochstadter, 32 Derencinova, Zagreb, Yugoslavia.
5A5TZ/K8APP FLOYD L. SPENCER, Box 334, 6930th Radio Group Mobile, A.P.O. 231, New York, N.Y., U.S.A.

British Empire Receiving Station

956 Father MARSHALL D. MORAN, Saint Xavier School, Katmandu, Nepal, via India.

Corporate Members (British Receiving Stations)

21477 R. WAUGH, 29 Linden Road, Dunstable, Beds.
21478 *B. CURREY, 41 Davids Road, Droylsden, near Manchester.
21479 A. R. WEBSTER-GRINLING, Beach House, Brighton Road, Worthing, Sussex.
21480 †P. W. BARNETT, 3 Marshalswick Lane, St. Albans, Herts.
21481 R. BOND, 118 Garteraig Road, Carntyne, Glasgow E.3., Scotland.
21482 W. LEGGE, 12 North Houses Lane, St. Anne's-on-Sea, Lancs.
21483 C. T. HARPER, 64 Glenburn Drive, Inverness, Scotland.
21484 J. G. MARCH, 168 Hillburn Road, Warlingham, Surrey.
21485 H. W. B. GARDINER, 15 Towers Road, Hatch End, Pinner, Middx.
21486 S. A. HEMES, 23 Lowerson Crescent, West Derby, Liverpool 11.
21487 B. A. YATES, 9 Hillside, New Barnet, Herts.
21488 W. R. SMITH, 87 Lancaster Road, Scunthorpe, Lincs.
21489 K. H. ADLINGTON, Sgts. Mess, R.A.F. Upwood, near Ramsey, Hunts.
21490 J. G. DENNY, 40 Canada Road, Woolston, Southampton.
21491 H. G. VALE, 1 Dunley Road, Stourport-on-Severn, Worcs.
21492 K. V. GODFREY, 11a Seventh Avenue, Northville, Bristol 7.
21493 R. Fleischmann, 199 Garstang Road, Fulwood, Preston, Lancs.
21494 A. P. MOSSFORD, 62 Millbank Road, Rhyl, Flints, North Wales.
21495 C. S. B. FREEBURN, 2 Nelson Terrace, New Road, Southsea, Wrexham, North Wales.
21496 J. E. COLLINS, 16 Woodlea Grove, Westfield, Yeadon, Leeds.
21497 C. M. JOHNSON, 30 Daisy Street, Glasgow S2.
3383 †E. P. WILLS, Woodtown, Alverdiscott Road, Bideford, North Devon.

Associates

J. T. BEAUMONT, 76 The Esplanade, Fleetwood, Lancs.
P. M. DUPONT, 192 Stakes Hill Road, Waterlooville, Hants.
D. E. FROST, 15 Mess, H.M.S. "Solebay," c/o G.P.O. London.
P. A. HADLER, 5 Argyle Road, Whitstable, Kent.
N. HAMPTON, 19 Grove Crescent, Kingsbury, London, N.W.9.
D. MANN, 20 Braemar Gardens, Colindale, London, N.W.9.
I. ROEBUCK, 2 Stradbroke Way, Sheffield 13, Yorks.
W. M. STIRLING, 22 Park Street, Gosport, Hants.
B. E. TEE, 18 Oakwood Hill, Loughton, Essex.

THE following were elected to Membership at the August, 1957, Meeting of the Council:—

Corporate Members, Home (Licensed)

GI2CIZ J. GALLAUGHER, 167 Cliftonpark Avenue, Belfast, N. Ireland.
G3CJS †F. J. SMART, Harcourt Road, West Malvern, Worcs.
G3DMV †K. H. VARNEY, 149 Whitehouse Common Road, Sutton Coldfield, Warwicks.
G3EHT †J. TREMAIN, High Lanes, Little Petherick, Wadebridge, Cornwall.
G3EKC †N. J. BIRKETT, 62 Belper Road, Derby, Derbyshire.
G3GLQ †W. V. SUTTON, 57 Ashfurlong Crescent, Sutton Coldfield, Warwicks.
G3GYX †J. J. WILSON, 6 The Grove, Breaston, Derbys.
G3IGX †L. F. COWLING, 157 Newbridge Hill, Bath, Som.
G3JDI †K. R. STRELLIS, 119 Langley Crescent, Dagenham, Essex.
G3JRB L. R. LEER, 129 Haydon's Road, Wimbledon, London, S.W.19.
G3JVJ R. A. Wybrow, 109 Underhill Road, East Dulwich, London, S.E.22.
G3KLV G. VINE, 16 Glasgow Street, Northampton, Northants.
G3LCM/T L. C. MANSFIELD, 131 Waddington Avenue, Coulsdon, Surrey.
G3LJF T. H. ARDERN, 21 Beaufort Avenue, Sale, Cheshire.
GM3LGM WM. MCGILL, 32 Devonview Street, Airdrie, Lanarks.
G3LMZ G. T. FLETCHER, 111 Manor Avenue, Sale, Cheshire.
G3LOW J. BARRETT, Porch House, Farnham Lane, Haslemere, Surrey.
G3LPY R. A. NYE, 20 Bramley Road, Southgate, London, N.14.
GI3LSM L. A. MILLER, 90 Moat Street, Donaghadee, Co. Down, N. Ireland.
GM3LUC 1924668 Cpl. E. BATE, Signal Section, R.A.F. Station, Kinloss, near Forres, Morayshire, Scotland.
G3LUW Sgt. B. C. WHITTAKER, Sgts. Mess, R.A.F. Station, St. Mawgan, Newquay, Cornwall.
G4HF †D. DEVEEN, 13 Stanwick Road, W. Kensington, London, W.14.
G4ZA E. W. ANDERSON, 96 Nork Way, Banstead, Surrey.

Corporate Members, Overseas (Licensed)

DL9MZ G. H. SCHRICK, Waldschulalee 58, Berlin-Ch.9, Germany.
K2AIM F. J. PEYTON, Sr., 312 Laurel Avenue, Woodlynne 6, New Jersey, U.S.A.
K2USG/DL4NU R. T. CARROLL, 30 Victoria Avenue, North Hillingdon, Middx.
K4MFL/CN8GR SCOTT ALLEN, Detachment Alpha, VP-5, F.P.O., N.Y., New York, U.S.A.
K6AXC DONALD L. TORBERT, 15425 Domart Avenue, Norwalk, Calif., U.S.A.
K6IEC N. P. BORCHERT, 912 South Riker Street, Salinas, Calif., U.S.A.
KH6BGE MRS. FLORENCE U. KUMUKAKI, P.O. Box 974, Hilo, Hawaii.
K8AZW DONALD E. SANDERS, 929 Vienna Road, Niles, Ohio, U.S.A.
K0HOX R. N. SUTTON, 5400 Ward Parkway, Kansas City, Miss., U.S.A.
LA9P OTTA GRONEBECK-AASS, Box 63, Askim, Norway.
VP6LT E. M. GLASSCOCK, c/o P.O. Box 272, Bridgetown, Barbados, B.W.I.
VQ2IE I. W. B. EMSLIE, P.O. Box 956, Lusaka, Northern Rhodesia.
VQ6ST S. W. TOWNSEND, Collector of Customs and Excise, Berbera, Somaliland Protectorate.
W1CJM M. SAKLAD, 38 Cooke Street, Providence, Rhode Island, U.S.A.
W1PST/W1ASA JUSTIN L. WYNER, 33 Martha's Lane, Chestnut Hill 67, Mass, U.S.A.
W1WDD P. C. CARD, 32 Elm Lane, West Barrington, Rhode Island, U.S.A.
W3HXA N. G. TULP, 12 Bradley Lane, Atholton Manor, R.F.D. No. 1, Ellicott City, Maryland, U.S.A.
W4WSF J. C. KANODE, 244 Parkway, Winchester, Virginia, U.S.A.
W7HKT EDWARD E. SQUIER, 3717 C, S.E.42 Avenue, Portland, Oregon, U.S.A.
W8NWO BART RYPSTRA, 801 W. Lawrence Charlotte, Mich., U.S.A.
W9BGS J. L. GREGG, 1830 S. Webster, Kokomo, Indiana, U.S.A.
W9FJB HARRY C. DEMUTH, 337 Abbottsford Road, Kenilworth, Ill., U.S.A.
W9MEL H. S. HART, Route 2, Box 45, Wiesbrook Road, Wheaton, Ill., U.S.A.
W9NDN S. A. LOEVY, 5729 North Bernard Street, Chicago 45, Ill., U.S.A.
W0EWF S. PIOTROWSKI, P.O. Box 338, Imperial, Nebraska, U.S.A.
W0OYP R. A. HOARE, Box 115, Mitchellville, Iowa, U.S.A.
W0USP J. R. KNOTT, 715 River Street, Iowa City, Iowa, U.S.A.
ZD4CP R. F. OXLEY, M.B.E., P.O. Box 971, Accra, Ghana.

Corporate Members (Foreign Receiving Stations)

277 P. G. WEE, c/o Messrs. Thiam Huat & Co., 26 Robinson Road, Singapore 1.
278 L. G. LESLIE, c/o 7 North Audley Street, London, W.1.

Corporate Members (British Receiving Stations)

21498 A. H. JENKINS, 79 Denmark Street, Plaistow, London, E.13.
21499 G. E. BARTLETT, 18 Abingdon Street, Burnham-on-Sea, Som.
21500 F. G. Morriss, 112 Windsor Road, Thornton Heath, Surrey.
21501 F. E. SIMONITE, 2 Olive Crescent, Sheffield 12, Yorks.
21502 S. SWINDELL, 12 Ingleby Avenue, Derby, Derbyshire.
21503 B. A. PEAT, 50 Moorelands Road, Bromley, Kent.
21504 A. H. KIGHTLEY, 28 Castlandhill Road, Rosyth, Fife.
21505 T. C. RUANE, 37 Claremont Road, Liverpool 15, Lancs.
21506 C. D. WEBBER, 7 Southbrook Crescent, Cannington, near Bridgwater, Som.
21507 IAN DOUGLAS, 28 Chapelhill Road, Paisley, Renfrewshire.
21508 K. G. MATHER, 18 Crown Street, Harrow on the Hill, Middx.
21509 J. C. BROGAN, 55 Woodfield Crescent, Ayr, Ayrshire.

21510 W. D. TOPLEY, 9 Cornmarket, Louth, Lincs.
21511 W. H. FLETCHER, B.Sc., Holmdale, Martin, Lincoln, Lincs.
21512 J. J. LOUDON, 126 Marton Road, Middlesbrough, York.
21513 MAJOR A. N. FRADGLEY, R.E., West Hill House, Allerton Hill, Leeds 7.
21514 H. E. WELLS, 110 Park Lane, South Harrow, Middx.
21515 R. D. LUSCOMBE, 4 Rosemont, Potters Hill, Torquay, Devon.
21516 G. JARRATT, Thorpe Lane Farm, Linswell Gate, Lofthouse, near Wakefield, Yorks.
21517 G. W. HALL, 11 Pinewood Close, Iver Heath, Bucks.
21518 R. E. M. BARTON, 11 Glade Road, Marlow, Bucks.
21519 J. K. HARDAKER, Holycroft House, Oakworth Road, Keighley, Yorks.
21520 D. WHELAN, 36 Charles Street, Cardiff, Glam., S. Wales.
21521 R. E. A. DAVIS, 76 Swakeleys Road, Ickenham, Uxbridge, Middx.
21522 *D. J. EARNSHAW, 74 Lower Clapton Road, London, E.5.
13337 †G. E. HERRINGSHAW, Westhope Manor, Seifton, Craven Arms, Shropshire.

Associates

1464 J. B. IRVINE, 68 Heath Road, Bebington, Wirral, Cheshire.
1465 W. S. Campbell, 43 Hilton Road, Alloa, Clackmannanshire, Scotland.
1466 R. M. GARNER, 130 Dyas Road, Great Barr, Birmingham 22A, Warwicks.
1467 M. GAY, 10 Rosebery Park, Dursley, Glos.
1468 I. R. WATLING, 4 Dolton Road, Maybush, Southampton, Hants.
1469 C. J. HUGHES, 129 Hunloke Avenue, Chesterfield, Derbys.
1470 D. A. HANCOCK, 191 Dudley Road, Springfield, Dudley, Worcs.
1471 G. H. TILSED, 6 Nansen Avenue, Oakdale, Poole, Dorset.
1472 R. S. OLIVER, 53 Overton Crescent, Woodheys, Sale, Cheshire.
1473 G. T. COLBOURNE, 7 Fairfield Road, Montpelier, Bristol 6.
1474 M. KIRK, 76 Mexboro Road, Bolton-on-Dearne, near Rotherham, Yorks.

** Denotes transfer to Corporate Grade*
† Denotes re-elected

Correction

THE address of Mr. G. R. Reid, B.R.S.21406 (now G3LVC), shown on page 523 of the May issue of the BULLETIN should have read Church Cottage, Fleet, near Weymouth, Dorset.

Forthcoming Events

REGION 1

Blackpool (B. & F.A.R.S.).—Wednesdays, Gadsby Street Hall, off Nelson Road.
Bury (B.R.S.).—October 8, 8 p.m., George Hotel, Kay Gardens.
Chester (C. & D.A.R.S.).—Tuesdays, 7.45 p.m., Tarran Hut, Y.M.C.A.
Crosby.—Tuesdays, 8 p.m., over Gordon's Sweetshop, St. John's Road, Waterloo.
Lancaster (L. & D.A.R.S.).—October 2, 7.30 p.m., George Hotel, Torrisholme.
Liverpool (L. & D.A.R.S.).—Tuesdays, 8 p.m., Room "A," Wavertree Community Centre, Penny Lane, Liverpool, 18.
Manchester (M. & D.R.S.).—October 7, 7.30 p.m., Brunswick Hotel, Piccadilly.
Manchester (S.M.R.C.).—Fridays, 7.45 p.m., Ladybarn House, Mauldeth Road, Manchester, 20.
Preston (P.A.R.S.).—Wednesday, 7.45 p.m., 48 High Street, off Lancaster Road.
Southport.—Thursdays, 8 p.m., Sea Cadets' Camp, Esplanade.
Stockport (S.R.S.).—September 25, October 9, 23, 8 p.m., The Blossoms Hotel, Buxton Road.
Warrington (W. & D.R.S.).—September 19, October 3, 17, 7.30 p.m., Royal Oak Hotel, Bridge Street.
Wirral (W.A.R.S.).—September 18, October 2, 16, 7.45 p.m., Y.M.C.A., Whetstone Lane, Birkenhead.

REGION 2

Barnsley (B. & D.A.R.C.).—September 27, 7.30 p.m., King George Hotel, Peel Street.
Doncaster.—October 1, 7.30 p.m., Lord Nelson Hotel, Cleveland Street.
Hull.—Second and last Tuesdays, 7.30 p.m., "Royal Oak" (Tony's).
Leeds.—Wednesdays, 7.30 p.m., 4 Woodhouse Square, Leeds.
Pontefract.—September 19, October 3, 8 p.m., Queen's Hotel, Tanshelf.
Rotherham.—Wednesdays, 7 p.m., "Cutler's Arms," Westgate.
Scarborough (S.A.R.S.).—Thursdays, 7.30 p.m., Chapman's Yard, North Street, Scarborough.
Sheffield (S.A.R.C.).—September 25, 8 p.m., "Dog & Partridge," Trippet Lane.
Slaithwaite.—Fridays, 7.30 p.m., 3 Dartmouth Street, Slaithwaite.
South Shields (S.S. & D.R.C.).—September 25, 7 p.m., Trinity House Social Centre.
Spen Valley.—September 18, October 9, 7.30 p.m., Temperance Hall, Cleckheaton.
York.—Thursdays, 7.30 p.m., Club Rooms, Y.A.R.S., Fetter Lane.

REGION 3

Birmingham (M.A.R.S.). — September 17 (A.G.M.), October 15 (Radio/TV Supression on Cars), 7 p.m., Midland Institute, Paradise Street.
(Slade).—September 27, October 11, 7.45 p.m., Church House, High Street, Erdington.
(South & Bournville).—Tuesdays, 7.30 p.m., No. 4 Committee Room, Cadbury Bros.
Coventry.—September 27, 7.30 p.m., Vine Street School, Coventry. (C.A.R.S.).—September 23, October 7, 7.30 p.m., 9 Queens Road, Coventry.
Solihull.—September 23, October 7, 7.30 p.m., Civil Defence H.Q., Sutton Lodge, Blossomfield Road.
Stourbridge & District.—September 20 (Annual Dinner), 8 p.m., "White Horse," Amblecote; October 1, 8 p.m., King Edward VI School, Stourbridge.
Wolverhampton.—September 16, 8 p.m., Nechells Cottage, Stockwell Road, Tettenhall.

REGION 4

Alvaston.—Tuesdays, Thursdays, 7.30 p.m., Sundays, 10.30 a.m., Boulton Lane, Alvaston.
Chesterfield.—Tuesdays, 7.30 p.m., Bradbury Hall, Chatsworth Road.
Derby (D.&D.A.R.S.).—Wednesdays, 7.30 p.m., Room 4, 119 Green Lane, Derby.
Ilkeston (I. & D.A.R.S.).—Thursdays, 7 p.m., Ilkeston College of Further Education, Field Road.
Lincoln (L.S.W.C.).—October 2, 7.30 p.m., Technical College, Cathedral Street.
Newark (N. & D.A.R.S.).—October 6, 7 p.m., Northgate House, Northgate, Newark.
Northampton (N.S.W.C.).—Fridays, 6.30 p.m., J-Beam Aerials' Factory, Weston Favell.
Nottingham.—September 20, October 18, 7.30 p.m., Basford Hall Miners' Welfare, Nuthall Road, Cinderhill.
Peterborough.—October 2, 7.30 p.m., 21 Hankey Street.
Retford & Worksop.—September 16, 7.45 p.m., King Edward VII Hotel, Ryton Street, Worksop.
Scunthorpe (S.A.R.S.).—September 17, October 3, 7.30 p.m., Talbot Hotel, Earl Street.

REGION 5

Chelmsford (C.A.R.C.).—October 1, 7.30 p.m., Marconi College, Arbour Lane, Chelmsford.
Norwich.—Fridays, 7.30 p.m., The Golden Lion, St. John's, Maddermarket.

REGION 6

Cheltenham.—October 3, 8 p.m., Great Western Hotel, Clarence Street. (C.A.R.S.).—Wednesdays, 8 p.m., Club Room, St. Mark's Community Centre, Brooklyn Road.
Gloucester (G.R.C.).—Thursdays, 7.30 p.m., The Cedars, 83 Hucclecote Road.
High Wycombe.—September 25, 7.30 p.m., G5WW, Nethercote, Totteridge Lane, Totteridge.
Newbury (N. & D.A.R.S.).—September 27, 7.30 p.m., The Canteen, Elliotts of Newbury, West Street. October 13, "Hamfest."
Oxford (O. & D.A.R.S.).—September 25, October 9, 7.30 p.m., Club Room, Cherwell Hotel, Water Eaton Road, Oxford.
Portsmouth.—Tuesdays, 7.30 p.m., British Legion Club, Queen's Crescent, Southsea.
Southampton.—October 5, 7 p.m., 1 Prospect Place, Above Bar, Southampton.
Stroud.—Wednesdays, 7.30 p.m., Subscription Rooms.

REGION 7

London (L.M.L.C.).—September 20, October 18, 12.30 p.m., Bedford Corner Hotel.
London (U.H.F. Group).—October 3, 7.30 p.m., Bedford Corner Hotel.
London.—September 27, 6.30 p.m., E.L.M.A. Lecture Theatre, Victoria Embankment. ("Trends in Aerial Design," S. Kharbanda, G2PU.)
Acton, Brentford and Chiswick.—September 17, October 15, 7.30 p.m., A.E.U. Club, 66 High Road, Chiswick, W.4.
Bexleyheath (N.K.R.S.).—Second & fourth Thursday, 7.30 p.m., Congregational Hall, Chapel Road, Bexleyheath.
Chingford.—For date and venue phone: Wanstead 2321 or Silverthorne 1740.
Croydon (S.R.C.C.).—October 8, 7.30 p.m., Blacksmith Arms, 1 South End, Croydon.
Dorking & Leatherhead.—October 8, 7.45 p.m., Star and Garter Hotel, Dorking. (Film Show.)
Ealing.—Sundays, 11 a.m., ABC Restaurant, Ealing Broadway, W.5.
East Molesey (T.V.A.R.T.S.).—October 2, 8 p.m., Carnarvon Castle Hotel, Hampton Court. ("Frequency Measurement," E. A. Dedman, G2NH).
Harlow & District.—Tuesdays, 7.30 p.m., rear of G. E. Read (G3ERN), 6 High Street, Harlow.
Holloway (G.R.S.).—Mondays (R.A.E. and Morse), Fridays (Club), Isledon School, Upper Hornsey Road, Holloway, N.7.
Ilford.—Thursdays, 8 p.m., G2BRH, 579 High Road, Ilford.
Norwood & South London.—September 20, Windermere House, Westow Street, Crystal Palace. ("Receiver Design," G2FKZ.)
Slough.—October 1, QTH from G2HOX, 13 Quaves Road or G3GYD, 5 Parklands Avenue, Slough.
Welwyn Garden City.—October 10, 7 p.m., Annual Dinner at "The Red Lion," Hatfield. (Guest of honour: D. A. Findlay, D.F.C., G3BZG.)

REGION 9

Bath.—October 21, 7.30 p.m., 12 James Street West.
Bristol.—September 20, October 18, 7.15 p.m., Carwardine's Restaurant, Baldwin Street.
Exeter.—October 10, 7.30 p.m., G3FLK, 43 Prospect Road; November 14, 7.30 p.m., G8DA, 3 Chard Road.
Falmouth.—First Wednesday in each month, 7.30 p.m., Y.M.C.A., Bar Road, Falmouth.
North Devon.—October 3, 7.30 p.m., G3BO, "Rosebank," Westcombe, Bideford.
Plymouth.—Alternate Tuesdays, 7.30 p.m., Virginia House Settlement, Barbican.
Torquay.—Second Saturday in each month, 7.30 p.m., Y.M.C.A., Castle Road.
Weston-super-Mare.—Second Wednesday in each month, 7.30 p.m., Albert Hotel, Sea Front.
Yeovil.—Wednesdays, 7.30 p.m., Grove House, Preston Road, Yeovil.

REGION 10

Cardiff.—October 14, 7.30 p.m., "The British Volunteer," The Hayes, Cardiff.
Neath and Port Talbot.—October 1, 7.30 p.m., Royal Dock Hotel, Briton Ferry.
Pontypool.—Tuesdays, 7 p.m., Educational Settlement, Rockhill Road.

REGION 11

Rhyl (F.R.S.).—October 2, 7.30 p.m., Marine Hydro, Rhyl (Mullard Film meeting).

REGION 14

Glasgow.—September 27, 7.15 p.m., Christian Institute, 70 Bothwell Street, Glasgow, C.2. (Single Sideband Techniques," Part 2, GM3CIX.)

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10,245	10,501	10,567	10,856	11,501	11,814	12,685

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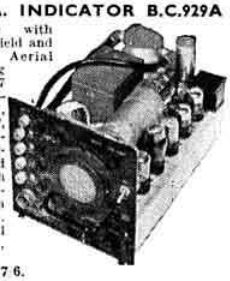

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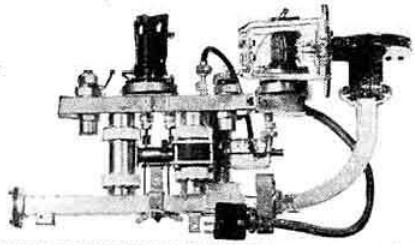

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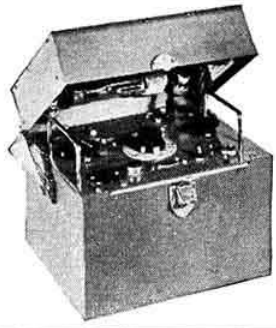

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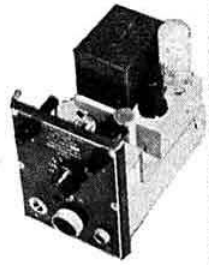

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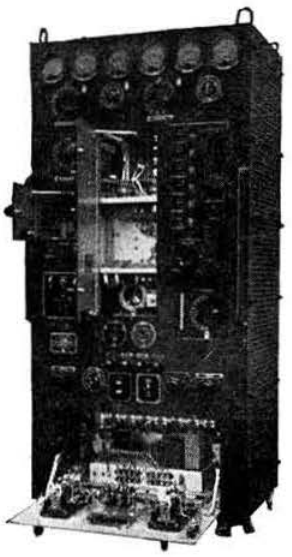

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R.C.A. AR77E 540 kc/s-31 Mc/s	£32
Hallicrafters S.38C, 550 kc/s-30 Mc/s	£25
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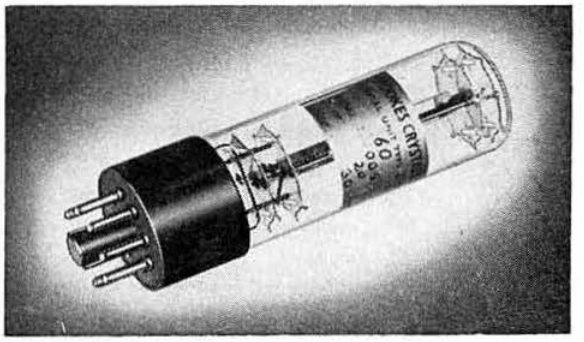

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