# RSGB BULLETIN

SEPTEMBER 1964
VOL. 40, No. 9

ON4VY OPERATING GB3RS

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

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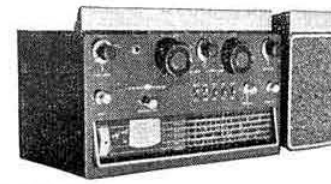

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**Volume 40 No. 9**

**September 1964**

**3/- Monthly**

# RSGB BULLETIN

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**Front Cover:** René Vanmuysen, ON4VY, operating GB3RS with the President, G. M. C. Stone, G3FZL, on August 7, 1964. For further details of this historic event see page 593. *Photo by Russell Preece*

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(Incorporated 1926)

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# Current Comment

*discusses topics of the day*

## *An Important Job for You*

IN the November 1963 BULLETIN there appeared an article by Major Haylock, G3ADZ on the work of the RSGB Intruder Watch. This vital job, undertaken by a very few devoted members has been serving you for many years and the time has come when we urgently need volunteers to help it carry on.

The importance of the work done by the Intruder Watch cannot be overemphasized and it just cannot be allowed to go by default for the want of a few people willing to give up a little of their time to check, record and report transmissions being made in the exclusive amateur bands from stations which are not authorized to use them.

It is the sort of job that should appeal particularly to the keen listener but we can use the services of licensed members also if they are willing to forgo the occasional QSO in order to keep the bands open for their own and other's use.

The way in which the Watch is kept and the methods employed were fully explained by G3ADZ. Anyone who is interested—everyone of us should be—and desires to have more information is invited to write to RSGB Headquarters, marking the envelope " Intruder Watch."

Those of us who have attended International Conferences and know the ways of certain Administrations, have many times had cause to be grateful to the few stalwarts who have maintained the Intruder Watch.

The main requirements are a good receiver, a fair knowledge of Morse, experience in identifying different types of transmission (for example, multiplex and two channel double frequency teleprinter), ability to tell genuine signals from spurious emissions, second channel, etc., a frequency meter, a knowledge of international procedures and some public-spirited enthusiasm.

From among well over 12,000 members, it should not be difficult to find a handful who are willing and able to do this efficiently.

Amateur Radio needs your help and needs it now.

# RSGB International Radio Communications Exhibition

Seymour Hall, London, W.1

October 28-31, 1964

### OFFERS OF EQUIPMENT FOR DISPLAY

Members are reminded that offers of home constructed equipment for display on the Society's stand are still required and should be sent to the Honorary Secretary of the Exhibition Committee at the address below.

A Silver Plaque will be awarded for the best piece of home constructed equipment displayed. For exhibits by members residing outside Region 7 (London Area) there will be two further prizes, consisting of vouchers to the value of 10 guineas and five guineas.

A special award of a voucher for five guineas will be made for the best piece of home constructed equipment entered by a member who is not, nor has been, employed in the radio or electronics industry. Entrants will be required to submit a signed declaration to the effect that they are not and never have been employed in the radio or electronics industry, that the item was constructed at their home, and that the construction and design is entirely their own work. It is emphasised that the smartest (in appearance) exhibit may not necessarily win the award.

### OFFERS OF ASSISTANCE

The Exhibition Committee requires offers of assistance to man the RSGB stands during the period of the Exhibition.

Offers should be sent to the Honorary Secretary of the Exhibition Committee, R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley, Sussex.

# A Transistor Pre-amplifier with Diode Clipping

By E. L. GARDINER, B.Sc., G6GR*

THE high-level modulator employed at G6GR for many years, and which terminates in a pair of 805s, has rather low gain by modern standards, requiring about one volt r.m.s. input to drive these valves to 100 watts of audio output. Moreover, although a " splatter filter " carefully constructed on the lines described on page 264 of the ARRL *Handbook*, 1958 edition, is used following the UM2 modulation transformer, provision for adequate speech-clipping in order to take full advantage of it was not available. As an ancient valve pre-amplifier had been " retired " due to honourable old age, it was felt that a transistor equivalent should be built as a step towards the goal of a more compact station layout, and to provide the gain necessary to try out various types of low-level microphones.

Previous experience had shown that audio stages employing transistors had not always functioned quite as well as their designers claimed, and that adjustment of resistor values had been necessary in order to obtain the lowest distortion, no doubt as a result of the wide variation in parameters which the lower priced transistors in particular frequently show. Some reading and experiment in this field brought to light a circuit arrangement which, whilst in no sense original, enables almost any of the several hundred varieties of audio transistor, which the average amateur may happen to acquire, to be used successfully in low-level audio stages with very similar results. Provided that too high a stage gain is not required, this circuit can be set up experimentally to give a very low level of distortion from almost any reasonable transistor and supply voltage, with the proviso that the latter should not exceed about half the maximum collector limiting voltage specified by the manufacturer. This point will be further considered later.

### Theoretical Considerations

The circuit is shown in Fig. 1, as applied to a typical *p-n-p* germanium transistor such as the Mullard OC71. The grounded emitter form of circuit has become much the most widely used for audio stages, and the working point of the transistor is determined mainly by the base bias, which in this instance is made adjustable by the potentiometer VR1, of 50K ohms. This value is not critical, and if it is important to draw minimum current from the negative rail, it may be raised to 100K ohms, or even higher. A collector load resistor, R3, of 4·7 or 5K ohms will suit the majority of transistors, and is again not critical. If, however, the transistor in use is one of the very low noise, or low current rating varieties, or is used in an early stage where signal levels are only in the millivolt region, it may be advantageous to raise the collector resistor to 10K ohms. The important point concerning this resistor is that it should be high enough to limit the collector current to a safe value under all conditions of base bias adjustment. For supply rail voltages between 6V and 12V, 4·7K ohms will normally do this.

The transistor is further protected by the emitter bias resistor of 1K ohm, which seems to be a " magic value " in this application, just as it always was for the cathode resistor of the majority of small audio valves in the past, such as the 6J5. This resistor is also in the form of a potentiometer, VR2, and the slider is connected to the earth line through a large electrolytic capacitor, C1, 20 $\mu$F at 12 volts d.c. minimum working being sufficient for speech purposes. Thus the emitter resistor will consist of a bypassed portion and an unbypassed portion in series. The latter, being adjustable, provides negative feedback to control stage gain and improve linearity. It is well known that the gain of a transistor stage of this kind, ignoring the effects of loading by a following stage, is given very closely by the ratio of the collector load resistor to the emitter resistor. If the former is considered as R3, and the un-bypassed part of the cathode emitter resistor R4, then the approximate stage gain is

$$\frac{R4}{R3}$$

and is substantially independent of the current gain of the transistor itself, provided that this is very much higher than the stage gain required. Thus, if the collector resistor is 5K ohms, and the emitter potentiometer set half-way to give a negative feedback value (R4) of effectively 500 ohms, then the stage gain will be found to be 10 within a few per cent, no matter which of a typical handful of audio transistors happens to be used. The differences which do exist

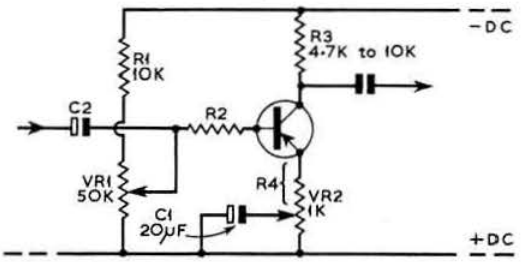



**Fig. 1. Circuit diagram of an experimental a.f. transistor amplifier stage.**

will be in respect of the upper frequency response, the maximum output available without serious distortion, and in the base bias setting. The two former are likely to be quite good enough for an amateur pre-amplifier in all cases.

Coming now to the all-important question of bias, this will vary for every type and specimen of transistor to some extent. By far the best way to determine the optimum value is to test the stage under working conditions with an audio tone input, preferably when working into whatever external load or following stage is to be used. The writer was fortunate in having the use of an Advance H1 audio oscillator, but if nothing of this kind is available there are a number of methods which have been used to get round the difficulty. For example, a tape recording can be made of the BBC tuning signal, and a short length of tape subsequently cut out and joined into a continuous loop to reproduce the tone for as long as it is wanted as a test signal. Alternatively, a number of circuits have been published for simple single-transistor audio oscillators quite adequate for the purpose, or it is even possible to get a suitable test tone from the station receiver by tuning to a harmonic of the transmitter v.f.o., and beating this against the receiver b.f.o. as if it were an incoming c.w. signal. For this purpose frequency and stability are not of prime importance, provided that a single tone between 400 and 1000 c/s and of good sine waveform can be conveniently obtained.

This tone is fed into the stage being set up, at a level low enough not to cause overloading, and the output from the collector circuit observed on the simplest form of oscillo-

* 223 Tettenhall Road, Wolverhampton, Staffordshire.

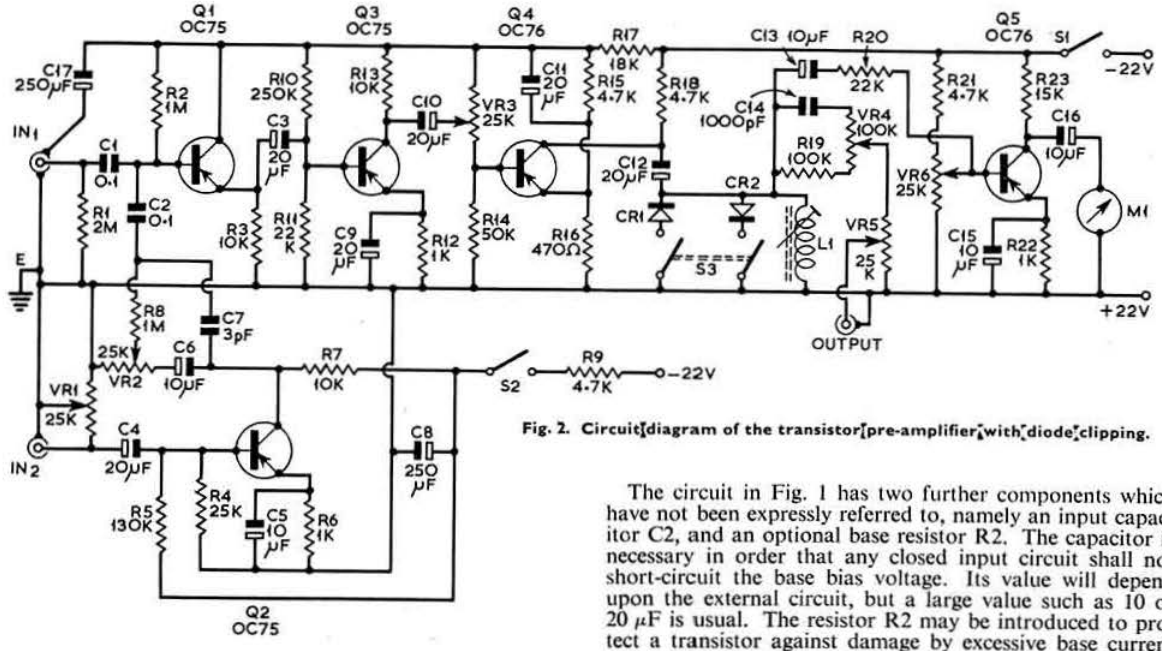



Fig. 2. Circuit diagram of the transistor pre-amplifier with diode clipping.

scope, that used at G6GR being an ex-army unit of very elementary design. The whole purpose is to observe distortion of the amplified waveform, and provided a stationary display can be obtained which can be compared with the test signal, it will be possible to adjust the transistor base bias for minimum distortion. The bias setting will be found to be quite sharp, and will become more so as the input signal is increased. A helpful procedure is to increase this level progressively, adjusting bias for minimum distortion after each increase, until an exact setting is arrived at which gives the strongest undistorted output. The effect of varying the negative feedback factor by means of VR2 can then also be checked, and a value selected to give the most suitable compromise between distortion, maximum output, and stage gain. Probably a fully bypassed emitter resistor will be chosen in the case of low level or input stages, but a degree of feedback is very desirable as higher signal levels are built up in subsequent stages, since it increases the output available with low distortion.

Having chosen the best bias setting for the transistor and application in hand, the two halves of the potentiometer VR1 may be read off on a multimeter, and fixed resistors of the nearest standard value substituted. Whilst the use of an oscilloscope of some kind is much the easiest procedure, reasonable results can be obtained from headphones, if the user has a good ear for distortion! If h.r. 'phones are available, it will still be essential to feed the transistor stage into the correct load into which it will eventually work, or into a resistor of equivalent value. Alternatively, low resistance 'phones must either be of the correct impedance to simulate this load, or fed through a buffer amplifier, since the " no-load " bias setting will not be the same as the loaded setting. Estimating distortion by headphone listening is not as sensitive a method as viewing the output waveform, but it can be argued that distortion which is too small to be heard will not be serious in an amateur modulation amplifier. In the writer's experience it can still be a better method than relying upon the " book " values of biasing resistors. In this particular case where a transistor of unknown characteristics is to be used, it gives a satisfactory means of finding out if in fact the transistor is good enough for the job.

The circuit in Fig. 1 has two further components which have not been expressly referred to, namely an input capacitor C2, and an optional base resistor R2. The capacitor is necessary in order that any closed input circuit shall not short-circuit the base bias voltage. Its value will depend upon the external circuit, but a large value such as 10 or 20 $\mu$F is usual. The resistor R2 may be introduced to protect a transistor against damage by excessive base current under conditions of excessive bias, and may be advisable in the case of unknown transistors, or if a negative rail voltage higher than, say, 9 volts is being used. A typical value is 10K ohms, and it will have the effect of reducing the stage gain somewhat, and also introducing high frequency loss. However, after a safe working bias setting has been arrived at, this resistor can be removed from the circuit in the low-level applications that we are considering.

### A Practical Circuit

The experimental procedure that has been outlined in the preceding paragraphs was used to arrive at the modulation pre-amplifier shown in Fig. 2. It should be stressed that whilst the values given for the components have proved excellent in the writer's shack, the circuit is capable of working well with a wide variety of transistor types in the audio range, and most of the component values are not critical. If, however, other transistors are chosen, it is suggested that the base-bias resistors R2, R4 and R5, R10 and R11, and perhaps R14, are made variable, so that the whole unit can be set up for minimum distortion by the methods described. Small pre-set carbon potentiometers of the kind freely used in transistor equipment today take up very little room, and can, if one feels so inclined, be left in place, so that the amplifier could be realigned in later years should the transistors or components age, or the overall requirements change.

Two alternative input stages are provided for the pre-amplifier, Q1 being for use with crystal or high impedance microphones, whilst Q2 is for low impedance microphones, such as dynamic or magnetic units. Q1 is used as an emitter follower, having a high input impedance, and in many ways resembles the valve cathode follower in behaviour. The resistor R1 can be of any high value, and serves only to hold down the input circuit when no microphone is plugged into the socket IN1. Many crystal microphones have a resistor internally connected, when R1 can be omitted. The bias resistor R2 must be carefully selected to suit the transistor, although 1M ohm will work well with the majority, as the high emitter load resistor of 10K ohms makes this stage largely self-biasing. Under average amateur speech conditions the use of a special low noise transistor, such as the

AC107, does not seem to be necessary, although it could be regarded as an improvement.

The alternative input stage Q2 is a normal high gain amplifier, feeding into Q1 through its own gain control VR2, and thus providing a much higher overall amplification. An adjustable resistor VR1 is joined across the input socket IN2, so that the load seen by a low impedance microphone can be adjusted to give the most effective speech quality. A degree of " top lift " is introduced by the bridging capacitor C7 across VR2, since most dynamic microphones seem to need this assistance. Users of very low output ribbon or equivalent microphones would be well advised to use a low noise transistor such as the AC107, when the resistor values given in a circuit in wide commercial use are 150K ohms for R4, 27K ohms for R5, and 3·9K ohms for R7 when used from a 7·5 volt negative rail. These values have not been checked in the present design, and the transistor used by the writer raises no noise problems when used with a popular moving-coil microphone having a built-in transformer, and described as " medium impedance." However, it should perhaps be pointed out that the whole amplifier was designed primarily for use with relatively close-talking crystal microphones into Q1. The Acos Mic 45 has been found, in the writer's experience, to yield the best reports of intelligibility over the air in comparison with a considerable number of other types, all of which have now been scrapped in its favour.

The stage Q2 is a separate sub-unit, and if not required, it can be omitted in its entirety without any disturbance to the remainder of the amplifier. At this juncture it may be of interest to note that a transistorized pre-amplifier of this nature has, amongst other advantages over a valve circuit, the property that audio transistors are quite insensitive to the radio frequencies in amateur use, having a sharp cut-off generally below 1 Mc/s. Consequently, r.f. feedback into the amplifier or microphone leads, which can be such a nuisance at times with earlier equipment, is conspicuous by its absence.

The second stage of the amplifier, Q3, is used as a conventional high gain circuit, and requires no further comment, being perhaps the least likely stage to give any kind of trouble. The coupling capacitors used throughout the design can be varied considerably without important effect upon the performance, and have been chosen to give a falling base response below 300 c/s. Values of 10 $\mu$F, 20 $\mu$F, or 25 $\mu$F can be used indiscriminately. It is advised, although not absolutely essential, that 25 volt working miniature electrolytics be used throughout, so that a high negative rail voltage can be employed as described later, should this be preferred. Similarly, C1 and C2 could be somewhat larger with no ill effect, 0·02 $\mu$F or 0·05 $\mu$F being satisfactory. The supply bypass capacitors C8 and C17 are given as 250 $\mu$F, and using this value the original equipment has proved free from instability. Larger capacitors, if available, can be used with every advantage, and may enable the working life of the batteries to be extended. The values of most of the electrolytic capacitors are of prime importance only in hi-fi designs, and for speech purposes are not at all critical. The 10 $\mu$F and 20 $\mu$F capacitors were selected mainly because they were available at the time.

The third stage, Q4, requires the use of a somewhat larger transistor than is necessary in the preceding stages as it is expected to deliver an output voltage swing in excess of 4 volts into rather a lower load impedance, which is in addition highly variable. Hence the stage is designed with more emitter feedback, the values being chosen to give the best clipping waveform on the oscilloscope. With switch S3 open, the stage feeds straight through into an output gain control VR5, which is necessary because the input required into a following amplifier is generally less than one volt r.m.s., whilst the output available is considerably higher than this. On closing S3 the two Zener diodes, CR1 and CR2, are connected back-to-back across the line, and clip the speech waveform symmetrically at a level rather below 4 volts peak. The diodes used were obtained from Brush Crystals Ltd. as samples of a particularly low voltage type now available, and having a nominal Zener voltage of 3·5. Higher voltage Zener diodes could be used, perhaps up to the more generally obtainable 5 or 6·3 volt types, but the degree of speech clipping would be reduced, as this is proportional to the ratio of the clipping voltage level to the peak speech voltage available from Q4.

Zener diodes, although convenient and effective, are not essential in an amplifier of this nature. Normal silicon diodes, such as the Mullard OA200 series can be used, and will clip at a level of approximately one volt if merely inserted into the circuit as illustrated. Better performance is obtained, however, if a biasing voltage from one or two dry cells is inserted into the earth return from each pole of S3, the bias sense being positive towards CR2 and negative towards CR1. This is a common American circuit, and capable of excellent results. It is also possible to employ germanium diodes, such as the Mullard OA81 or OA91, but the clipping action is less perfect because these devices have a higher forward resistance than their silicon counterparts. The relative cleanness of the clipping action obtained is best judged by the oscilloscope trace. However, it is arguable if the difference between the various diodes mentioned would be genuinely noticeable under DX conditions.

The diode circuit gives its best performance into a load of low d.c. resistance, and therefore the choke L1 was employed. This is in fact the primary winding of a Radiospares type T/T3 transistor coupling transformer, of ratio 3·6 to 1 + 1, as it was felt convenient to have a low impedance output from the secondary of this transformer, to be fed into a further transistor modulation amplifier in the future. The output from VR5 is suited to the higher input impedance of a valve amplifier, for which it is in fact used. The inductor L1 is neither essential nor critical, and it can be replaced by a resistor without serious loss of performance, except that as Q4 will now see a lower overall load, there is a reduction in the maximum clipping ratio obtained. Experience over the air showed that many operators, particularly mobile stations and those using highly selective s.s.b.

## COMPONENT LIST FOR FIG. 2

| | |
|---|---|
| C1, 2 | 0·01 $\mu$F tubular. |
| C3, 4, 9, 10, 11, 12 | 20 or 25 $\mu$F, 25V wkg. electrolytic. |
| C5, 6, 13, 15, 16 | 10 $\mu$F, 25V wkg. electrolytic. |
| C7 | 3 pF silver mica or ceramic. |
| C8, 17 | 250 $\mu$F or larger, 25V wkg. electrolytic. |
| C14 | 1000 pF silver mica. |
| CR1, 2 | Brush Z 3·5 (see text). |
| L1 | Primary of a.f. transformer (see text). |
| M1 | Post Office pattern db meter (see text) |
| Q1, 2, 3 | Mullard OC75 (see text). |
| Q4, 5 | Mullard OC76 (see text). |
| R1 | 2 M ohms, or higher value, $\frac{1}{4}$ watt. |
| R2, 8 | 1 M ohms, $\frac{1}{4}$ watt. |
| R3, 7, 13 | 10K ohm, $\frac{1}{4}$ watt. |
| R4 | 25K ohms, $\frac{1}{4}$ watt. |
| R5 | 130K ohms, $\frac{1}{4}$ watt. |
| R6, 12, 22 | 1K ohm, $\frac{1}{4}$ watt. |
| R9 | 4·7K ohms, $\frac{1}{2}$ watt, 10 per cent. |
| R10 | 250K ohms, $\frac{1}{2}$ watt, 5 per cent. |
| R11 | 22K ohms, $\frac{1}{4}$ watt, 5 per cent. |
| R14 | 47 or 50K ohms, $\frac{1}{2}$ watt, 10 per cent. |
| R15, 18, 21 | 4·7K ohms, $\frac{1}{2}$ watt, 10 per cent. |
| R16 | 470 ohms, $\frac{1}{4}$ watt, 10 per cent. |
| R17 | 18 or 20K ohms, $\frac{1}{2}$ watt, 10 per cent. |
| R19 | 100K ohms, $\frac{1}{4}$ watt, 10 per cent. |
| R20 | 22K ohms, $\frac{1}{4}$ watt, 10 per cent. |
| R23 | 15K ohms, $\frac{1}{2}$ watt, 10 per cent. |
| S1, 2 | On-off toggle switch, single pole. |
| S3 | On-off toggle switch, double pole. |
| VR1, 2, 3, 5, 6 | 25K ohms, 1 watt, wire wound. |
| VR4 | 100K ohms, 1 watt, carbon track. |

receivers, preferred increased high frequency response, and for this purpose the network consisting of C14, VR4, and R19 was added. Theoretically this network is capable of some 18db of lift at 3 kc/s, and has proved popular with many operators, as no doubt it helps to offset the loss introduced by the following high-level " splat " filter, and in effect gives a sharper audio cut-off.

The final transistor stage Q5 is not strictly part of the main design, and could be omitted if preferred, as from its input capacitor C13. This stage drives an ex-GPO decibel-meter obtained from the usual surplus sources, and which is in effect a bridge rectifier type a.c. voltmeter, calibrated in db. As a substitute any available 1 mA, or more sensitive, moving-coil meter could be used, in series with a germanium diode such as the OC81. In this application the meter should be damped by the addition of a resistor across its terminals, selected to give a suitable full scale deflection for the maximum speech level desired from the amplifier, and also by a parallel capacitor in the region of 1 $\mu$F, in order to increase the time constant, and indicate a reasonably steady speech level. The GPO decibel meter already has critical damping inherent in the design. It is probable that a spare S meter, calibrated in db for one of the popular American communications receivers could be found, which would meet this requirement.

Provision of the meter stage is very helpful in monitoring the performance of the amplifier, and keeping a reliable level of modulation. With the speech clipping switched out, the meter will show the level of speech peaks corresponding to a particular microphone and gain setting, and it is convenient to make the meter shunting resistor a pre-set variable panel control, so that the meter can be set to read full scale on the normal operating adjustment. On switching in the clipping diodes by means of S3, the meter reading will fall by a certain number of db, which is a measure of the clipping action. It is then only necessary to set the gain of the main modulation amplifier, or the output gain control VR5 to give full modulation at the clipped level, and the system is in correct adjustment throughout. Any drop in battery voltage, or other loss of performance, will show up at once as a drop in the average meter reading. The input gain control VR3 can be set to maintain the correct level for the voices of other operators, changes in microphones, or in talking distance.

Coming now to the selection of transistors, and of the corresponding supply voltage to be used with them, a wide choice is possible. The governing factor is simply that the higher the speech peak voltage which can be generated at the collector of Q4, the greater will be the clipping ratio obtainable from any particular pair of Zener diodes, and it is nice to have plenty in hand. The peak voltage safely obtainable will be limited to something less than the collector voltage of Q4, and it is therefore advantageous to have as high a line voltage as the transistors will safely accept. For this reason the types OC75 and OC76 were used by the writer, because they were available, and the latter has a maximum collector rating of 32 volts. The OC77 with a rating of 60 volts would be an even better choice. With these transistors the supply line was progressively raised until with a 22·5 volt photoflash battery it was found that the pre-amplifier delivered all the output which could be usefully employed with the writer's particular modulation equipment. The maximum clipping obtainable appeared to be approximately 18db, and it is probable that 12db will be as much as most operators will generally wish to use, as higher levels begin to have rather a drastic effect upon speech quality.

At this juncture it is worth remembering that the handbooks tell us that speech waveform is not symmetrical, and the effect of reversing the microphone leads or the connections to the capsule should be tried where this is possible, as the correct sense will be found in some instances to give a noticeable improvement. Whether this effect is noticeable depends very much upon the operator's voice, and there is not, as a rule, much to be gained by reversing leads *after* the clipping stage, since most of the asymmetry will be removed by the compressing action. It is, however, important to ensure that whenever any great difference can be noticed, the stronger speech peaks correspond to upward modulation of the transmitted carrier, and this can be effected by reversal of leads after the pre-amplifier.

In cases where lower rating transistors, such as the OC71 and OC72 are used, it is advisable to limit the line voltage to 12V, when the results will not suffer a great deal. The system will work with as little as 6 volts supply, but the clipping action at this level is perhaps hardly worthwhile, although the pre-amplifier will act as an over-modulation protection device since the diodes effectively prevent the speech output from rising above a fixed level however loudly one talks. With silicon diodes such as the OC200 for CR1 and CR2, about 8db of clipping has been measured, at an output level of some 0·8 volts peak, and this will be quite useful provided that the main modulation amplifier which follows has sufficient gain to deliver its full output from this signal. With the specified design as illustrated, the pre-amplifier will deliver nearly 4 volts peak, which is ample for almost any main amplifier, and if the latter is being built, may make it possible to leave out the first stage (frequently an EF86) and thus save work. As has been explained, when using a transistorized main amplifier, a suitable low-impedance signal into the first base circuit can be derived from the secondary of L1, which is in fact a transistor coupling transformer primary.

There remains only to consider the layout and construction of the amplifier, which the writer does not propose to describe in detail as it is felt that the construction at G6GR would not be most people's " cup of tea." The station is still of rather bulky rack-and-panel design, and the pre-amplifier was laid out in the most straightforward manner on a single long tag-board laid flat against the back of the standard aluminium panel, between two horizontal rows of sockets and controls. Input sockets are to the left of the panel, and output to the right, the other controls being arranged from left to right in their circuit order, thus keeping all leads very short. This general method of laying the components flat against an earthed metal panel, and as close as possible to it, seems eminently satisfactory, as no trace of instability has been noticed at any phase of the work. The earthed panel effectively prevents hum pick-up, provided of course that there are no large a.c. components too near, and reduces risk of feedback through stray capacities. Most of the stray capacity will be from the components to earth, rather than to each other, and at audio frequencies with the low impedances used in transistor circuitry, the effects of this shunt capacity in causing high frequency losses will be negligible in the amateur speech range.

Constructed in this manner, the pre-amplifier is quite large, but this was not felt to be important when the other equipment used with it is even larger. However, the circuit, containing no bulky components, could be made up in a very compact form, and the present unit is thought of as a trial of the design, to be built more compactly later. Transistor circuits give much less trouble from stray feedback than valve circuits, and provided that a straight-through layout without back-loops is used, and the components kept close to an earthed metal surface such as an Eddystone die-cast box, no trouble should be encountered from any reasonable construction. It is important not to make any kind of earth return through the panel or chassis, and in this respect transistor circuits are more akin to v.h.f. practice. Quite large currents flow through the earth returns, and because the circuit impedances are themselves relatively low, stray couplings caused by " earth-loops " can be very serious. The pre-amplifier described is earthed to the panel

at one point only, which can be at the input socket, or the positive battery terminal, and all circuit returns are taken to a single 16 s.w.g. tinned-copper busbar run along the length of the tag-board. Do not be tempted to earth this at both ends to make it nicely secure: the resulting loop can pick up enough r.f. from a nearby aerial feeder to give a large reading on the db meter! If the output transformer L1 is used, it will assist by breaking the earth loop at the output end. When feeding into a modulation amplifier through co-ax, however, it may be found best to earth the system at the output socket, or at the main amplifier input, and to insulate the microphone sockets from the panel or box. The inductance of a rack panel is not negligible at r.f., and there can be quite large r.f. potentials between the two ends of it. From this point of view a box is superior, and when constructed entirely within one there should be no objection to earthing both the input and output sockets directly to the body of the box, but this is not true for any kind of open chassis or panel construction.

In presenting this pre-amplifier as a suggestion to the busy amateur, no pretence is made at an elegant design employing advanced techniques. We can, of course, purchase the latest pairs of complementary transistors and sub-miniature components, and perhaps engineer the whole thing into a microphone casing, as the writer has in fact tried to do with some mobile equipment. The intention here is to offer a simple design, with the widest possible component and transistor tolerances, which was built almost entirely from the contents of a, perhaps rather well stocked, junk box, and which is working splendidly on the air after very little test or adjustment. Most of the components could be varied by as much as 50 per cent without serious effect, and it will work reasonably with almost any transistors, even those queer objects having no name or mark other than a spot of paint! It is worthwhile to have something reasonable as Q4, such as a small output type or an OC76 equivalent if possible, as this stage does the real work. A good sized battery is much more economical in the end than a tiny one, and will not give endless trouble by developing a high internal impedance almost before you have had time to get a reply to the first CQ.

# A Light-weight Aerial Feeder

By R. A. E. GERMAN, G3OZT *

SOME time ago the need arose for an open-wire feeder for use with the G5RV and tuned multi-band type aerials. It was felt that the usual 600 ohm line constructed from 14 s.w.g. wire and 6 in. spreaders was far too heavy and cumbersome for the job, usually resulting in a considerable sag at the centre of the aerial span.

An examination of the design charts in the various handbooks showed that a reduction of wire gauge and spacing would still give a characteristic impedance of about 600 ohms, and it was with this in mind that the light-weight feeder described here was constructed. It is realized that the actual feeder impedance is of little consequence when applied to tuned aerials, but the remarks are still pertinent.

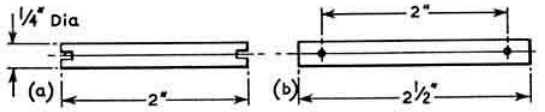



**Fig. 1. (a) Dimensions of polystyrene spacers. (b) Dimensions of the first spacer below the aerial connecting point. See text.**

## Construction

The spacers are made from ¼ in. diam. polystyrene rod cut into 2 in. lengths, with a shallow saw cut in each end as shown in Fig. 1(a).

Two lengths of 20 s.w.g. enamelled copper wire, slightly longer than the required feeder length, are stretched side by side between two suitable supports in the garden. The slotted ends of the spacers are then painted with polystyrene cement and fitted between the wires with the wires resting snugly in the slots. As the work of cementing and fitting proceeds, it is advisable to draw the wires together at intervals with insulating tape or string, as at point *A* in Fig. 2, to prevent the spacers from falling out before the cement has set.

About 2 ft. is allowed between spacers as this was found to be optimum, but this can, of course, be varied to suit individual requirements.

The ends of the spacers are given further coats of cement, each coat being allowed to dry before the next is applied, until a good sized blob of polystyrene has been built up around the wire.

In cases where the feeder does not hang freely beneath the aerial, but is pulled towards one end, as is usual when the shack is at the end of a centre-fed aerial, the first spacer below the aerial connecting point was found to be subject to a certain amount of strain and frequently parted company with the wire. To overcome this difficulty, a different type of spacer was made for use at this point. This spacer is cut to a length of 2½ in. and two clearance holes for the wire are drilled ¼ in. from the ends (Fig. 1(b)). The ends of the wire are pushed through the holes and the spacer is cemented in place. This part of the operation is best accomplished just prior to connecting the completed feeder to the aerial. A point often overlooked is not to allow the feeder to hang directly from the aerial, but to loop it around the insulator so that the joints themselves do not carry any of the weight.

## Results

A 50 ft. length of this feeder, which only took an afternoon to complete, has been in use for 18 months, and with only the supports at either end has satisfactorily withstood wind and weather. The only breakage that occurred was due to an entanglement with the XYL's washing, but it is felt that this is a test many a stronger feeder system would fail.

A 90 ft. span has been constructed but has not been in use for long enough to evaluate its performance.

Materials for the feeder are fairly cheap and readily obtainable. In the writer's case, more than enough 20 s.w.g. wire was provided by a large surplus transformer which also yielded sufficient 14 s.w.g. wire for the aerial itself.

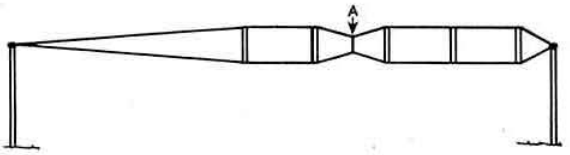



**Fig. 2. Suggested method of securing spacers while the polystyrene cement dries. See text.**

* 10 Beverley Road, Butts Ash Lane, Hythe, Southampton, Hants.

# A Simple Converter for 70 Mc/s

By JOHN C. GRAHAM, G3TR *

WITH the increasing popularity of 4m for fixed and mobile use, there seems to be a need for a simple and cheap converter which can even be built by a newcomer to Amateur Radio.

The idea behind the design to be described was to make something very simple and foolproof using the minimum of components to keep the cost really low. At the same time, although a reasonably good performance was essential, obviously there had to be some compromise between performance, simplicity and cheapness.

The converter is not intended to compete in performance with the more elaborate types which have been described in past issues of the RSGB BULLETIN. This little unit has, however, given very good account of itself and is in regular use by G3TR.

Fig. 1 shows that standard superhet practice has been followed, i.e., an r.f. amplifier followed by a mixer.

The valve chosen for the r.f. amplifier is the EF183 which gives a very high gain without being unduly noisy; this valve is of course in regular use in modern TV receivers which operate at frequencies very close to the 70 Mc/s band.

In order to achieve cheapness as well as simplicity a crystal controlled mixer is not used but an ECH81 mixer is employed, the oscillator section employing a coil and capacitors at fixed frequency instead of the crystal multiplier chain.

The r.f. stage is quite standard and coupling to the mixer is by transformer. Output from the mixer is by transformer in the anode circuit of the ECH81.

The intermediate frequency chosen was 21 Mc/s because the station receiver has good bandspread on this range, but other i.f.'s could be used by altering the oscillator frequency and the output transformer. Here a note of warning: for a 21 Mc/s output the oscillator frequency will be around 49 Mc/s and should not cause TVI. If, however, 28 Mc/s were chosen as an i.f. then the oscillator frequency would be 42 Mc/s which might cause TVI.

A v.h.f. Colpitts circuit was chosen for the oscillator—this gives adequate injection to the mixer and by a careful choice of capacitors stability after a short warm up period was found to be quite good.

* The Willows, Church Road, Lowfield Heath, Crawley, Sussex.

### Construction

To get the best out of this simple unit it is no good using a lash up! Follow the layout in the photograph, keep all leads short and use really stiff wire, particularly in the oscillator section otherwise microphony will take over on strong signals with fiendish results. I know—it happened to me in the prototype!

### Alignment

Having wired everything up and carefully checked to see that all is correct connect the converter to the main receiver which should be tuned to 21 Mc/s (or whatever i.f. has been chosen). Switch on power to the converter and adjust the slug in the i.f. output transformer until the noise in the main receiver is peaked.

Now comes the only difficult part. If you own a g.d.o. covering 49 and 70 Mc/s it should not be too difficult—if you don't, try to do what the writer did: borrow one from somewhere.

Assuming that a g.d.o. is available switch off the power to the converter and check the frequency of the oscillator coil L6 and then adjust the frequency by tuning C11 until the circuit is on 49 Mc/s; this should be around mid-position of C11.

The next step is to switch on the power and using the g.d.o. as a signal source on 70·3 Mc/s, place the g.d.o. anywhere in the shack—close coupling is not necessary. It will be found that by slight adjustment of the g.d.o. a loud signal will be heard. If the g.d.o. is near enough to 70·3 Mc/s all

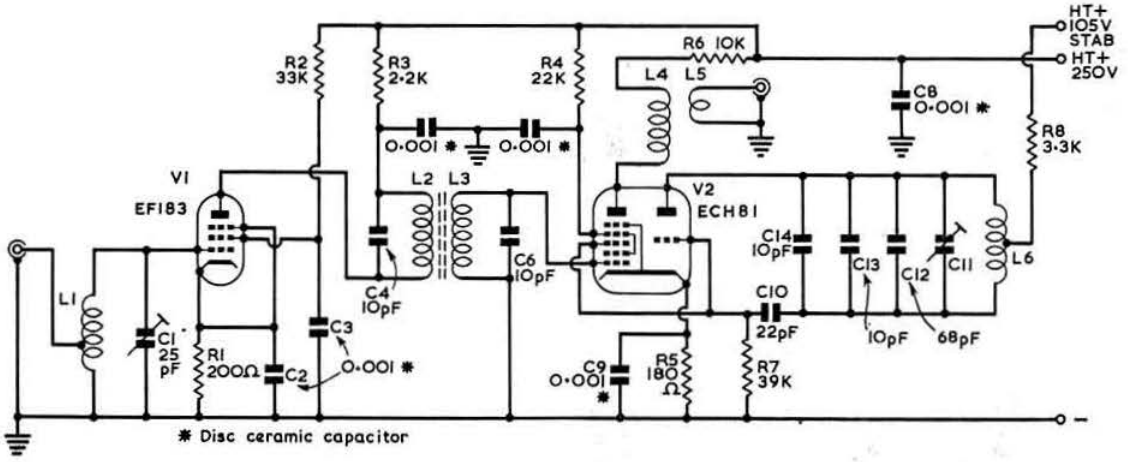



Fig. 1. Circuit of the 4m converter. C11, trimmer with two fixed and two moving vanes; L1, 7 turns, 18 s.w.g. tinned copper wire, tapped 3 turns from earthy end, ⅜ in. o.d.; L2, 3, 6 turns, 24 s.w.g. enam., spaced $\frac{1}{16}$ in. apart; L4, 28 turns, 24 s.w.g. enam., wound on ¼ in. diam. Aladdin former; L5, 3 turns, 24 s.w.g. enam., wound on same former as L4; L6, 3 turns, 16 s.w.g., centre tapped, with lead lengths of ½ in., wound on ¼ in. diam. Aladdin former.

is well. If not then set it to 70·3 Mc/s and adjust C11 until the strong signal from the g.d.o. is heard.

The slugs in L3 and L2 should then be adjusted for maximum signal. Having done this—plug in the aerial to the converter, and tune C1 for maximum signal—this is best done with the g.d.o. remote from the converter.

The final step in the alignment procedure is to listen for signals in the 4m band. If there is an amateur in the area who is on 4m ask him to come on the air for a test—it should be possible to hear his signals by tuning the main receiver. However, as g.d.o. calibrations at these frequencies are not always all that good, nothing may be heard, but all is not lost because a little tuning on C11 should put matters right. Final peaking up on L1, L2 and L3 can then be made and the job is done.

Alignment is of course more of a problem if no g.d.o. or signal generator that covers 70 Mc/s is available. Nevertheless if the instructions as to layout have been followed, pick a time when there is likely to be some activity on the band; Wednesday evenings and Sunday mornings are usually good.

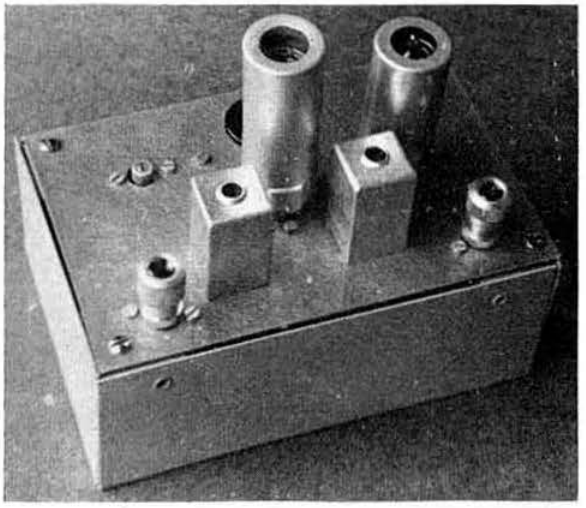
Peak up L4 as described earlier, then with the aerial plugged into the converter set the slugs in L2 and L3 about half way in and C1 at half mesh.

The only remaining adjustment at this stage is that of C11, the coverage of which is wide enough to take care of normal variations in construction. If there are any signals on 70 Mc/s, you can expect to hear a station by tuning C11. Do not despair if you do not—there are many hours when no one is on the band—just persevere and you will eventually be rewarded. After finding a signal carry out final adjustments to L2, L3 and C1 and you are then equipped for listening on 4m.

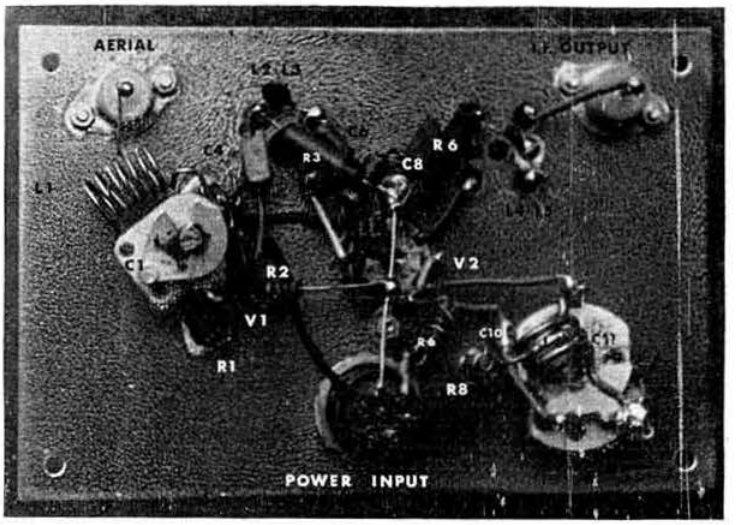
### Aerials

In conclusion, a word on aerials: no receiver will give its best unless it has a good aerial.

Local signals will be heard with just a dipole in the shack. A dipole 25 ft. high outside will enable more distant stations to be heard but to get the best results some form of beam array is really essential. So, to give this little converter a chance, put up the best aerial you can.



View of the completed converter.




Layout of the components below the chassis of the 4m converter.

## Kincardine on Top Band and Two Metres

Rarely do amateur signals emanate from the Scottish county of Kincardine as they did during the middle fortnight of July, 1964. The call used was GM3SIG, allocated to 92nd Signal Regiment, Army Emergency Reserve.

This year, a wealth of equipment was available. Through the generosity of G3EDD, the v.h.f. transmitter and receiver of the Pye Radio Club was lent to the Regiment; TW Electronics provided another complete v.h.f. installation consisting of a 10 watt transmitter, transistorized v.h.f. receiver, and power supply unit; and J-Beam Aerials Ltd. provided a 6-over-6 slot fed array.

V.h.f. activity occurred on several occasions, with Sunday, July 18 as the most important date, when the Club journeyed to Cairn o' Mounth. It was anticipated that an altitude of 1,492 ft. above sea level would be an advantage, but their arrival at the planned site coincided with a vicious thunderstorm, and they deemed it advisable to set up the station some distance below the Cairn. In torrential rain, the beam was erected, and soon after mid-day the station was in operation. Many stations in the Edinburgh and Glasgow areas were worked, whilst the best DX included G3BA (Sutton Coldfield), G3BNL (Notts.) and G3LRP (Wakefield).

Top Band working was carried out on several evenings. Heavy static made communication difficult but a number of stations in the south of England were contacted. A dipole was used, together with an HQ180 and a small transmitter for 160m.

The 92nd Signal Regiment has twelve licensed amateurs in its Radio Club, all of whom are members of the Royal Signals Amateur Radio Society. The Club is affiliated to the RSGB. Further details of the Club and the Regiment may be obtained from W. Robertson, GM6RI, Schoolhouse, Tannadice, by Forfar, Scotland, or from R. J. Hughes, G3GVV, "Farleigh," 65 Harlands Road, Haywards Heath, Sussex.

# TECHNICAL TOPICS

By PAT HAWKER, G3VA

*Silicon Controlled Rectifiers · Tunnel Diodes · More on the Hula-Hoop Aerial*
*Multiband Dipole with 300 ohm Feeder · Transistor Transmitters · Broad-band Pre-amp*
*Saturable Reactor Variable Inductance · Speech Compressor · Economical Valve Voltmeter*
*Receiver Wash and Brush-up · Rectifier Precautions*

ONE by one the final bastions of the thermionic valve are surrendering. During recent months we have seen demonstrations of semiconductors being used in almost every sphere of radio and television. Already u.h.f. tuners for television receivers are on the market (giving about 3db reduction in noise figure over equivalent valve tuners); stereo hi-fi amplifiers and even stereo radiograms (incidentally with silicon planar transistors in the v.h.f. tuner); more and more communications receivers including a fully transistorized version of the famous Racal RA17 (the RA217 due in production next year). We have even seen transistorized colour television receivers produced by the French firm CFT who have been developing the SECAM colour system.

The list could be extended almost indefinitely—and in each case some real advantages accrue from the change over from valve to solid-state. In professional communications equipment valves are now increasingly being confined to the high power r.f. stages of transmitters and (sometimes) to the front-ends of receivers where cross-modulation can still be a problem with transistors.

No wonder that in the January issue G2UJ questioned whether the days of the valve are numbered. The evidence for this is certainly continuing to mount.

### Silicon Controlled Rectifiers

One of the features of " solid-statery " is the number of off-shoots that have appeared. At first such devices are usually extremely costly but in most cases the prices fall until they come within the sphere of the amateur experimenter. Silicon transistors are beginning to come within this category—and so are silicon controlled rectifiers (s.c.r.) and tunnel diodes.

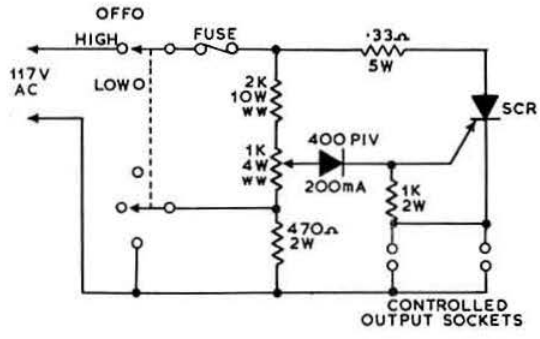



**Fig. 1. Typical circuit for a silicon controlled rectifier unit providing up to about 1 kW pulsating d.c. output power to the controlled sockets. The SCR is General Electric type C22B. Note that this unit is for 117 volt supplies and would require different values and ratings for 240 volts, but is included to illustrate the type of circuits which can be used for workshop and domestic applications of SCRs.**

In fact many circuits using s.c.r.s (the solid-state version of the thyratron) are already appearing in American journals. Although many of these have no direct application to amateur transmitters and receivers, they nevertheless seem likely to find many uses for ancillary control devices in the home and workshop.

For example, at the recent IEA Exhibition, we noted the use of these devices for controlling the speed of electric drills, and other applications requiring controlled speeds with constant torque for small motors. Light dimmers, battery chargers, temperature control for soldering irons are other fields in which these units are likely to find widespread use.

The s.c.r., like the thyratron, presents a high impedance until a certain critical triggering current is applied to its " gate " electrode. Once conduction has been initiated in this way, the gate loses control and the device remains low impedance until the supply voltage has been removed or reversed its polarity. Thus before triggering an s.c.r. has the inverse characteristic of a silicon rectifier; while after triggering it has the forward characteristic. When an a.c. input is applied, it is possible to control the output by means of phase-shifting to adjust the exact position in the half-cycle at which the gate of the s.c.r. fires.

Fig. 1 shows a typical control unit from *Radio Electronics* (June, 1964); this is for 117 volt supplies and would have to be redesigned for 240 volt supplies but is included to show a type of s.c.r. circuit which has wide application in the field of domestic control applications up to about 1 kW, and which the gradual lowering of s.c.r. prices will make possible.

### Tunnel Diodes

Another type of semiconductor device which as yet appears only infrequently in Amateur Radio journals but which is well worth keeping an eye on is the tunnel diode. First described in 1958 by the Japanese engineer Leo Esaki (hence sometimes called the Esaki diode), these were soon hailed as a major new technique for obtaining the advantages of a transistor—and some additional ones—with only a two-terminal device. But rather soon the circuit snags which this involved (for example the difficulty of separating input and output circuits) led to many people abandoning work on them. But there are now increasing signs that this phase has passed and that practical interest is again increasing rapidly.

While new tunnel diodes are still fairly expensive, we have seen surplus units containing several of these diodes selling around 2s. 6d.

From an amateur viewpoint, one of the most promising applications would seem to be low-noise v.h.f. and u.h.f. pre-amplifiers. Although the noise figure tends to be greater than the best parametric amplifiers, there is no complication of a pump frequency being required.

We noticed recently that one of the radio telescope observatories reported having used a tunnel diode pre-amplifier for over a year with excellent results—achieving a

noise figure of around 5db in the 8000 Mc/s microwave band (gain over 10db), with stability, reliability and low-cost.

A Hughes engineer also told us recently that it is planned to use a tunnel diode front-end for the receivers in some further synchronous communication satellites.

### The DDRR Hula-Hoop Aerial

Last year, *TT* (April, 1963) presented the first brief description in an amateur journal of the " hula-hoop " or DDRR (directional discontinuity ring radiator) aerial invented by Mr. J. M. Boyer, W6UYH, of Northrop Space Laboratories. Subsequently, several British amateurs are known to have carried out some experiments although results were generally rather disappointing. Later we worked YU3EM who told us that on 7 Mc/s he had worked some very good DX with a hula hoop aerial, although we are not certain if this was a true DDRR system.

Now, in *CQ* (June, 1964) W4MIP provides an extensive description of these aerials with dimensions for all bands: see Fig. 2.

He points out—as we indicated in *TT* (August, 1963)—that an extremely efficient ground plane is needed and recommends a solid copper or aluminium (provided this is prevented from becoming oxidized) sheet with a diameter about 25 per cent larger than the aerial ring.

By using a thick loop (as shown in the table) operation is possible, says W4MIP, on two bands; for single-band operation a much thinner loop is possible. He also points out that the tuning capacitor must have very high voltage rating—about 4 kV for 100 watts.

It is only fair to add that there is still some controversy over various points relating to the principles of the DDRR aerial, and an article in *Microwave Journal* (November, 1963) did not support the views of W6UYH, although the aerial then described did not have precisely the configuration of his ring aerial.

Early this year we wrote to W6UYH to ascertain whether any further articles had been published on this system, and he very kindly replied that although additional information was being prepared, most of the existing material is in the form of " classified " military reports.

The stringent requirements for the ground plane make the aerial rather less attractive than at first sight for amateur operation on the low-frequency bands—but there is obviously a good deal of scope for further experimenting.

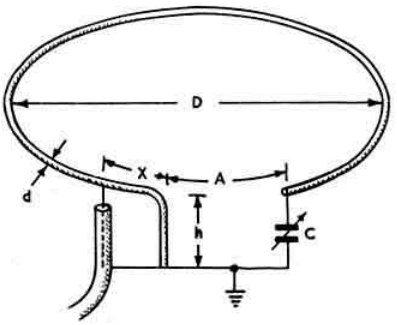



**Fig. 2. Dimensions given by W4MIP for the W6UYH Northrop Hula-Hoop DDRR aerial.**

| Band | D | H | d | A | X | Cl |
|---|---|---|---|---|---|---|
| 160m | 36 ft. | 48 in. | 5 in. | 18 in. | 12 in. | 100 pF |
| 80m | 18 ft. | 24 in. | 5 in. | 12 in. | 6 in. | 100 pF |
| 40m | 9 ft. | 12 in. | 2½ in. | 6 in. | 3 in. | 75 pF |
| 20m | 4 ft. 6 in. | 6 in. | 1 in. | 3 in. | 1½ in. | 50 pF |
| 15m | 3 ft. 4 in. | 4½ in. | ½ in. | 2 in. | 1 in. | 35 pF |
| 10m | 2 ft. 3 in. | 3 in. | ½ in. | 2 in. | ¾ in. | 25 pF |

**where D is diameter of loop, H is height above ground plane, d is tube diameter (two band), A is gap, X is feed-point.**

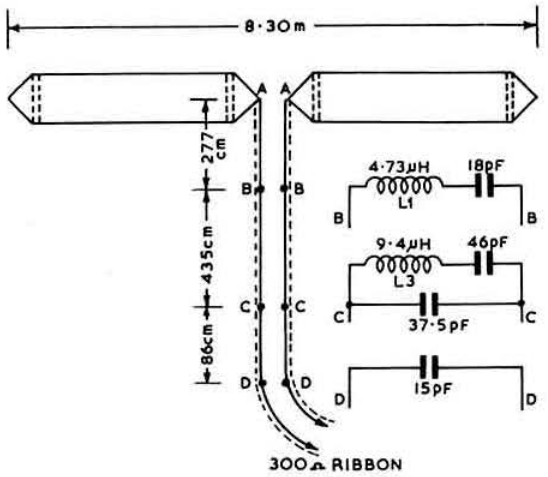



**Fig. 3. F9GO's multi-band dipole for 7, 14, 21 and 28 Mc/s. Basically the aerial is a broadband doublet resonating on about 17 Mc/s and appears capacitive on 7 and 14 Mc/s and inductive on 21 and 28 Mc/s. Network for terminals B-B with leads shorted should resonate at 17·3 Mc/s. Network for C-C should resonate at 12 Mc/s with terminals open and 7·8 Mc/s with C-C short circuited. L1, 25 turns, 15 mm diam., 26 mm long. L3, 35·5 turns, 15 mm diam., 28 mm long. For adjustment of feeder, aerial at A-A can be replaced by 10 ohms in series with 29 pF (7·1 Mc/s); 51 ohms in series with 110 pF (14·2 Mc/s); 150 ohms in series with 1·8 μH inductor (21·3 Mc/s); and 310 ohms in series with 3·3 μH (28·4 Mc/s).**

### Multiband Dipole

An aerial matching technique of some interest is also described by F9GO in *Radio-REF* (June, 1964). This consists basically of a broadband dipole element about 25 ft. long fed by conventional 300 ohm balanced feeder with three compensating reactive networks connected across the feeder near the dipole feed point. The remaining portion of the feeder is then non-resonant and can be extended to any length. The dipole can be used without any modifications on 7, 14, 21, and 28 Mc/s, it is stated.

Reactive networks always present a bit of a problem but F9GO shows how these can be checked and adjusted by means of a grid dip oscillator before connection across the feeder line (see caption to Fig. 3). He suggests that these networks can be protected from the weather in the polythene bottles widely used for domestic cleaning fluids. These can be cut and then rejoined.

The directivity of the aerial is less pronounced than for a full length half-wave dipole on 7 and 14 Mc/s, a little sharper on 21 Mc/s, and rather like two half-waves in phase on 28 Mc/s.

The arrangement certainly seems to offer a versatile multiband aerial for use in restricted spaces and one which should prove fairly easy to transport for portable or /A operation.

Some methods of feeding 300 ohm balanced feeders from conventional pi-networks were described in *TT* (December, 1960).

### Transistor Transmitters

Although the subject of transistorized transmitters has been given a good going-over in *TT*, every month brings further evidence of the increasing availability and—perhaps more important—a downward direction in prices of h.f. power transistors.

We noted, for example, a compact 1·8 Mc/s 10 watt telephony transmitter on the Texas Instruments stand at the recent IEA exhibition. This comprised a 2N697 v.f.o. (supply stabilized by Zener diodes), 2N697 buffer and

2S024 p.a. on a heat sink. A pair of 2N697s was used in the modulator output stage. The power supply provided a 35 volt line.

Among the h.f. and v.h.f. power transistors we have noted recently are the RCA 2N3229, a triple diffused *n-p-n* planar transistor providing 15 watts at 50 Mc/s or 5 watts at 150 Mc/s with 1 watt drive; the TRW Semiconductors (the new name for Pacific Semiconductors) 2N2887 giving 10 watts output at 100 Mc/s with 9db gain (described as " now one-third of its former price "); the Motorola 2N2947 (15 watts at 50 Mc/s) and 2N3297 (15-20 watts p.e.p. for s.s.b. rigs at 30 Mc/s); and the Clevite Corporation 3TE130 silicon type providing 30 watts at 70 Mc/s with 11db gain. (Clevite have also recently announced substantial price cuts in r.f. power transistors.) A Motorola advertisement shows how 15 watts output at up to above 500 Mc/s can be obtained by using three 2N2947s to drive varactor frequency multiplier diodes.

It must be emphasized that all these devices, despite recent price reductions, are still very much more expensive than valves of similar rating but they give a good idea of the flood of transmitting transistors which are now appearing and which eventually may well become available at ham-budget prices.

### Broad-band Pre-amp

Some time ago (*TT*, October, 1961) we included a hint from G3JGO pointing out that ferrite beads could be used as toroidal cores for wideband h.f. and v.h.f. transformers. We were interested to see this technique used in a transistor

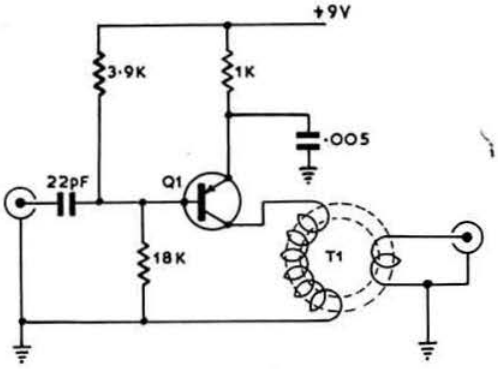



**Fig. 4. Broad-band pre-amplifier for v.h.f./f.m. band (88-108 Mc/s) providing about 16db gain at 98 Mc/s and about 13db at band limits. Q1, 2N2398. T1, 13 turns primary, 1½ turns secondary (this will depend on ferrite bead used). Final tuning by spreading or tightening primary turns.**

pre-amplifier intended for use on the American v.h.f./f.m. band of 88-108 Mc/s but which could easily be adapted for amateur bands. Fig. 4 shows the circuit, from *Electronic Design* (February 3, 1964).

For professional communications equipment, wideband r.f. transformers using ferrite-cores have been developed handling up to very high power and are being used to simplify many problems in interstage and aerial matching metworks. Hughes for example have used what they call " Ison " broadband ferrite networks in the input and output circuits of a 100W p.e.p. transistor linear amplifier (HC106) so that the only manual tuning required throughout the h.f. band is that of the aerial matching network.

### Variable Inductance

The moving ferrite, iron-dust or brass slugs have long provided us with a most useful means of varying inductances for r.f. applications, but there are no corresponding variable

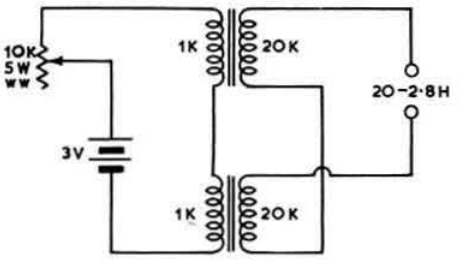



**Fig. 5. Variable inductor using saturable reactor principle with two miniature interstage transistor transformers. Inductance varies from 20 Henries with no d.c. to under 3 Henries with 20 mA.**

inductances of much greater values which would come in useful for a number of purposes (for example, tunable audio filters).

In *Electronics World* (February, 1964), Mr. R. P. Turner shows how two miniature interstage transistor transformers can be used to provide an inductance continuously variable from 2·8 to 20 henrys. This is achieved by using the " saturable reactor " technique found in magnetic amplifiers. One set of windings carry d.c., the other form the a.c. load inductance. By varying the d.c., the a.c. impedance changes: see Fig. 5.

### Wash and Brush-up

Sorting through some old papers recently we came across one of those National advertisements prepared by W1FSN and torn out of *QST* back in September 1949. This contained a large number of hints on the spring-cleaning of Amateur Radio equipment, most of which apply equally today as when they were published.

For cleaning smooth grey cabinets, W1FSN recommended the use of a good wax polish (e.g. Johnson No. 100) using soft cloths, free from grit and avoiding undue pressure on any aluminium speaker grilles. He pointed out that although plastic dial windows were treated at the factory with anti-static compound this wears off so that dust and lint tend to cling to the windows if these become electrically charged, for example from polishing. These particles can be removed by breathing on the window and wiping with a slightly dampened *very soft* cloth. Cleaning fluids and abrasives could permanently fog or scratch the plastic. W1FSN also points out that abrasive cleaners should not be used on etched nameplates and calibration charts. All solvents such as paint thinner, lighter fluid and turpentine should be kept well away from receivers since they can cause permanent damage.

For models in wrinkled enamel cabinets (e.g. the wartime HROs) he suggests the cabinets should be removed and scrubbed with soap and warm water, using a fairly stiff brush. Then the cabinets should be rinsed thoroughly with clean hot water and dried behind a stove or in the sun. A coat of wax can then be added and rubbed up with a soft shoe-polishing brush. W1FSN advises against using rags with wrinkle surfaces since these will be torn, leaving large quantities of lint.

For dusting chassis and components, he recommends a small paint brush, which can also be used for occasional dusting of a front panel and the control knobs. Should dust fail to yield to dry brushing, the brush can be dipped in carbon tetrachloride (e.g. Thawpit)—but this should not be used until all loose dirt has been brushed off.

If the carbon tetrachloride is used to clean band switch contacts or capacitor rotor brushes a little Vaseline should afterwards be applied. Alternatively, one of the special contact cleaning substances should be used (see *TT*, August,

1961). If Vaseline is used, apply this sparingly since it will tend to gather dirt and the contacts will become noisy in a short time.

### Transistor Speech Compressor

In *TT* (April, 1964) we gave the circuit for a speech compressor unit which could be connected between the microphone and the normal speech amplifier to remove variations in microphone output and enable high-levels of modulation to be maintained. A similar type of unit but using transistors is described by W2ZLF in *Electronics Illustrated* (May, 1964): see Fig. 6. Q1 operates as a bootstrapped emitter-follower providing a high-impedance input circuit suitable for use directly with crystal or ceramic microphones. Q2 is an amplifier whose gain is controlled by the rectified and averaged output from Q3.

If the gain of Q2 is excessive, capacitor C7 should be removed.

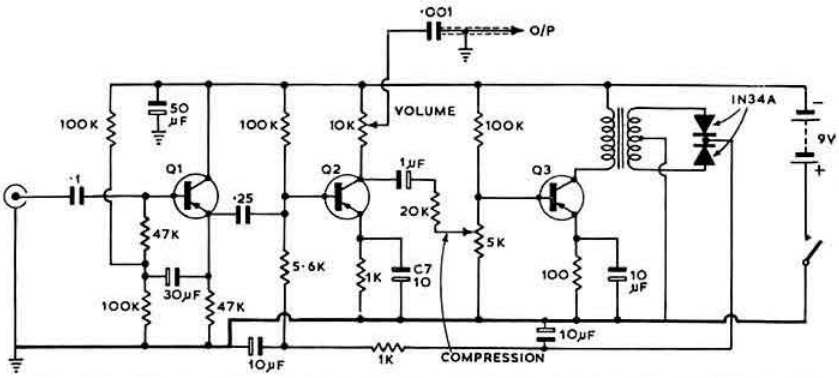



**Fig. 6. Speech compression unit using transistors. Q1, Q2, Q3, 2N217, 2N109 or equivalent. T1, transistor interstage transformer.**

### Poor Man's Valve Voltmeter

A circuit which has been going the rounds (*Radio-Electronics*, January, 1964, *Funkschau* No. 11/1964) is an economical high-impedance valve voltmeter using a balanced bridge circuit: see Fig. 7. The meter can be anything from 50 µA to about 300 µA. Calibration can be carried out by checking against another valve voltmeter. If necessary a shunt resistor can be added across the meter to correct calibration ranges.

### Silicon Diode Rectifiers

In March, 1962, we published a short article in the BULLETIN on the importance of providing adequate protection against mains over-voltages and the transient voltages generated in inductive components when using silicon power rectifiers. This was followed in November, 1962 by an article by G3GYE giving further information on this subject.

Since then a great deal of material has been published by the makers of silicon diodes. Good examples are: *Power Rectification with Silicon Diodes*, a booklet (TP552) published by Mullard Industrial Semiconductor Division; and Ferranti Application Note No. 12 *Voltage Transient Protection of Silicon Rectifiers*, and No. 14 *Silicon Rectifiers in High Voltage Applications*.

Effective protection against mains-transients has been helped by the introduction of power diodes such as the BY100 intended for use without mains transformers in television receivers and which have sufficient transient ratings to stand up to the vagaries of our mains supplies provided that a simple protection capacitor and surge-limiting resistor are used.

We note however from *Mullard Outlook* (May, 1964) that even when the recommended protection circuits have been used, some failures of the diodes have been reported in television receivers. These have occurred in sets using iron-cored inductors as mains dropping devices instead of the more usual resistive mains droppers. This again emphasizes the need for full protection against such inductive surges. For television receivers, it is pointed out that a most effective protection has proved to be the use of voltage - dependent - resistors (v.d.r.) which effectively prevent the build-up of surge voltages. Mullard type E299DD/354 are recommended for this application in television receivers.

This type of component has similarly been used in transistorized television receivers to prevent high flyback voltages from appearing on the collectors of field and line-scan output transistors.

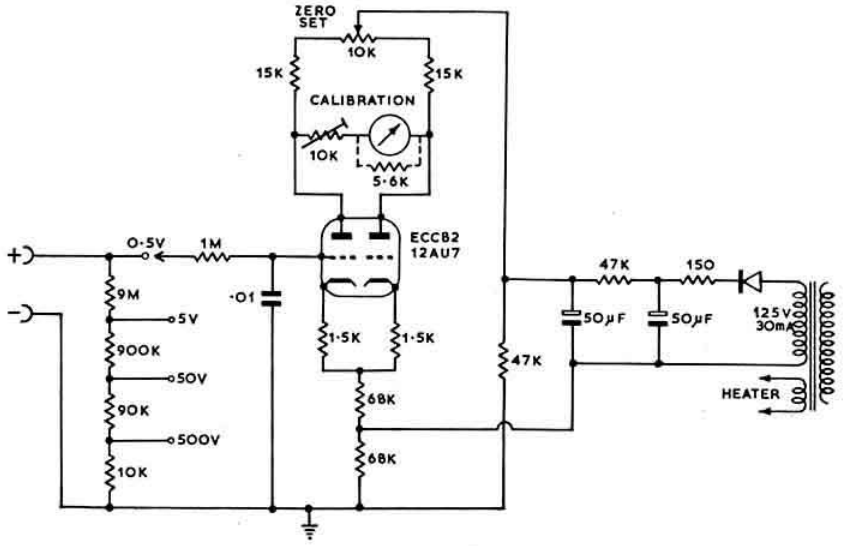



**Fig. 7. Economical valve-voltmeter.**

# Single Sideband

By G. R. B. THORNLEY, G2DAF *

AN up-to-date front-end unit using Electroniques coils and a low noise double triode mixer, based on the original G2DAF Communication Receiver circuit, was described in the June, 1964 issue of the BULLETIN. All components were mounted on a box chassis measuring 12 in. × 5 in. × 2½ in.

Machine pressed box chassis in 18 s.w.g. aluminium and 2½ in. deep are made in a wide range of standard sizes and are obtainable from N.W. Electrics, 52 Gt. Ancoats Street, Manchester 4. These are accurately dimensioned and have small radius right angle bends, thus enabling them to be fitted together in various combinations to form a full size transmitter or receiver chassis.

Using these box sections, the existing front end unit can become part of a complete receiver on a total chassis size of 16 in. × 12 in. Reference to the drawing of Fig. 1 will show how two box sections, 12 in. × 5 in., one section 8 in. × 6 in. and one section 6 in. × 3 in. are fitted together to form the complete unit. In order to raise the ganged tuning capacitor to the correct height to mate with the driving boss of the Eddystone 898 drive assembly, the three gang capacitor VC3, VC4 and VC5 is mounted on the 6 in. × 4 in. v.f.o. section that is already raised 2 in. above the normal chassis top face. In order to give the necessary rigidity the front part of the gang capacitor is further supported by a 2 in. bracket bolted to the 8 in. × 6 in. box section.

It is necessary to provide clearance for the flywheel of the Eddystone 898 drive and this is effected by setting the 17½ in. × 9 in. panel 1½ in. away from the front chassis apron. This space also gives a useful clearance for the selector plate of the main band change switch S1 to S8, the R.F. GAIN and AUDIO GAIN controls, the sprocket pulleys and chain drive used to couple the driving shafts of the sideband and a.m. switch S13 to S11 and S12. The *Q* multiplier notch filter V10 and associated components can be built on a small 3 in. × 2½ in. sub-chassis as shown. This unit can be wired and tested before fitting into position. Connection to either the grid or the anode of V7 is by a 7 in. length of 3/16 in. o.d. standard TV coaxial cable.

A suitable capacitor for VC3, VC4 and VC5 is manufactured by Jackson Bros., Ltd. and may be obtained from Electroniques Ltd., although if this is used slight modification of the values of the associated fixed shunt and series capacitors will be necessary.† Either the Denco Type IFT-11-465 or the Electroniques equivalents can be used for IFT1, IFT2, IFT3 and IFT4, with the secondary of IFT4 modified by removing the internal 65 pF resonating capacitor and re-wiring it with the 75 pF and 1000 pF series capacitors as shown.

It is assumed that most constructors would wish to use silicon rectifiers in place of the original 5Z4 rectifier valve V19, and these are shown mounted on a paxolin panel together with the two mains fuses above the mains transformer. A secondary winding of 175—0—175 volts at 125 mA will give a smoothed h.t. output of about 220 volts, and this is ample for the requirements. A suitable midget mains transformer with a 200/250 volt primary and 125—0—125 volts secondary is obtainable from Radiospares and this can be mounted under the chassis to feed the bias rectifier V18.

### Circuit Notes

The circuit diagram showing the necessary changes for the double triode second mixer V4 and the Kokusai mechanical filter is shown in Fig. 2. Both the tunable i.f. coils L1 and L2 may be wound on Neosid or Aladdin 0·3 diam. formers with

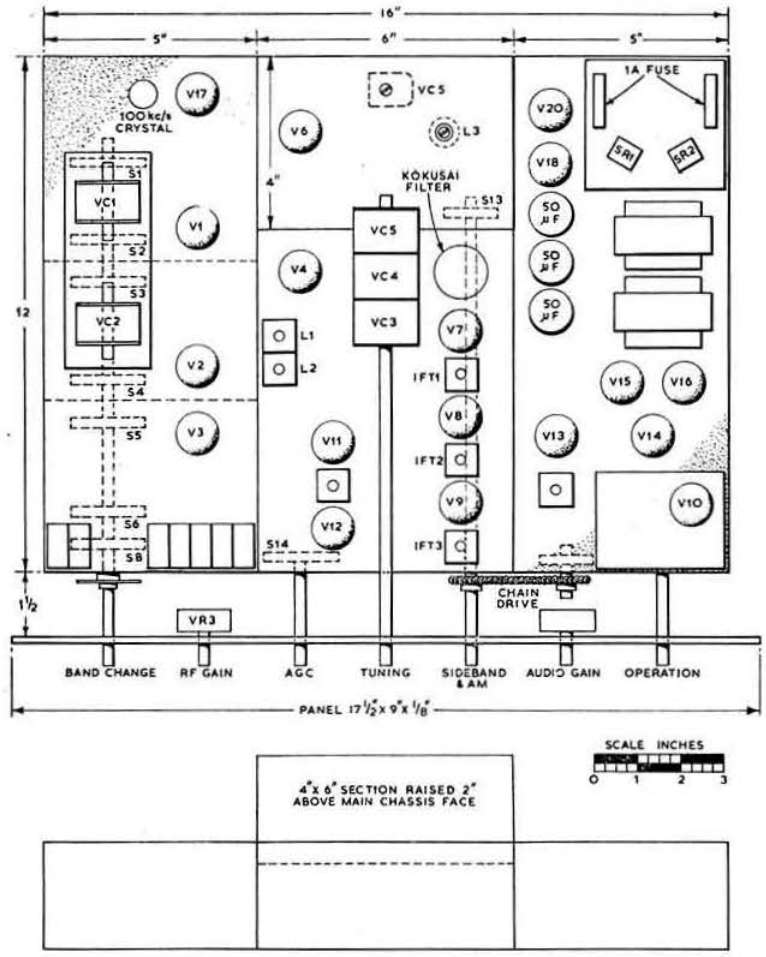



**Fig. 1. Suggested chassis layout for the G2DAF receiver, using standard aluminium box sections**

* 5 Janice Drive, Fulwood, Preston, Lancs.

† Replacement capacitor values for the trimmers for VC3, 4 and 5 are given in the article, "Some Notes on the Construction and Alignment of the G2DAF-type Receiver," by G. C. Monkhouse, BRS25729, RSGB BULLETIN, June, 1964, p. 362. The necessary information is also available from Electroniques Ltd.

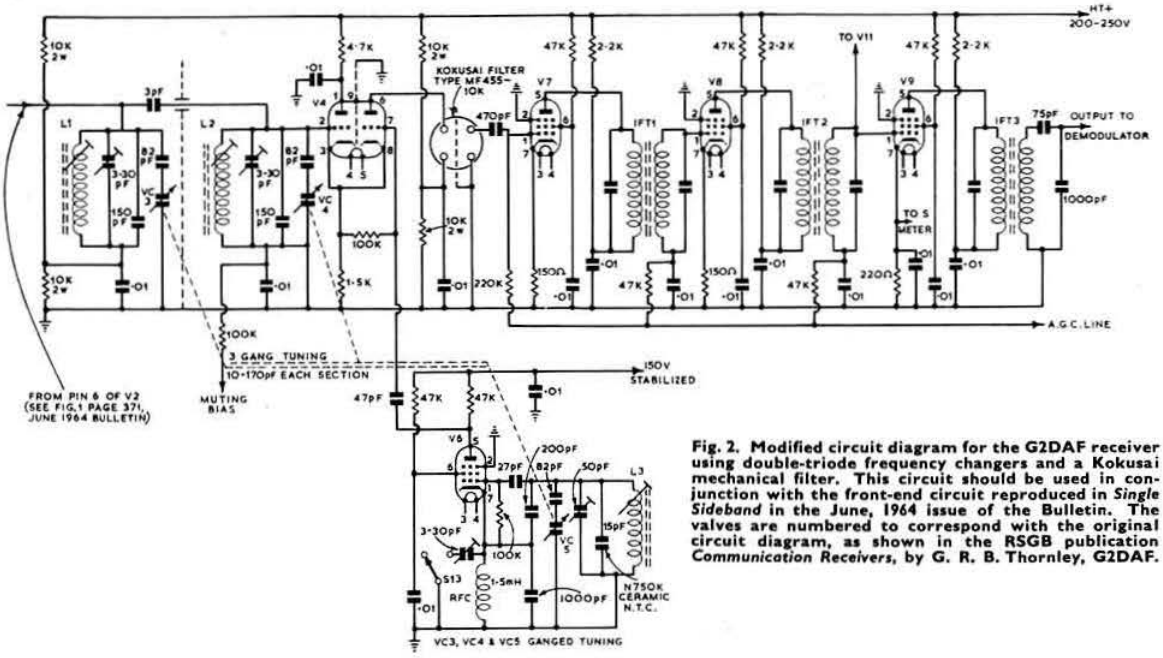



**Fig. 2. Modified circuit diagram for the G2DAF receiver using double-triode frequency changers and a Kokusai mechanical filter. This circuit should be used in conjunction with the front-end circuit reproduced in *Single Sideband* in the June, 1964 issue of the Bulletin. The valves are numbered to correspond with the original circuit diagram, as shown in the RSGB publication *Communication Receivers*, by G. R. B. Thornley, G2DAF.**

2½ in. × ⅛ in. × ⅛ in. screening cans. Each will require a winding of 32 turns of 32 s.w.g. enamelled wire. The shunt capacitance across the coil is made up with a fixed mica capacitor and a Philips 3-30 pF trimmer, and this value shunt controls the frequency variation of the circuit caused by the rotation of the variable tuning capacitor. By adjustment to the dust core and the Philips trimmer, each coil can be made to track correctly so that it covers the range 5·0 to 5·5 Mc/s, with the dust core at the l.f. end, and the trimmer at h.f. end. L1 and L2 may be the original coils supplied by Electroniques and as these are unscreened they must be mounted in the position indicated, but under the chassis. If this procedure is adopted it is most important that one coil cannot see the other coil and a small cross screen must be fitted between L1 and L2 so that the *only* coupling for r.f. is via the 3 pF top capacitor.

Major changes necessary in the i.f. strip are removal of the original filter crystals and associated coupling transformers: this enables considerable simplification and a worthwhile saving in chassis space. It also allows the three valves V7, V8 and V9, and the i.f. transformers to be positioned in a straight line along the right-hand side of the central chassis section.

As the load presented by the mixer valve, V4, to the v.f.o. is at high impedance and the grid input capacitance is very small due to the negative feedback across the 1·5 K ohm cathode resistor, the original v.f.o. cathode follower valve V5 can be omitted. A mixer injection of between 1 and 2 volts r.m.s. is ample for the ECC85 valve, and this low level output from the v.f.o. also reduces the amplitude of birdies that might be produced by higher order harmonics of the v.f.o. beating with the conversion crystal in use, or alternatively being accepted by the signal frequency tuned circuits as a weak signal within the 10m band tuning range.

In regard to v.f.o. stability it should be clearly understood that, notwithstanding the many claims that have been made in the past, there is no such thing as a " driftless " L/C oscillator. A quartz crystal has a high degree of frequency stability because quartz is a material with a low temperature co-efficient. Replacing the crystal by building an equivalent series tuned circuit using L and C—as for instance in the so-called " Clapp " v.f.o.—does not give the same stability as a crystal, for the simple and obvious reason that it is not possible to manufacture standard coils and variable capacitors with the temperature co-efficient of natural quartz.

The Colpitts v.f.o. circuit shown in Fig. 2 has a high degree of frequency stability, a small warm up drift, almost constant amplitude of output voltage across the tuning range of 500 kc/s, and because of the high effective value of C in the tank circuit it has a very low harmonic output. As the frequency is controlled by the tuned circuit, the stability cannot be any better than the stability of the L and C forming this circuit. It therefore follows that as the temperature co-efficients of copper wire coils and brass plate tuning capacitors are outside the control of the amateur, the secret of success is in the mechanical stability of the assembly as a whole, the care with which the tank inductor L3 is constructed and finding the right value of negative temperature co-efficient compensating capacitance across this coil.

The coil former should be ceramic, with a dust core mounted on a screwed brass rod fitting into a pressure loaded clutch so that there is neither end or side float of the core within the winding. Highly recommended is the ½ in. diam. Cambion former Type 1538-2-2 with a 20063-K slug. The winding of 14·5 turns of 22 s.w.g. enamelled wire should be close wound under tension, and finally thoroughly doped with polystyrene cement.

The Kokusai Type MF 455-10K mechanical filter has a nominal bandwidth of 2 kc/s at the 6db points. In practice

(*Continued on page 579*)

# *Using the B44 Mk. 2 Transmitter-Receiver on 70 Mc/s*

By A. J. GIBBS, G3PHG*

FROM time to time, there becomes available on the Surplus Market an item of equipment that can be readily adapted for amateur use. Such is the case with the B44.MkII transmitter-receiver which, although originally intended for radio-telephone communications within a restricted area, can be modified to produce a potent and sensitive mobile transceiver for the 70 Mc/s band.

In its unmodified form, the transmitter and receiver sections of the B44 each operate on one crystal controlled spot frequency within the range 60 Mc/s to 95 Mc/s. The transmitter and receiver frequencies may or may not be the same, and are selected according to operational requirements. The power output of the transmitter is of the order of 3 watts into a 75 ohm load, whilst the receiver sensitivity is rated at 2 $\mu$V for 50 mW output.

After modification, the transmitter output is increased to 10 watts into a 75 ohm load, and offers a choice of two

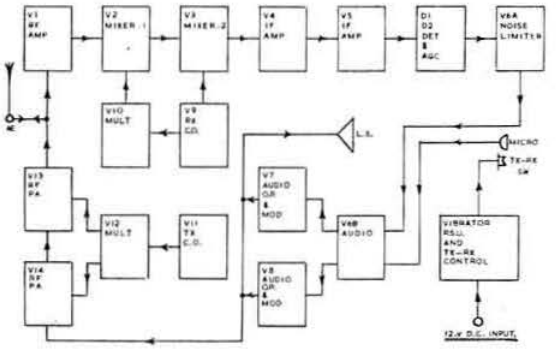



**Fig. 1. Block diagram of B44 transmitter-receiver.**

operating frequencies. The receiver sensitivity is increased to better than 0·5 $\mu$V and provides continuous tuning between 70·1 Mc/s and 70·7 Mc/s. The modifications which bring about these changes do not involve changing any valve types, although the r.f. stage of the receiver could be completely removed, and an E88CC cascode arrangement substituted. However, under normal mobile working, there is some doubt as to whether all the work involved in such a modification is justified.

Before modifying equipment, it is always helpful to have a fairly thorough knowledge of it in its basic form. For this reason, this article falls fairly naturally into two parts. The first is concerned with the equipment in its original form, and the second enumerates the various modifications.

Since none of the modifications are particularly difficult or involved, except perhaps that associated with converting the receiver from crystal control to variable tuning, there may well be a temptation to undertake all the modifications in one fell swoop. This must be resisted. Each modification should be individually completed and the equipment checked before progressing to the next. This is vitally important in relation to the conversion of the receiver to variable tuning.

* 6 Dairyfields, Gossops Green, Crawley, Sussex.

*The B44 must be aligned using crystal control before this is attempted.*

While the order in which the modifications are listed may not seem, at first sight, to be the most logical, they are arranged in such a manner that the equipment can be made operational fairly quickly, and moreover, so that subsequent modifications do not cause the unit to be out of service for any great length of time.

## General Notes

The B44 is contained in a solid die-cast case, and has an even more solid front panel. This panel, upon which are mounted all the input and output sockets together with the controls, is attached to the chassis. The panel screws to the body of the case, and around the joint between the two is a rubber gasket. All sockets are fitted with waterproof caps. The original idea was to make the equipment so watertight that it could be thrown in a river for a few hours—yet be retrieved in good working condition.

The unit is powered from a 12 volt (nominal) secondary battery, and has a built-in vibrator power supply. The consumption is approximately: RECEIVE (stand-by) 3·5 amps; TRANSMIT 5·1 amps. With a fully charged 48 ampere hour battery in good condition, continuous operation for a period of 12 hours may be expected on a transmit-to-receive basis of 1 : 3.

The B44 is a transceiver which uses a common audio system for both receiver output and transmitter modulator (See Fig. 1).

The change-over from TRANSMIT to RECEIVE is accomplished by two relays which are actuated by a press-to-talk switch incorporated in the microphone housing. The contacts of this switch are so timed that the relays operate and mute the loudspeaker before the microphone insert is connected, so avoiding the audio howl which would otherwise occur.

A master control switch is fitted to the front panel and this has three positions: (i) OFF (ii) STAND-BY and (iii) TRANSMIT. In the STAND-BY position only the receiver functions, and in order to conserve current, the transmitter heater line is disconnected, as are the transmit-receive relays. If the press-to-talk switch is operated while the equipment is in the RECEIVE position, feedback will occur, and this serves as a warning that the transmitter is switched off. In the TRANSMIT position of the master switch, the transceiver becomes fully operational—after time has been allowed for the transmitter valves to warm up. This will be between 45 seconds and 90 seconds depending on the battery.

It should be particularly noted that, in its original form, the B44 is designed for *negative earth* supplies. If it is operated in a motor vehicle without modification, great caution will be needed to prevent it coming into contact with any metalwork, for if it does, it may well end up as a permanently spot-welded attachment. Take heed ! !

## Receiver

The receiver arrangement is shown in block form in Fig. 1 while the circuit diagram is given in Fig. 2. Particular attention should be paid to the method of securing the mixer injection frequences, for although the system used in the B44 is now common commercial practice, it loses none of its cunning for all that, and could cause some confusion to those not familiar with this particular technique.

Fundamentally, the receiver comprises a bandpass tuned r.f stage, V1, followed by two frequency conversions, V2 and V3, feeding an i.f. amplifier system V4, V5, detector D1, a.g.c. D2, Noise Limiter, V6A, Audio, V6B, and push-pull output stages V7 and V8.

The r.f. stage, V1, is a straightforward pentode arrangement which requires no particular explanation, the grid coils

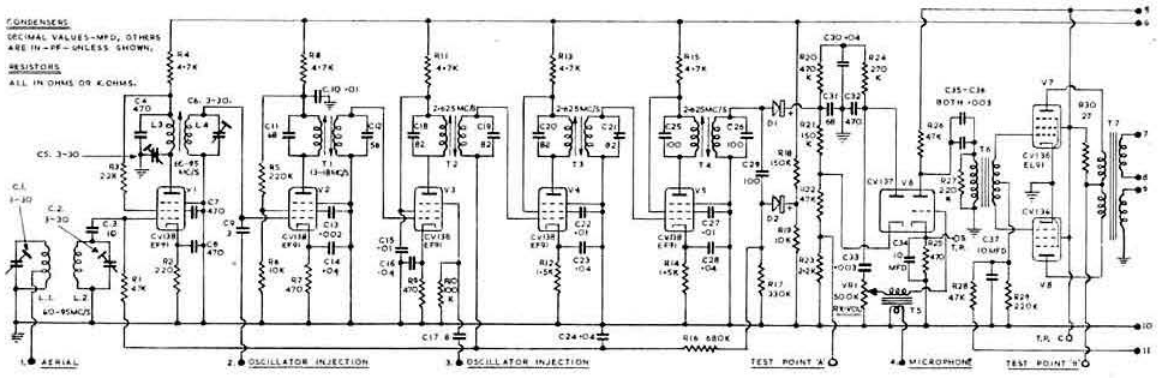


**Fig. 2. Receiver and audio/modulator circuit. The terminals marked 1, 2, 3, 5, 6, 7, 8, 9, 10 and 11, connect with those bearing the same numbers in Fig. 3. Terminal 4 goes to Fig. 4.**

L1, L2, and the anode transformer L3, L4, tuning over the signal frequency range 60 Mc/s to 95 Mc/s.

The first mixer, V2, is an EF91 operated as a pentode with oscillator injection to the signal grid g1. All incoming signals are converted to a first intermediate frequency in the range 13 Mc/s to 18 Mc/s by suitably adjusting the injection frequency. The second mixer is also an EF91, V3, but with the oscillator injection taken to the suppressor grid, g3. The output of this mixer is always at the fixed i.f. of 2·625 Mc/s.

The oscillator injection frequencies for both mixer stages are derived from a common crystal oscillator, V9 (Fig. 3) which feeds (a) the second mixer *directly*, and (b) after a frequency multiplier stage, V10, the first mixer. Since the output of the second mixer is at a fixed frequency, the output of the first mixer must vary over a specific range depending upon (i) the received frequency; (ii) the harmonic of the crystal oscillator, V9, produced by the multiplier V10, and (iii) the frequency of the crystal itself. While the B44 will accept signals in the range 60 Mc/s to 95 Mc/s, the first i.f. is restricted to the range 13 Mc/s to 18 Mc/s and this reduction in frequency range is accomplished by the correct selection of the crystal harmonic in the anode of V10. The main i.f. is 2·625 Mc/s as has been stated, and two stages of amplification V4 and V5 follow standard practice.

The detector and a.g.c. rectifier stages both employ semiconductor diodes: D1 and D2 respectively. Delay bias for the a.g.c. diode is derived from a simple potentiometer chain R18, R19 which is connected directly across the h.t. line. This delay is so arranged that the overall noise produced by the receiver does not trigger the a.g.c. system, and a fair level of signal is required to produce a.g.c. action. Such an arrangement is essential when short grid base pentodes are controlled by a.g.c. in view of the rapid manner in which they cut off. That this a.g.c. system is highly effective soon becomes apparent once the equipment is in use. Under long and middle distance contacts the full gain of the receiver is available, but at close range the a.g.c. swings into action, and even where the separation is less than 50 yd., the receiver does not block.

The noise limiter, V6A, which is self-adjusting, is excellent. Ignition and other impulse noises are completely removed, but without producing any discernible audio distortion.

The first audio amplifier, V6B, may seem a little strange at first sight. The secondary of the transformer T5 which is in series with its grid serves two purposes. First, this transformer functions as a microphone matching transformer when the audio system acts as a modulator for the transmitter, but more than this, the inductance of the secondary is adjusted so that it shapes the audio response and this materially assists readability under weak signal conditions.

The transformer, T6, which drives the output valves, V7, V8, is parallel fed from the anode of V6B, and here again some audio frequency shaping is introduced by C35 and C36.

The output valves, V7, V8, not only function as audio amplifiers for the receiver, but also as modulators for the

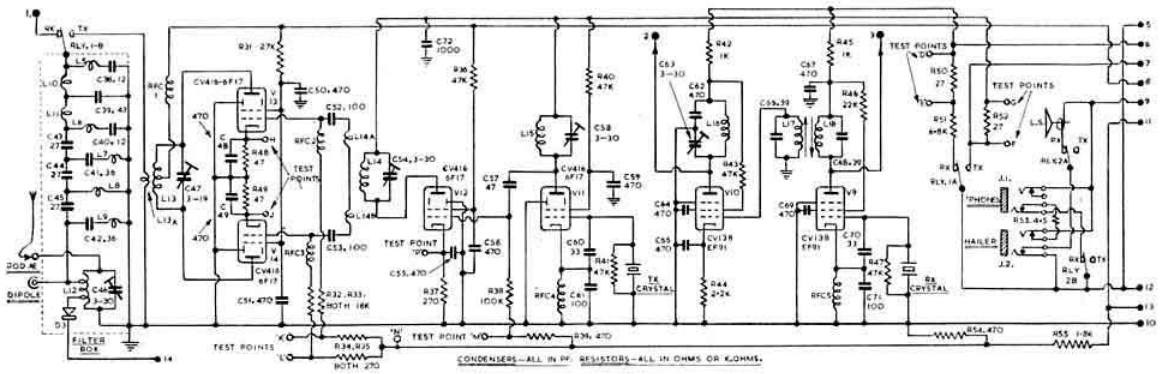


**Fig. 3. Transmitter and receiver crystal oscillator/multiplier. The terminals marked 10, 12, 13 and 14 connect with those bearing the same numbers in Fig. 4.**

transmitter. It should particularly be noted that they are operated under class B conditions with fixed bias. It is because of this, and the fact that there is more than ample reserve of power in this stage, that the B44 carrier power can be substantially boosted without suffering from severe undermodulation.

### Receiver Bandwidth

The bandwidth of the first i.f.—13 Mc/s to 18 Mc/s—is of the order of 280 kc/s at the 6db points, while that of the second i.f.—2·625 Mc/s—lies between 50 kc/s and 70 kc/s at the 6db points.

When the receiver is to be used within the frequency range 60 Mc/s to 76 Mc/s, which includes the 70 Mc/s allocation, the frequency of the receiver crystal, together with that of the first i.f., is determined as follows:

Frequency of received signal $F$
Let first i.f. be $F_1$
Let second i.f. be $F_2$
Let crystal frequency be $F_x$
Let multiplier output be $F_m$
Let crystal oscillator output be $F_o$

For a signal frequency between 60 Mc/s and 76 Mc/s:

$$F_o = 3F_x$$

and $$F_m = 9F_x.$$

Now since $$F_1 = F - F_m$$
$$= F - 9F_x$$

and $$F_2 = F_o - F_1$$
$$= F_o - F + 9F_x$$
$$= 3F_x - F + 9F_x$$
$$= 12F_x - F$$

therefore $$F_x = \frac{F_2 + F}{12}$$

*Example:* Received frequency 70·32 Mc/s

$F$ = 70·32 Mc/s . . . Given.
$F_2$ = 2·625 Mc/s . . . Fixed second i.f.

As $$F_x = \frac{F_2 + F}{12}$$

Substituting $$F_x = \frac{2{\cdot}625 + 70{\cdot}32}{12}$$

$$= \frac{72{\cdot}925}{12}$$

THEREFORE CRYSTAL FREQUENCY IS 6·079 Mc/s

First i.f. is $$F_1 = F - 9F_x$$
$$= 70{\cdot}32 \text{ Mc/s} - (9 \times 6{\cdot}079 \text{ Mc/s})$$
$$= 70{\cdot}32 \text{ Mc/s} - 54{\cdot}711 \text{ Mc/s}$$

HENCE FIRST I.F. IS 15·609 Mc/s

### Receiver Alignment

It is essential to undertake the initial alignment of the receiver section of the B44 while its local oscillator is crystal controlled and not after conversion to a tunable type.

Even as it stands, the alignment procedure can be quite tricky if any appreciable shift is required to bring it on to the 70 Mc/s band, and the introduction of yet another—and unproven—variable might well make it an exceedingly difficult operation.

The alignment of the B44 most certainly cannot be undertaken with a wet finger and a screwdriver. The minimum of test equipment required is as follows:

(a) A signal generator which is reasonably accurate in the 2 Mc/s to 3 Mc/s and 13 Mc/s to 18 Mc/s ranges, and goes up to 70 Mc/s. In-so-far as the last-mentioned frequency is concerned, the second harmonic of a generator on 35 Mc/s could be employed.

(b) *One* of the following items: (i) valve voltmeter; (ii) audio output meter or (iii) a microammeter with a sensitivity of 500 $\mu$A or better.

(c) A damping circuit consisting of a 0·01 $\mu$F capacitor and 1K ohm resistor in series fitted with short clip leads.

While it may just be possible to align the B44 without the use of a signal generator, it will involve hours of frustration and tons of luck—so don't try.

The general order of the alignment procedure is to check out the second i.f.; align the first i.f. to the precalculated frequency associating with this adjustments to the crystal oscillator, and finally adjust the r.f. signal circuits together with the crystal oscillator multiplier stage.

### Second I.F. Amplifier on 2·625 Mc/s

Connect either an audio output meter to the 'phone jack on the front panel, or a valve voltmeter across the a.g.c. line (between the junction of D2/R17—negative—and chassis. Tag 5 on tag strip F. See Fig. 6) or a sensitive microammeter across part of the diode detector load (across R23. Connect meter between Test Point A—positive—and chassis. See Fig. 5).

Set the generator to exactly 2·625 Mc/s and connect between pin 1 of V5 and chassis. Adjust the generator output to give about half scale reading on the meter indicator. If a valve voltmeter is employed, this should be set to its 5 V range. Adjust the *upper* core of T4 for maximum output. Connect the damping network between pin 5 of V5 and chassis. Adjust the *lower* core of T4 for maximum output.

Remove the damping network and connect between pin 1 of V5 and chassis. Connect generator between pin 1 of V4 and chassis. Retune upper and lower cores of T4 for maximum output. Tune *upper* core of T3 for maximum output. Transfer damping network to between pin 5 of V4 and chassis. Now tune *lower* core of T3 for maximum.

Remove the damping network. Connect the generator between pin 1 of V3 and chassis. Retune T3. Tune *upper* and *lower* cores of T2, and in that order, for maximum output.

The output of the generator will have to be progressively decreased as the various stages are tuned to resonance, and this should be done in such a manner that the meter indicator remains at about half scale reading.

To complete the alignment of the second i.f. amplifier, all the core settings should be finally checked working back from the detector to the second mixer.

### First I.F. and Crystal Oscillator

Fit the correct frequency crystal to the receiver crystal oscillator socket.

Set the signal generator to the precalculated first i.f. and connect it between pin 1 of V3 and chassis.

Gently rock the signal generator about the calculated

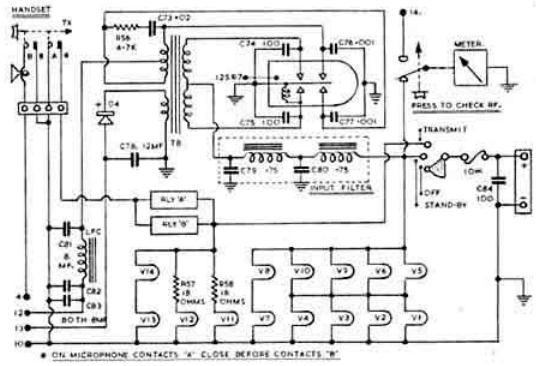



**Fig. 4. Vibrator power supply and control circuits.**

first i.f. to see if any output can be secured. If not, leave it set to the calculated figure and adjust L18, *upper* core in screening can, until output is secured. Alternate these adjustments, i.e. rocking the generator about the calculated frequency and L18 core, until output is secured. Once this has been achieved, adjust L18 for maximum output.

Connect the generator to pin 1 of V2 and set it to the first i.f. Adjust T1, *upper* core and then *lower* core for maximum output.

### R.F. Stage and Crystal Multiplier

Connect the signal generator to pin 1 of V2, and set its frequency to about 70·3 Mc/s. Rock the generator tuning about this point until some output is obtained. It may be necessary to increase substantially the generator output in order to secure a response, and furthermore, as very few generators are accurately calibrated in this region, the frequency at which output is secured may appear to be incorrect. Once some output has been secured, adjust L17, *lower* core and L16, and in that order, for maximum output.

Transfer the generator to pin 1 of V1. Adjust C5 and C6 to their mid-positions, and then adjust the core common to L3, L4 for maximum output. Finally, touch up C5 and C6 until no further increase in output can be secured. C5 and C6 should be around their mid-positions after the adjustments have been completed, and if they are not, further attention should be given to the common core of L3, L4.

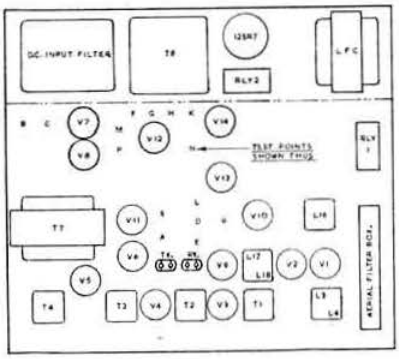



**Fig. 5. Layout of above chassis components.**

At this stage there may well be so much gain from the receiver that it is impossible to keep the output of the generator down sufficiently to prevent overloading. If this is the case, connect a short wire aerial to the aerial input socket, and remove the generator to a distance at which the pick-up level is adequate.

Finally adjust C2 and C1, and in that order, for maximum output, and after having done this, starting at the detector, work back to the aerial circuits checking each of the adjustments that have been made. Undertake these in the order which has already been given.

### Odds and Ends

A number of "popular" faults have come to light in various B44's, some of which may, or may not, be found while aligning the receiver.

If adjusting a core of a transformer or screened coil produces no effect, check that the core has not become detached from the adjusting screw. If it is suspected that the gain of a stage is not up to specification, check the screen grid, cathode, and anode circuit decoupling capacitors. Look for dirt and grime between plates of variable capacitors. The vane spacing is very close indeed, and great care must be taken when adjusting them to avoid placing too much pressure on the screw. One capacitor in particular, C4, 470 pF, is very prone to blow up, and should be replaced irrespective of whether it seems to be good.

### Modification 1—Aerial Filter

The aerial filter has a power insertion loss of 3db, and this reflects on both the transmitter and receiver. As we are concerned with optimum performance, and are not likely to operate the B44 adjacent to transmitters working on closely related frequencies, this unit can be removed completely.

This is a perfectly straightforward operation which requires no particular explanation.

Measurements conducted on a B44 transmitter operating without the filter box have shown the following attenuated radiations in relation to the carrier frequency and power: 35 Mc/s not measurable; 105 Mc/s 85db down; 140 Mc/s 60 db down. All measurements were made at a distance of 40 ft., and are well within the requirements of the licensing authority.

### Modification 2—Rod Aerial Mountings

Once the filter box has been removed, the rod aerial mountings may also be detached from the front panel. In each of the two holes left, a chrome bezel neon indicator may be fitted, green in the top, and red in the bottom. Wiring these to the receiver h.t. supply—Test Point D—and the transmitter h.t. supply—Test Point G—respectively will provide a visual check on the h.t. supplies, as well as indicating TRANSMIT OR RECEIVE.

### Modification 3—Changing to Positive Earth

As the Plessey 12SR7 vibrator is a self-rectifying unit, changing the polarity of working involves replacing the rectifying elements of the 12SR7 by some external rectification system. BY100 silicon rectifiers are used for this purpose. While it is possible to get away with using only two rectifiers, it is false economy to do so as the reliability factor is not adequate, due in the main to the peaky nature of the waveform produced by the vibrator.

Four BY100 rectifiers should be arranged in pairs, and the rectifiers in each pair wired in series so producing two complete rectifier units. Across each individual rectifier a 470 pF 500 V capacitor should be connected.

Disconnect the wires attached to pins 2 and 5 on the base of the 12SR7 vibrator (See Fig. 6). Tags 1 and 2 on tag strip A will be found to be unused. Connect one of the wires to tag 1, and the other to tag 2. Arrange the rectifier units as illustrated in Fig. 7(a). If the B44 being modified is fitted with a meter, the leads on the rear of this must now be reversed.

This completes the working polarity changes, and the B44 will now operate with positive earth systems.

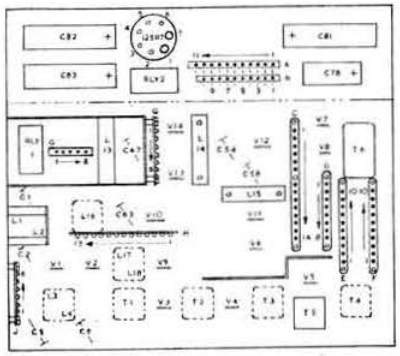



**Fig. 6. Position of components on underside of chassis. Component tag strips are identified by code letters. The tags are numbered in the direction indicated by the arrow.**

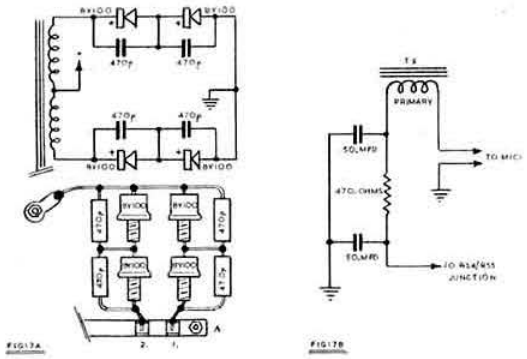



**Fig. 7. Revised rectifier circuit allowing operation on positive earthed supplies. Modifications required to microphone input circuit to accommodate a carbon microphone.**

### Modification 4—Bias Supply

One of the modifications to be detailed later involves changing the microphone type from electromagnetic to carbon. As the polarising current for the carbon microphone is derived from the bias line supplying the modulator valves and transmitter, an extra load is placed on this supply. While this is quite within the capabilities of the transformer T8, the bias rectifier, D4, is not man enough for the job.

To prevent bias failure, and the consequential damage, the bias rectifier should be replaced. A BY100 may again be used, although in this case a much smaller silicon diode could be employed. The rectifier will be found between tags 8 and 11 on tag strip A.

### Modification 5—Increasing I.F. Gain

Both the i.f. amplifier valves are run with a very high value of cathode bias, and a substantial increase in sensitivity can be achieved by reducing the cathode resistors fitted—1·5K ohms—down to 220 ohms (See R12 and R14 on V4 and V5, Fig. 2).

### Modification 6—Reducing First Mixer Noise

Pentode mixers are notoriously noisy and the EF91 arrangement in position V2 is no exception. This can be converted to a triode mixer by the simple expedient of connecting the screen grid directly to the anode, and disconnecting the screen feed resistor R3. Quite obviously this does not give the absolute optimum performance, but nevertheless it is simple and very worthwhile. Experiments with injection levels from the local oscillator line seem to indicate that, as it stands, the level given by the existing coupling arrangement is satisfactory.

The supply to the screen grid of V2 is taken from tag H7—bottom (See Fig. 6). The wire running from this tag to the valve base should be disconnected, and pins 5 and 7 on the valve base connected together.

### Modification 7—A.G.C. and Detector Diodes

The diodes fitted to the B44 in positions D1 and D2 have been found to suffer from ageing effects causing inferior back resistance and a poor forward to reverse ratio. These should be changed for diodes type OA81.

The diodes are located inside rubber sleeves and positioned between tag strips E and F near the transformer T4.

### Modification 8—Increasing A.G.C. Delay

With the now increased gain of the receiver, shot and thermal noises rise to a level far greater than that of it in its original form. This results in a small standing a.g.c. voltage being developed which produces a reduction in gain—quite at variance with our objective. This is overcome by increasing the positive delay voltage applied to the a.g.c. diode D2.

The biasing resistor R19 should be increased from 10K ohms to 15K ohms. In some cases 22K ohms has been found satisfactory. The object is to use as large a value as possible, but not so large that the receiver blocks under local reception conditions. This resistor will be found positioned between tags E9 and F9 (See Fig. 6).

### Modification 9—A.G.C. Line Clamp Diode

In some instances where the delay voltage has been increased, it has been found that the a.g.c. line swings positive under no signal, or low signal, conditions. If a valve voltmeter is available this point can be verified.

This may be overcome by fitting a clamper diode to the a.g.c. line. The diode, type OA81, should be fitted between tag H1—lower—and chassis with its positive end connected to the tag H1.

### Modification 10—Delay Voltage Decoupling

From the circuit of Fig. 2, it will be seen that the delay voltage junction R18, R19, is not decoupled. This creates quite a lot of noise. It can be overcome by fitting a 0·1 $\mu$F capacitor from the junction of R18, R19 to chassis. The capacitor should be fitted from tag F10 to earth.

### Modification 11—Audio Top Cut

A worthwhile reduction in receiver hiss can be achieved by introducing some top cut into the receiver audio system. As this must be positioned so that it does not affect the operation of the modulator, it is arranged between the slider of the volume control and chassis, and consists of a 0·001 $\mu$F capacitor wired in this position.

*This completes the first series of modifications to the receiver and power supply.*

*(To be continued)*

### International Red Cross Tests

A series of test transmissions has been arranged by the International Red Cross Society. These will take place on September 21, 23, and 25, at 07.30, 13.00, 16.30 and 22.30 BST on 7210 kc/s. Reports which will be acknowledged by the IRCS direct from Geneva, should be sent to G. A. Allcock, G3ION, 71 Bassett Green Close, Southampton, Hants.

### Single Sideband (Continued from page 574)

the passbands are usually wider than this and KW Electronics Ltd. will be able to supply an MF 455-10K filter with a 6db bandwidth of 2·5 kc/s if so requested. Filter bandwidth in a receiver is inherently a compromise between the conflicting requirements of the maximum possible selectivity and a reasonable audio bandwidth without objectional colouration.

The circuit and chassis layout has been given primarily as a guide, as this is not intended to be a constructional article.

* * *

It is regretted that it is quite impossible to find sufficient time to answer individual queries in relation to receiver construction. Any reader requiring further help is therefore referred to the RSGB publication *Communication Receivers*, to the excellent article by George C. Monkhouse in the June, 1964 issue of the BULLETIN, and to *Single Sideband*, February, 1964.

# THE MONTH ON THE AIR

## A CHRONICLE OF EVENTS ON THE HF AMATEUR BANDS

By R. F. STEVENS ,G2BVN *

WITH DX now in the doldrums the time is opportune to give consideration to two of our bands which are often neglected, i.e. 7 and 28 Mc/s. Article 5 of the *Geneva Radio Regulations 1959* clearly sets out that 7000 to 7100 kc/s is allocated to amateur use, without any qualifying footnotes. Unfortunately this part of spectrum has become the breeding ground for a particularly useless form of energy producer in the form of short wave broadcasting, much of it devoted to unedible propaganda. This type of emission is largely brought about by prestige considerations and what will happen when the newly emergent nations have asked for their fourpennyworth is anybody's guess. However it is strongly recommended that the amateur service should not neglect the band because of its occupancy by broadcasters and others in defiance of international regulations. It has been proved that some of the intruders can be shifted, particularly by s.s.b. transmissions on the frequency, and full opportunity should be taken to use this band and not let it fall by default to other services.

The 28 Mc/s band is an oft neglected band but one on which interesting work can be done. The activity weekends organized by G6QB have promoted greater usage, and now that there are three beacon stations operational around 29 Mc/s, there is good reason for casting an ear on this band at more frequent intervals than before. GB3LER on 29,005 kc/s, DL0AR on 29,000 kc/s and 5B4WR on 29,008 kc/s are all to be heard, and often one or more of these stations is received when there are no other signals on the band. This is surely significant and calls for greater activity. Trans Atlantic QSOs have been made recently, which at this stage of the sunspot cycle is a most unusual occurrence. Obviously this cannot be propagation by *F2* and it is believed that double hop *sporadic E* is responsible. Reports of this type of QSO will be welcomed, and in addition to a listing in *MOTA*, will be used in the IQSY research programme now being carried on by the Society.

### *News from Overseas*

A letter from **5X5AU**, QSL manager of the **Uganda Radio Club**, mentions the flood of cards being received for non-existent stations sporting the 5X5 prefix. Amongst the latest crop destined for the waste paper basket are: 5X5's AA, AD, AI, AZ, CW, GT, IM, RU, RV, TK and ZA. Also, 5X5AU frequently receives bundles of cards for stations in other parts of Africa and points out that the Club has severe financial limitations and cannot bear the cost of redirecting cards. Please therefore note that the Uganda Radio Club QSL Bureau can only accept cards for fully paid up members of the Club and the Radio Society of East Africa.

The Amateur Radio club at **RAF Masirah** is hopeful of expansion in the near future when s.s.b. operation will be possible and also the acquisition of a new air conditioned shack. Cpl. T. E. Druce (" Earl ") has QSLd all contacts made during 1963-64, but further requests should be made to Amateur Radio Station VS9OC, RAF Masirah, BFPO 69, Aden. Logs are available for some of the operation during 1962 but there is not a 100 per cent record for this period.

The **Korean Amateur Radio League Inc.** will be holding an exhibition during April, 1965 to commemorate the 10th anniversary of the founding of KARL, and invite photographs of typical ham stations to be sent to them by the end of 1964. The photographs should be larger than 15 cm by 20 cm and will be returned if requested. The address of KARL is Central PO Box 162, Seoul, Korea, and the League now has 400 members with 100 licensees and 60 stations.

**The first Australian S.S.B. Convention, Hamilton, Victoria, May 16-17, 1964. Back row (L. to R.): VK3ZX, VK3UJ, VK3AZM, VK3XM, VK2AVA, VK3TW, VK5QR, VK3ZU, VK5RO, VK6KJ, VK3APS, VK5KC. Third row: VK3JX, VK5XB, VK5HY, VK3ES, VK5NN (ex G3MFN), VK3AHT, VK3RE, VK3AG, VK2QJ, VK5DC, VK3AHC, VK3AC. Second row: VK5MF, VK2AEB, VK3AWL, VK2AXD, VK2DQ, VK3BM, VK3JA, VK3WK, VK3VH, VK5RD, VK5EF. Front row: VK3ADD, VK3APH, VK3AEM VK3IT, VK3PZ, VK7XL, VK3XO. A " mobile " contest was held on 7097 kc/s during which contacts were made with G3AOO, GI6TK and other G stations, the mobiles being parked in a field at the time. During the convention a short technical symposium was held which included demonstrations of equipment.** *(Photo via VK5NN)*

* Please send all items to RSGB Headquarters to arrive not later than September 16 for the October issue and October 9 for the November issue.

**Maintaining a firm grip on his newly won Hallicrafters SR-150 Transceiver, Urb Le Jeune, W2DEC (right), DX Editor of CQ Magazine, poses with John Hern, VS9AAA (left), who flew in from Aden to attend the recent Single Sideband Amateur Radio Association Dinner and Hamfest in New York. The firm grip was in answer to John's joking attempt to convince Urb that he needed it more!**

**VS1LP** made the first ever Top Band QSO with JA on June 27 by working **JA3AA** on 1880 kc/s at 15.05. Although Japanese stations are regarded as locals VS1LP points out that the distance involved is similar to that between the UK and W1. Despite the commercial QRM conditions on 7 Mc/s have been surprisingly good and VS1LP was able to work a number of UK and European stations around 21.00 using s.s.b. Bob is looking for a set of 160 metre coils for his 200V and hopes to be able to work the UK on s.s.b. during the coming winter.

The list of *banned countries* often referred to by ARRL is now: Cambodia, Indonesia, Laos, Thailand, Viet Nam and Jordan.

**W1BB** send the following news of *160 metre activity*: VE2UQ journeyed to Resolute Bay, 900 miles from the North Pole, where there are 24 hours' daylight, and conducted tests with W1BB to see if signals would penetrate under these conditions, but the lowest usable frequency was 3·5 Mc/s and then only with weak signals. **ZE6BCT** and **W1BB/1** QSOd on July 15 at 04.35 on 1809 kc/s with the former using ten watts only to a doublet aerial. The peak times of WCC on 2036 kc/s were observed and schedules were set up which were successful on the second try. **9L1HX** and **W1BB/1** made a first ever QSO on July 26 at 04.47, and this was held for 25 minutes. 9L1HX was induced to try Top Band by G3PLQ, an operator on the *MV Penang*, which visits Freetown occasionally. Yet another first was registered when **VQ2AS** and **W1BB/1** QSOd on July 29 at 04.10, the former using a 250 ft. sloping dipole. Obviously conditions are now such that propagation to the South on Top Band is favourable and it is hoped that the following winter will bring many interesting contacts. W1BB would like it to be known that he stands by on 1809 kc/s during contests to give a 160 metre multiplier, and would be happy to set up prearranged times for any QSO on this band to take advantage of favourable propagation conditions.

**5N2JKO** is once again active on 28 and 21 Mc/s s.s.b. and 14 Mc/s a.m., and reports 21 Mc/s open to the UK as late as 21.00. 5N2JKO will be making a trip to Thailand in October but will not be taking along any radio equipment.

### *DXpeditions*

There is little to report under this heading at the present time. Most of the projected trips seem to have fallen by the wayside, but a joint effort between Gus, **W4BPD** and **Hammarlund** is promised for the months ahead. Gus left New York in the latter half of August and promises activity from many unusual areas.

**W9WNV/XV5** may be the call of Don Miller of HL9KH fame who hopes to commence operation around September 20 from Cambodia.

The **St. Bartholemy Is.** trip of FG7XT was deferred, but this is believed to be only a temporary setback, although rumour is now current that the Island will not be recognized as a separate "country". What effect this will have on future plans remains to be seen.

Hardly now a Dxpedition, **FB8WW** on Crozet Is., is often well heard around 05.00 to 06.00 at various frequencies in the c.w. portion of 14 Mc/s. The QSO rate however is not rapid and the listening frequencies are often hard to determine. QSLs should go to 5R8BC.

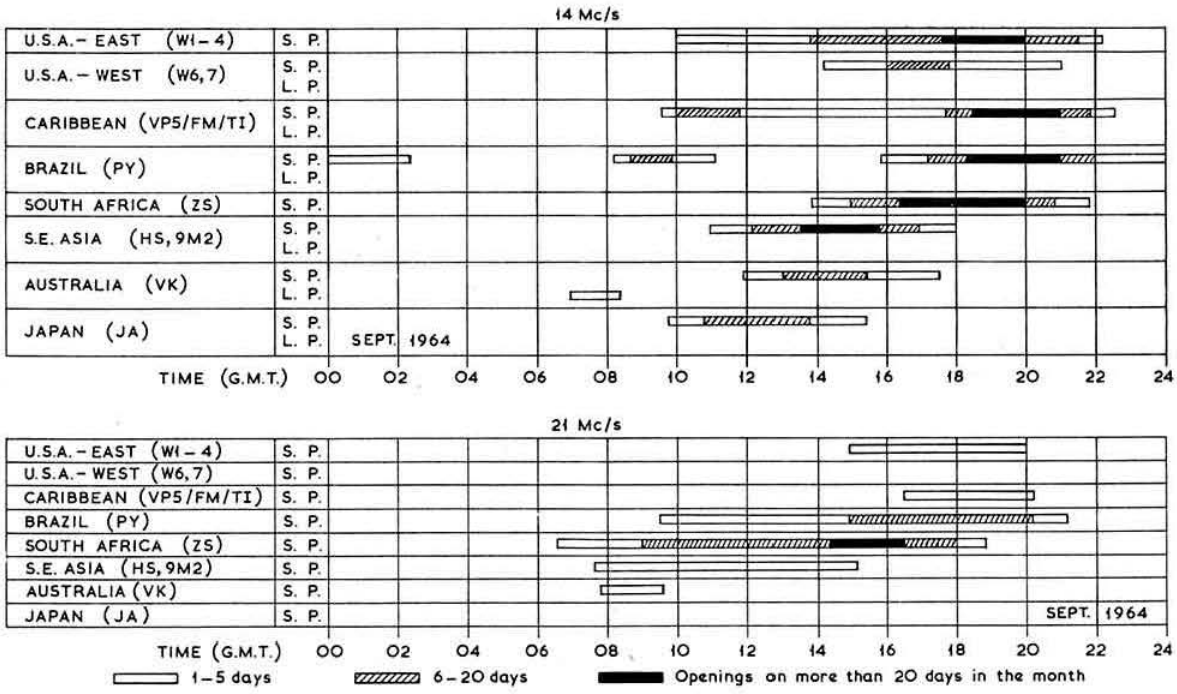
### *Contests*

The telephony section of the **VU2/4S7 Contest** will take place between 06.00 October 10 and 06.00 October 11, with the c.w. section a week later. Separate logs must be submitted for the two sections and only one contact per band with any one station is permitted for scoring purposes. The usual serial numbers must be exchanged and these will consist of the signal report plus a serial number commencing with 001 for the first contact. Stations outside VU2/4S7 will score two points for each QSO on a band with VU2/4S7 stations and one point for each contact on a band with the rest of the world. In addition to the usual "countries", each call area of W/K, JA, SM, UA, VK and ZL will count separately. Logs should show full particulars of each contact and should contain a declaration that the rules and regulations were observed, and should be accompanied by a summary sheet giving station details and total points on the various bands. This information should be sent to the ARSI Contest Committee, Post Box 534, New Delhi-1, India, and must be postmarked not later than November 15, 1964. The same rules apply to the SWL section as to the transmitting section except that operators may only log VU2/4S7 stations for the purposes of scoring.

The **Scandinavian Activity Contest**, a popular annual event with a number of operators, will take place between 15.00 September 19 and 18.00 September 20 (*c.w.*) and the same times on September 26 and 27 for the *telephony* section. Bands between 3·5 and 28 Mc/s may be used and there are a maximum of eight multipliers per band, as in previous years. Each completed QSO counts one point and

**G8SG with his well earned collection of certificates.**

## PROPAGATION PREDICTIONS




**In September, as in March, there is an approximately symmetrical distribution of frequency limits about the equator and for this reason the propagation conditions in the Northern and Southern hemispheres are almost identical. At the same time the slow transition from summer to autumn conditions takes place during this month. In years close to a sunspot maximum this change would lead to a sharp rise in the daytime *F2* MUF's. At the present time, however, which is close to sunspot minimum this rise is much less marked, so that in the coming months of autumn (September, October and November) the DX conditions on the h.f. bands will show only a slight improvement compared with those of the summer. With the present low solar activity, 28 Mc/s is of no practical value for DX, and the season for short-skip contacts on 28 and 21 Mc/s comes to an end during September. The possibility of making European contacts via reflection from northern aurora is, however, not affected. The most favourable period for DX contacts with South Africa on 21 Mc/s is approximately from 14.30 to 16.30 GMT. The 14 Mc/s band will still be the main one for DX, but it will hardly be possible to work DX via the indirect path during the present season with day and night of equal duration. From 16.30 to about 19.00 GMT, it will be possible under favourable conditions to work KH6. With the approach of autumn and the lengthening nights, the opportunities for DX in the latter half of the night on 14 Mc/s will practically disappear during the course of the month. Because of this 7 Mc/s will assume increasing importance for DX traffic in the latter half of the night. On this band as well as on 3·5 Mc/s it is basically possible to work DX when the greater part of the transmission path lies in darkness. This requirement applies especially to 3·5 Mc/s. The longer autumn nights and the lower noise level favour DX on 7 and 3·5 Mc/s in comparison with the summer months. The dead zone will frequently interrupt local contacts on 3·5 Mc/s in the latter half of the night.**

**The provisional sunspot number for July 1964 was 3·4 with the period of greatest activity lying between July 14 and 18. Between July 19 and 30 the sunspot number is shown as zero. The predicted figure for November, December and January is 5.**

the final score is the sum of QSO points multiplied by the sum of multipliers. Logs should be accompanied by a summary sheet giving scores on the various bands and should be sent not later than October 15, 1964, to SSA Contest Manager SM7ID, Box 2005, Kristianstad 2, Sweden. The organizers point out that this contest is a means of effecting contacts for the OHA, OZCCA, WALA, WASM and other Scandinavian certificates.

The **Columbus Contest** will take place between October 9 and October 11, 1964, and this has been organized by the International Institute of Communications of Genoa to honour Christopher Columbus. The rules are lengthy and intending participants may obtain a photocopy of these by sending a s.a.e. to RSGB Headquarters.

The **CQ WW DX Contests** will take place as follows: *Telephony:* October 24 to 25. *C.w.:* November 28 to 29.

The **Fifth Annual CQ 160m C.W. Contest** was again a resounding success with exceptional activity and conditions. There were 904 participating stations from W/K whilst G realized 348, the next highest being OK with 90. In reporting W2EQS comments that European signals were frequently much stronger than West coast USA stations. The Top Ten were:

| | | | |
|---|---|---|---|
| G3GRL | 43,824 | W0AIH | 31,588 |
| GM3IGW/A | 39,015 | VE2UQ | 31,518 |
| K2DGT | 37,100 | W4BVV | 30,772 |
| DL1FF | 36,904 | W8HGW | 29,744 |
| W9EWC | 35,208 | W2EQS | 28,710 |

Congratulations to **G3GRL** and **G3IGW** on their achievement.

### *Awards*

Firstly, a correction in connection with the **Diploma Radio Barcelona** (EAJ1 Award) mentioned in *MOTA* for July. The address for claims should be PO Box **5041,** and not as given.

The **California Counties Award** sponsored by the *Directory of Certificates and Awards* may be claimed by operators having confirmed contacts with two stations in Californian counties. There are five classes to this award ranging from two contacts with all 58 counties to contacts with 20 counties.

Full information, including a list of counties and a map will appear in the *Directory*, and a copy of this leaflet may be obtained by sending a s.a.e. to G2BVN. The custodian of this award is K6BX, Box 385, Bonita, California, USA.

The **US Navy Maritime Mobile Certificate of Recognition** may be claimed by any operator who has established two-way communication with at least five US ships operating /MM under special authority granted by the Chief of Naval Operations. QSL cards are not required and applicants should submit the following information:

(i) Name of ship; (ii) date of contact; (iii) GMT time of contact; (iv) call sign of shipboard operator; (v) approximate contact frequency. This information should be sent to: Director, Naval Communications (Op-945N), Navy Department, Washington, D.C.-2030. (Tks G3NBC.)

The SARL have issued a new list of the countries eligible to count for the **All Africa Award** and intending applicants are recommended to obtain this to avoid possible confusion. It is noted that certified applications will be accepted from members of IARU societies. (Tks Geoff Watts.)

The **Royal Air Force ARS Century Club Award** is now available to all radio amateurs and may be claimed in one of four classes for confirmed contacts with 25, 50, 100 and 200 members. A GCR list will be acceptable and should be sent, together with 3s. or six IRC, to RAFARS Headquarters, Royal Air Force, Locking, Weston-super-Mare, Somerset, England, from whom further information is available.

An SWL member of Chapter 8 of the **Certificate Hunters' Club**, A2498, Dave Gray, offers to answer queries regarding SWL-CHC if addressed to 1 Sunderland Road, Easington, Peterlee, Co. Durham, and accompanied by a s.a.e. SWL CHCers are now welcome in Chapter 8 and it is hoped that in due course it will be possible to form an SWL Chapter. In view of the many certificates that are available to listeners, attaining the basic qualification of 25 awards for membership of CHC should not be difficult for the enthusiastic DX'er.

Congratulations to ardent sheepskin chaser, **G5GH,** the first operator in Europe to receive the *UJC Award* mentioned in *MOTA* of May 1964.

### *Around the Bands*

Reports received this month cover all the available bands and give a pretty good insight into what is happening and where. Considering that we are now very close to sunspot minimum there are still a great number of good DX contacts taking place, even though circuits to the antipodes remain stubbornly closed. However, with the approach of the equinoctal period even these really long haul circuits will come to life. Anyway, short skip sporadic *E* QRM from European stations is on the decline so that, if there is DX coming through we shall have a better chance of hearing it.

Already there are signs of the autumnal awakening on **1·8 Mc/s** and the best DX heard is reported by **BRS20317** (Bromley) who heard 9L1HX on 1808 kc/s, peaking S6 at 04.50 calling W1BB, who was also audible. This was on July 25, an extremely early date for the band to be showing signs of life and a good augury for the coming season.

The **3·5 Mc/s** band is covered by **A2498** (Croydon) who reports hearing OA4KY (03.20), PX1MO (22.05), VO1FX (02.00), DJ1HP/MM off Newfoundland (02.15), and W1/5, 8 and VE3 all around 02.20. All these were in the s.s.b. segment of the band, and A2498 opines that a lot more DX contacts could take place on the band if DXers got down to it in earnest.

Despite all the "noises off" on **7 Mc/s**, experienced and dedicated operators still manage to effect good DX contacts on a regular basis, and if DX means distance and rarity, then 7 Mc/s is second only to 14 Mc/s at the present time. Look, for instance, at the 7 Mc/s s.s.b. log of **BRS25429**: MP4BEQ (20.10), VQ2WR (21.00), MP4BBW (21.30), VS9MG (21.00), ZS1ZH (21.00), VS9MB (21.25), 4W1B (20.00), 5Z4AA (21.15), 7Z1AA (20.15), OY7ML (21.30), VS1LP (23.00), VS1LX (21.00), ZD6PBD (21.55), 5H3HD (21.30), 9K2AX (21.20), OX3JV (20.30) and LX3QT (20.30). On the c.w. end of the band G3POI (Croydon) worked OX3LP (00.10), CP5AQ (00.35), VP3YG (00.10), CP5EZ (00.45), OR4VN Antarctica (00.50), YV5BRA (02.00) and LX3AZ (17.35). **BRS20317** completes the reports by commenting that North American stations start to appear around 21.30, South Americans and Central Americans about an hour later and Africans during early evening. The next month or so should show an increase in the signals received from Asia

**"That's him!" say Antioch DX Society members, atop the 2500 ft. high Mt. Butte, near Jackson, California, at 7 a.m. on January 25, 1964. A report of RST 349 was received on 160m phone from KR6TZ who was sent a report of RST 229. Left to right: SWL (Bob), WA6IJH, WA6IJG, WA6JCD, and K6PJY.**
*(Photo by WA6GJW)*

### QTH Corner

| | |
|---|---|
| EL8B | S. Larson, Sandelsgatan 25, Stockholm No, Sweden. |
| FH8CD | via 5R8BC, V. Defaysse, BP 587, Tananarive, Malagasy Rep. |
| OD5AX | via W9YFV, 190 E. North Ave., Elmhurst, Illinois, USA. |
| TJ1AC | F. Bucher, c/o Electricity Corp., Victoria, West Cameroun. |
| UA1CK | V. Kaplun, Tramwajnyj PR2, FL47, Leningrad L215, USSR. |
| VS1LS | D. T. Llewellyn, Box 25, Paya Lebar, Singapore, 19. |
| ex 6O1ND | N. Duxbury, American Embassy, Bolzmanngasse 16, Vienna IX, Austria. |
| 7G1L | via W3ZBG, 209 Ripin Rock Dr., Silver Spring, Maryland, USA. |
| 7G1IX | via OK Bureau for OK1GL. |
| 7QDI | via Hammarlund DXpedition of the Month QTH. |
| 9M2DQ | J. C. Pershouse, Baling Estate, Kuala Ketil, Kedah, Malaysia. |
| 9M2RM | R. C. Marsehke, Married Quarters 280B, RAAF, Butterworth, Malaysia. |
| 9M2YY | A. J. Smith, 11 Lorong Bukit Keramat, Kuala Lumpur. |
| 9Q5AK | via W4UMO, 2718 Connally Dr., S.W., Atlanta 11, Georgia, USA. |
| 9U5BB | via ON5KY, 36 Ave. Guillaume Gilbert, Ixelles, Belgium. |

* * *

RSGB QSL Bureau: G2MI, Bromley, Kent.

while the VK and ZL stations should also be putting in an appearance again before long.

As usual, and the position is not going to change much during the next few years, **14 Mc/s** continues to be the most consistent band for DX with signals being reported from all six continents, even though VK and ZL and the Pacific area generally have only been heard or worked on rare occasions. During the period August 4 to 14, **G3AAE** (Loughton) logged c.w. signals from CR9AH (13.00), VQ9HB (16.30), HZ3TY (20.20), VP2AV (21.30), VS9PGM Perim Island (16.15), VS6EY (18.00), KG6AAY (16.05), VQ8AM (16.15), 5R8AN (16.25), 7Z1AA (17.50), CP5EZ (22.10), HI8MMN (22.35), FB8WW (05.35), 5H3KB (17.40), 4W1D (18.45), FR7ZI (16.20). According to G3AAE, FB8WW is on regularly between about 05.15 and 06.00 with signals peaking a rough S8 and working considerable numbers of European stations. It was DXCC country number 320 for G3AAE who has never run anything more powerful than a pair of 807s in his transmitter.

**GM3ITN** (Clydebank) also used c.w. for W3FMC/MM off KS6 (08.00), HL9US (12.15), JA6PA (15.20), MP4BEX and MP4BEQ (20.30), KL7EFG (11.00), VS1MD and VS1ML (16.15), VS9OC (16.20) and ZL3UY (10.15). **G8JM** (Chingford) spends most of his operating time on s.s.b. and worked AP2MI, CE1DD, CR6CA, EL6E, FH8CD Comoro Is, HR1SO, HZ2AMS, HM1AX, JA1AEA, KA5MC, KR6EW, WA0EHW/KG6, PJ3CF, VS9MB, VP2KD, YV8AS, 6O6BW, 5H3JR, 9U5BB and 7Z1AA. **G3POI** adheres to c.w. and works such as VP3YG (21.00), FY7YJ (23.20), VP2KJ (23.00), 7G1L (19.40), TT8AM (21.20), FG7XC (22.10), VP1TA (22.30), 5X5JG (18.20), VS9OC (17.00) and CR9AH (15.20).

**G3LPS** (Blackburn) logged c.w. contacts with CO2XX (23.10), CR6DA (20.50), CP5EZ (22.35), EL2AD (22.45), EP2RC (19.13), FG7XF (21.19), HP1BR (22.35), LX3AA (22.35), KZ5KY (22.46), OA4CG (20.49), VS1LP (16.10), VS9OC (16.36), 6O6BW (17.50), 7G1L (21.27) and 9K2AD (19.50).

Turning now to the listening fraternity, whose reports all cover telephony and mainly single sideband, and commencing with **A2498** we find AP2MI (16.05), AP5KC (05.20), CE1DD, CE3RC (20.00), CP1CY (01.05), CR6CA (18.40), EI0AC (18.50), ET3HP (20.10), ET3MEN (05.10), EP2AZ (19.15), FM7WQ (22.50), HC8FN Galapagos Is. (23.40), HH2OP (02.40), HL9TS (13.40), HR1UA (01.10), HV1CN (20.45), KA2USF (19.05), KV4AQ (11.10), LX1DE (12.05), MP4TBA (17.55), OY8KR (10.45), PJ3CF (21.45), PX1MO (06.55), TG9GZ, TG9RJ, TG9SC and TG9SM (23.45 to 02.10), VP2KJ (21.10), VP6AW (20.30), VQ8BFC (18.30), VS9MB (14.25), XE3PY (02.50), 4U1ITU Geneva (13.40) and 4U1SU Gaza Strip (17.40). Continuing with the numeric starters A2498 lists 4W1B (20.20), 6Y5MJ and 6Y5UC (00.30), 7Z1AA (07.30), LU2XL/9K3 (14.10), 9X5GG/P (20.05) and 9X5GG/M (10.25). Quite a list that.

**A4038** (Exeter) reports s.s.b. from ZD6PBD (18.25), OD5AX (20.50), TG9RJ (21.00), CP1BJ (18.00), 7Q7PBD new call-sign of ZD6PBD (17.55), FG7XL (21.22), VP7ND (21.00), YV8AS (21.15), VP2KM (21.20), TI3SXG (21.25), YS1RRD (21.00), 6O6BW (21.05), VP4VP (21.00), CE1DD (20.40), and reverting to a.m. 7X2MD (17.45), SU1KH (17.50), 9G1FR (18.15), CO2CT (20.52), EL5D (21.25), LX1DB (12.00), ZS8G (17.30) and EA9EO (12.15). **A4148** (Cwmbran) comes in with some c.w. IP1PRC (17.30), PX1JQ (17.36), SV5L (17.40), VQ2GR (17.45), HK4DQ (22.10), and LA2PH/MM whose ship ejected signals continue to arrive from many parts of the world. **BRS25901** (Worcester) and **A4048** (Morden) confirm most of the above and are thanked for their reports as are all contributors.

The **21 Mc/s** band is but a shadow of its former self, and apart from the North/South path is yielding practically nothing except Europeans on short skip. **G3POI** keyed with CR6EI (19.55), OY7ML (17.34), 7Q7RM (17.00), CR7IZ (14.20), VQ8AM (16.45), 5H3JI (17.00) and SV1BK (17.40). **A4038** inhaled a.m. signals from CR6JL (18.10), 5N2EGL (18.15), 9G1DM (18.17), 5X5JK (15.05), 9Q5ED (13.50), LX1DC (14.05), CR6AL (16.25), 9X5VF (17.30), 9Q5YL (16.20), CR6GQ (16.40), 9U5DL (19.10), TN8AD (18.25), TU2AE (18.15) and the solitary signal from the West KV4CX (20.40). **A2498** also heard KV4CX but at 18.15, together with CX5AAM (18.00), K1SDS/AM (08.10), TN8AD (18.45), TT8AM (17.00), 9G1DM (18.00), 9L1WN (17.45) and sundry 9Q5s around 18.00. **A2498** remarks about the paucity of s.s.b. signals on this band and during the period under review only found SV0WF (Rhodes, 17.55), 5Z4AA (17.50) and 9U5BB (19.30).

**BRS20108** (Welwyn) logged these prefixes between 16.30 and 18.30: CR7, CR6, TN8, VQ2, ZE, 5N2, 5B4, 6W8, 9G1, 9Q5, 9L1 and 9U5.

The 28 Mc/s band is almost barren except for sporadic short skip Europeans, which are now less frequently audible than they were 6 to 8 weeks ago. Very occasionally African stations are audible with good signals but with heavy QSB, such as 9G1DM reported by **BRS25901** and VQ2DT, 5X5JK and 9LIHX reported by **G3AAE** in the early evenings. However, the most surprising report (28 Mc/s is always full of surprises even at sunspot minimum) comes from **A4048** who on August 2 logged W2HMV (14.40), W1CHG (14.45), W2LOT (14.55) and W1PMZ (15.00) on a.m. This was, of course, a freak opening, but of considerable interest.

While on the subject of the higher frequency bands your contributor wonders exactly how dead these bands *really*

(*Continued on page 587*)

**Numeral Prefixes**

| | | | |
|---|---|---|---|
| 2AA-2ZZ | UK | 5WA-5WZ | W. Samoa |
| 3AA-3ZZ | Monaco | 5XA-5XZ | Uganda |
| 3BA-3FZ | Canada | 5YA-5ZZ | Kenya |
| 3GA-3GZ | Chile | 6AA-6BZ | United Arab Rep. |
| 3HA-3UZ | China | | |
| 3VA-3VZ | Tunisia | 6CA-6CZ | Syrian Arab Rep. |
| 3WA-3WZ | Viet-Nam | | |
| 3XA-3XZ | Guinea | 6DA-6JZ | Mexico |
| 3YA-3YZ | Norway | 6KA-6NZ | Korea |
| 3ZA-3ZZ | Poland | 6OA-6OZ | Somaliland |
| 4AA-4CZ | Mexico | 6PA-6SZ | Pakistan |
| 4DA-4IZ | Philippines | 6TA-6UZ | Sudan |
| 4JA-4LZ | USSR | 6VA-6WZ | Senegal |
| 4MA-4MZ | Venezuela | 6XA-6XZ | Malagasy Rep. |
| 4PA-4SZ | Ceylon | | |
| 4TA-4TZ | Peru | 6YA-6YZ | Jamaica |
| 4UA-4UZ | UN | 7AA-7IZ | Indonesia |
| 4VA-4VZ | Haiti | 7JA-7IZ | Japan |
| 4WA-4WZ | Yemen | 7RA-7QZ | Algeria |
| 4XA-4XZ | Israel | 7SA-7SZ | Sweden |
| 4YA-4YZ | ICAO | 7TA-7YZ | Algeria |
| 4ZA-4ZZ | Israel | 7ZA-7ZZ | Saudi Arabia |
| 5AA-5AZ | Libya | 8AA-8IZ | Indonesia |
| 5BA-5BZ | Cyprus | 8JA-8NZ | Japan |
| 5CA-5GZ | Morocco | 8ZA-8ZZ | Saudi Arabia |
| 5HA-5IZ | Tanganyika | 9AA-9AZ | San Marino |
| 5JA-5KZ | Colombia | 9BA-9DZ | Iran |
| 5LA-5MZ | Liberia | 9EA-9FZ | Ethiopia |
| 5NA-5OZ | Nigeria | 9GA-9GZ | Ghana |
| 5PA-5OZ | Denmark | 9KA-9KZ | Kuwait |
| 5RA-5SZ | Malagasy Rep. | 9LA-9LZ | Sierra Leone |
| | | 9MA-9MZ | Malaysia |
| 5TA-5TZ | Mauretania | 9NA-9NZ | Nepal |
| 5UA-5UZ | Niger | 9OA-9TZ | Congo |
| 5VA-5VZ | Togolese Rep. | 9UA-9UZ | Burundi |
| | | 9XA-9XZ | Rwanda |

Part I of a New Series

# Progressing Through Amateur Radio

By K. L. SMITH, G3JIX* and P. G. MARTIN, G3PDM†

AMATEUR Radio is a worldwide achievement of which we all may be proud. The very diversity of interests and knowledge contained in it offers a challenge. Its history, like most scientific progress shows great variety, always showing the interplay of human feelings and minds without which any activity is pretty well dead. There are those who like to communicate and compete, purely and simply. Others love technical achievement, construction and experiment.

If any short-wave receiver is tuned around 20, 40, 80 or 160m, amateurs may be heard communicating and unfamiliar expressions are heard, like "QSO," meaning the radio contact, "DX," meaning difficult long-distance working.

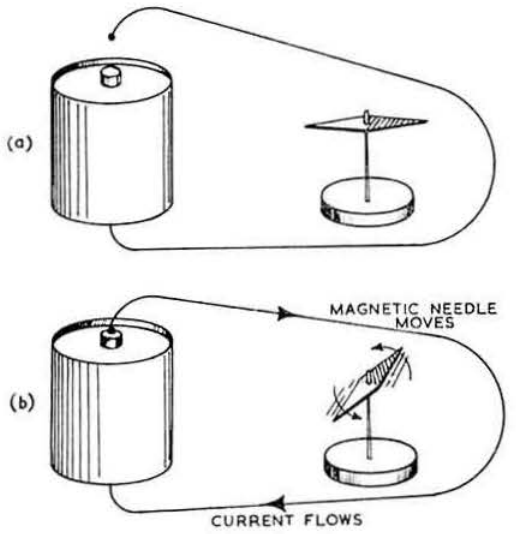



Fig. 1. Oersted's observation.

You may hear "73," meaning kind regards. The list of these abbreviations, originally developed to reduce the amount of time required when using Morse signals, is fairly long and has been adopted by amateurs the world over as a kind of friendly jargon. We feel most people, especially the younger more technically minded, are interested in the fundamental background to the activity. This series sets out to cover the techniques behind the front panels, using, we hope, a fresh, modern approach.

### The Beginning

We start by having a quick look into the past at the story of what has given us Amateur Radio.

Perhaps the first "wireless" signal occurred in the summer of 1822 during a lecture by the Danish scientist Oersted [1, 2, 3]. He noticed a nearby compass needle move when electric current was switched on and off in a circuit connected to the newly available batteries developed from Volta's work (Fig. 1). This great discovery showed that the electric current produced magnetic effects. We hear a great deal more about this effect later.

Michael Faraday [1, 2, 3], the great English experimeter thought that the reverse might be true: that magnetic effects might produce electrical activity. By a series of brilliant experiments he showed this to be so (Fig. 2). From this development have sprung generators and power stations, motor engine ignition, telephones and of course radio, radar and television.

A little later, Clerk Maxwell [1, 2] mathematically connected Faraday's work with other facts to show that not only were electricity and magnetism one combined subject, but predicted that electromagnetic waves should exist. He went further, showing that light moved in the form of these electromagnetic waves. The speed of the waves from Maxwell's mathematics turned out to be about 186,000 miles per second, seven and a half times round the equator in a second! Light had been shown to travel at this speed by measurements and its wavelength was shown to be very small, about 0·00005cm. Maxwell's work also predicted waves of much longer wavelengths.

Heinrich Hertz [1, 2], working where the DLs are now, Germany, set out to find these waves. The entry in his diary is a fitting memorial to what is about the first QSO near 4m:

> "November 1887—Vertical electric vibrations in wires stretched in straight lines—discovered. Wavelength 3 metres."

Things were now really warming up. It was Marconi who began the commercial exploitation of the radio waves. His experiments brought radio before the public eye, and founded the electronics industry. The transatlantic transmission from Poldhu in Cornwall really gave the impetus needed. The fact that the sunspot cycle was just right to give

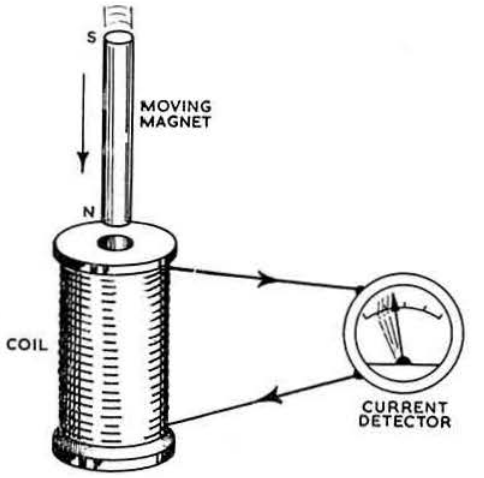



Fig. 2. Faraday's experiment.

* RSGB Education and Training Committee.
† RSGB Technical Development Sub-committee.
‡ Lists of centres conducting courses for the May 1965 examination are given in this and preceding issues of the BULLETIN.

ionospheric reflection for the wavelength used was probably one of the greatest pieces of luck ever experienced in the history of the work [4].

Marconi himself said later that amateurs were contributing to the progress of the science and that their work was valuable.

After the publicity concerning radio, groups of electrical experimenters soon got together to investigate the " new " wireless and the Amateur Radio movement was born. In England the London Wireless Club was founded in 1913. A great deal of work was done by the late Rene Klein in this connection. The Club developed, and by 1922 it had evolved into the Radio Society of Great Britain [4].

One of the first and most enthusiastic groups was the Radio Club of America. It must have been pretty moving as well as prophetic to hear Master William Stokes addressing the Committee of American Senators in 1910 and appealing for freedom for the amateur experimenters. He was 14 years old at the time [5].

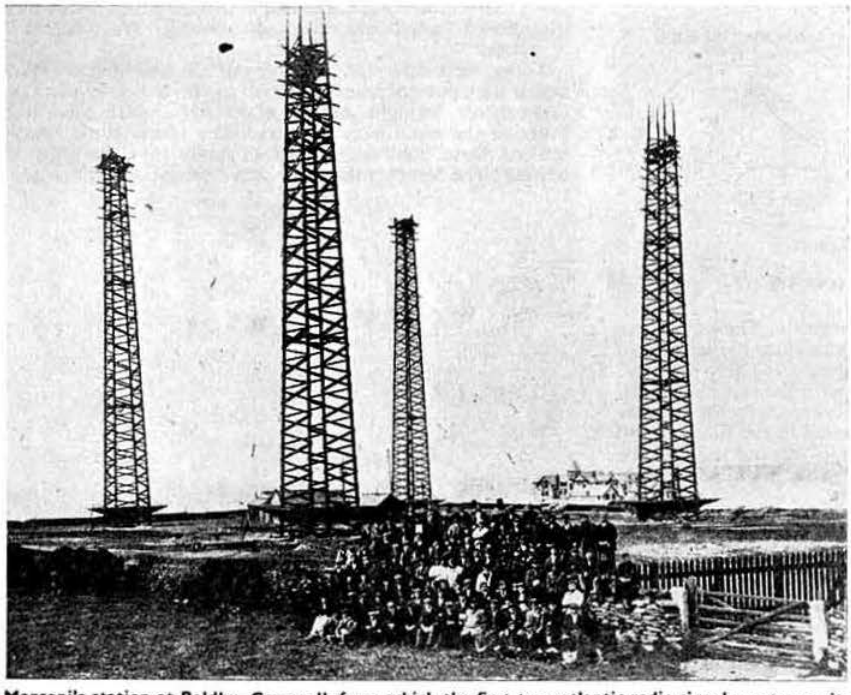
Since those days the movement has reached the status of an international service and is much more sophisticated. The Amateur Service now contains more communicators than almost any other. It develops trained operators and technicians. Future scientists are often started off by early enthusiasm for Amateur Radio. The advantages of a large amateur movement are obvious for any nation, all at a small cost to the various exchequers, because of the self-training nature of the movement.

The activities vary widely. The emergency networks are always alert to help during national or local disasters. Television pictures are sent between amateurs, and the British Amateur Television Club co-ordinates work in this field. There is teleprinter operation for the RTTY enthusiasts. Mobile working is ever increasing: the larger and larger rallies are becoming important social functions. On the technical side, Morse is used as much as ever, with perhaps assistance from semi-automatic keys (" bug " keys) or electronic keyers (" el-bugs "). Single sideband methods are also increasing rapidly in popularity, and it is conceivable that for telephony transmissions it will be the only mode in use one day.

The scientific contributions that can be (and are) made by radio amateurs should not be neglected. The beacon stations operated by the Society are a case in point. The OSCAR satellite projects have been very successful, and Doppler shift observations were carried out by many amateurs on early satellites. Co-operation with the IGY (International Geophysical Year) and now with the IQSY (International Quiet Sun Year) was and is being carried out. Amateurs can co-operate with the work of astronomers interested in the radio signals coming from outer space, and very cordial relations exist between the RSGB and the British Astronomical Association.

The Amateur (Sound) Licence A is issued to British subjects who have passed the Radio Amateurs' Examination and a Post Office Morse test in sending and receiving plain language at 12 words per minute. A helpful pamphlet entitled *How to Become a Radio Amateur* is sent free of charge on application to Radio Services Department, GPO Headquarters Building, St. Martins-le-Grand, London. Details are also given of the Amateur (Sound) Licence B which requires no Morse test.

In many parts of the country, local evening institutes run RAE (Radio Amateurs Examination)‡ courses and the prospective amateur might do well to take advantage of them. If no such course is running in your area, then by building up a keen group and going along to the local centre, a course may be arranged for you. Many radio clubs exist, and the pleasure of meeting together to discuss the common interests is rewarding. The club movement keeps the co-operative aims in view and many new friends may be made.



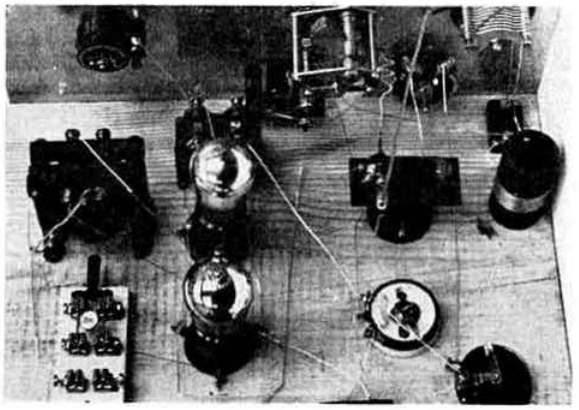
**Marconi's station at Poldhu, Cornwall, from which the first transatlantic radio signal was transmitted to Newfoundland. The buildings were demolished some years ago but the site now belongs to the National Trust and there is a commemorative column on the cliff top.**
*(Photo by courtesy of The Marconi Company Ltd.)*

We have discussed the background which supports the state of the movement as it exists now. It is clear that things still unknown have yet to be achieved. With a spirit of enquiry which surrounds all scientific endeavour, we can rest assured that Amateur Radio can go ahead into the Scientific and Leisure Age contributing knowledge, increasing the degree of scientific thinking and surely helping many to learn things for their own sake. Why is the rather cynical question always asked: " But what's the use? " The answer must be that a man should gain his livelihood to support himself and be of service to the community, and in leisure time to investigate something for the sheer delight of it.

It is with this spirit that we move on, discussing now the effects of the electric current. An understanding of them explains the operation of all electronic equipment.

### The Electrical Effects

There is the important magnetic effect mentioned earlier. The commonly observed heat-



A receiver of the 1920's.

ing effect of the current is put to use. Emission of electrons from hot surfaces is called the thermionic effect. Electrons can also be emitted by light striking a surface; this is the photo-electric effect. Both these effects are used in valves and tubes. Then there are the important electrostatic forces operating between charges. The piezo-electric and thermo-electric effects have interesting and important applications in such devices as crystal microphones and meters for measuring radio frequency current. The chemical effect is noticed in connection with electric batteries and electro-plating.

### Things to Do

***Oersted's Observation.*** Stretch a wire across the top of a pocket compass, so that it lies along the needle. Connect the ends to the poles of a cell such as a U2. Reverse the connections. Notice the effect in both cases. Try the wire under the compass. Finally wind the wire round the case and note the results.

***Faraday's Generation of a Current.*** A coil of many turns of fine wire is required (such as an old loudspeaker energising coil), a sensitive milli-ammeter to detect the current, and a magnet. If you have no meter at this stage, take your coil to the radio club meeting, to a friend or, if you are still at school take it there. For keen experimenters, a galvanometer (current detector) can be made based on Oersted's discovery. Many turns of fine wire are required around a delicately balanced magnetized needle. A good way to suspend the needle is to hang it up on a silk thread. It is important to run long wires separating the home-made galvanometer from the coil to reduce the risk of direct interaction between the magnet and the needle.

Move the magnet into the coil, remove it and try the other end. Vary the rate of moving. The variations show what goes on in nearly all electro-magnetic systems. Remarkably simple, isn't it?

*(Part 2 in this series will appear in an early issue)*

### References


[1] R. R. Butler, *Scientific Discovery*, E.U.P. Ltd.

[2] Grimsehl, *A Textbook of Physics, Vol. III, Electricity and Magnetism.*" Blackie. See chapter 3 for the work of Oersted; Faraday, chapter 12; H. Hertz, chapter 12. This book has many beautiful diagrams and is of great interest in the scientific approach to the subject.

[3] McDougal, *The Wonders of Electricity*, Pitman. A book for boys, but it should inspire anyone with its enthusiasm and simplicity. Recommended for teachers and club leaders for their boys.

[4] Asa Briggs, *History of Broadcasting*, Oxford University Press. Marconi's work, chapter 1. RSGB, chapter 3. *Fifty Years for the Advancement of Amateur Radio*, RSGB BULLETIN, July 1963.

[5] Radio Club of America: *Fiftieth Anniversary Golden Year Book*, Patent Office Library. Shelved under HG 85.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## The Month on the Air (Continued from page 584)

are. One so often hears stations on lower frequency bands saying " I have just had a listen around on 21 and 28 Mc/s, but both bands are as flat as a pancake." One visualizes hundreds of amateurs all over the world listening on 21 and 28 Mc/s and turning away disappointed, not because the bands *were* dead but because they were presumed so. Now if a few trial CQs had been radiated the bands might have been found to be not so dead after all. Agreed the higher frequency bands are in poor shape these days but lack of activity on them is partly to blame.

Well, another six months or so and the absolute trough of the sunspot cycle should be passed and, it is as well to remember that once passed conditions start to improve at about twice the rate that they deteriorated before the minimum. A happy note upon which to terminate this review of current activity on the bands.

### *DX Briefs*

**OY8KR** is QRT from the Faeroe Islands and is now in Israel. Martin, OY7ML, will endeavour to assist with any outstanding QSL requests and can be reached at Box 184, Torshavn.

*The DX'er*, the club bulletin of the North California DX Club, is now under the editorship of W6WX, Dave Baker, 930 Colby Ave., Menlo Park, California.

The whereabouts of **VS1JO** and **VS1JV** are sought by G2MI. Neither of these calls appear in the latest MARTS lists.

**VK0PK** is said to be active on 7 Mc/s c.w. from Macquarie Island, whilst Norfolk Island representation comes from VK9RB on 14 Mc/s c.w.

**FH8CD** may often be found dispensing s.s.b. QSOs at the high end of 14 Mc/s, and it is evident that the Comoro Islands still figure on many " wanted " lists.

Cards for the W4BPD operation at HS1AA, XW8AW and YA5A are being distributed, but no BY cards will be printed. This follows the decision of the ARRL not to recognize this operation for DXCC purposes.

* * *

Co-operation from correspondents is gratefully acknowledged as is assistance from the West Gulf DX Club *Bulletin* (W5IGJ), the LIDXA *Bulletin* (W2MES), DX'press (PA0FX), the Florida DX Club *Report* (W4HKJ) and *The DX'er* (W6WX). Please send all items to RSGB Headquarters to arrive not later than September 16 for the October issue and October 9 for the November issue.

# Mobile Column

By E. ARNOLD MATTHEWS, G3FZW*

### As Others See Us

Our attention has been drawn to recent correspondence in *The Motor Trader* which published a letter describing what were obviously 160m /M aerials and enquiring what " these things " were. The correspondent concluded, " In any case, surely the recognized form and size of car radio aerials would be almost as cheap or cheaper, more effective *and* (our italics) *certainly less ugly*? "

This letter prompted four replies. Three were from amateurs, who seemed more concerned with technicalities and achievements while the other was from a non-amateur whose references to our social value made better advocacy for amateur radio than any of the other letters on this subject published by *The Motor Trader*.

This correspondence does remind one that, whereas there are millions of motorists, only about a thousand are /M Radio Amateurs, and what may be a thing of beauty to our eyes might be an eyesore to others.

### Tidy up that Rig

One of the factors contributing to untidy installations may be that some operators are only " Shamobiles," i.e., their equipment is placed in cars for static operation only. Suppression is at a minimum and the aerial is fixed only because it is necessary. The owners may offer the explanation, " I don't operate on the move because the distraction is a driving hazard." A reasonable argument, but a much greater danger is often overlooked. Apparatus loose on the back seat can become airborne and will make anything but a " three point " landing if the brakes are applied hard, and this can inhibit emergency braking.

One can add much to safety and passenger comfort by installing equipment properly, and this does not necessarily mean major modifications to the car body. The writer's transceiver has been tidily installed without the use of any tools other than normal electrical implements, by simply wedging it firmly under the parcel tray with a block of hard rubber. It is safe, accessible and inconveniences neither driver nor passengers, and is very quickly installed and removed. The d.c. supply unit is positioned under the driver's seat. All wiring has been run under the carpets close to the side of the car, and the only cable visible is the microphone lead.

Has the d.c. supply to your rig got a fuse in circuit? If not, does your vehicle insurance cover fire risks?

### Frequency Measurement

It is encouraging to see that rally organizers are introducing frequency setting tests in rally programmes. Such tests are much more worthwhile than field strength tests or awards for DX QSOs with rally stations.

Frequency tolerances demanded by the new Amateur (Sound) Licence A require at the very least a very stable and accurately calibrated v.f.o. when working near the band edge. A crystal calibrator should not be regarded as a luxury, for how else can one know, with certainty, where the band edge is?

### Reading Mobile Picnic

The date of the Reading Mobile Picnic, which was originally September 13, has been moved forward a week to September 20 to avoid a clash with the RSGB Mobile Rally at Woburn Abbey which falls on the former date.

* 1 Shortbutts Lane, Lichfield, Staffs. Please send reports for the **October** issue to arrive by **September 11**, and for the **November** issue by **October 2**.


**A view of the site at the Cornish Mobile Rally on Pentire Headland on July 26.**

*(Photo by G3LXP)*

The Mobile Picnic will be held at the Childe Beale Trust Pavilion, Lower Basildon, near Pangbourne, Berks., on the banks of the River Thames. G5HZ will be talking-in on 144·15 Mc/s, and G3OLA will be on 1920 kc/s. Screen stickers are available from R. G. Nash, G3EJA, " Peacehaven," 9 Holybrook Road, Reading.

### Cornish Mobile Rally

The rally organized by the Cornish Amateur Radio Club and held on Pentire Headland, Newquay, on July 26 attracted a good attendance, bearing in mind the distance from the large centres of population. About 150 amateurs (including 30 mobiles) and their families made their way to the site adjacent to two excellent beaches. Visitors came from as far away as London, Preston, Guildford, Maidenhead, Torquay and Newton Abbott.

Talk-in stations using the call-sign GB3CRC operated on Top Band and 2m (using G3XC's equipment) and on 80m (equipment supplied by G2BHW). A vertical aerial proved most successful on the lowest frequency. Adjacent to the operating positions was an interesting display of well-constructed amateur equipment.

In the concours d'elegance the prize for the best home-built equipment went to G3GMN/M of Gloucester, for the safest equipment to G3NBR/M of Dartmouth and for

**RSGB NATIONAL MOBILE RALLY**

**Woburn Abbey, Bletchley, Buckinghamshire**

*(by permission of His Grace the Duke of Bedford)*

**SUNDAY, SEPTEMBER 13, 1964**

* Park opens 11 a.m.
* State Apartments open.
* More than 3,000 acres and 2,000 animals.
* Children's Playground, Pets' Corner and Boating Lake.
* Trade stands.
* Raffle.
* Model Aircraft Display.
* Restaurants and Snack Bars.
* Specially reserved rally car parks.

**TALK-IN STATION**

**GB3RS on 2, 4 and 160 metres**

*Organized by the RSGB Mobile Committee*

the best v.h.f. equipment to G3SJO/M of Colchester. The receiving prize was won by BRS10663.

A useful item in the well-produced programme was a description of some of the more interesting places in the surrounding area.

### Dartmouth Mobile Rally

On Sunday, August 9, about 300 people arrived at the Brittania Royal Naval College, Dartmouth, in Devon, to take part in a mobile rally organized jointly by the Brittania Royal Naval College Radio Club and the Torbay Amateur Radio Society.

There were 26 mobile stations among 100 cars, and these were talked in by G3LMG on 2 and 4m, and by G3LHJ and G3LKJ on 160m. G3HRW/M made the longest distance contact with the 160m talk-in station from St. Dominic in Cornwall, and the same was achieved on 2m by G3MPS/M in Ashcott, Somerset. G3RBJ/M, G3NKR/M and G4UZ/M travelled the longest distance on the day of the event. In the competition for the best mobile installation, this year the accent was on safety. For home-built equipment G3NBT/M was judged to have the best station, while G3MPS/M won in the commercial equipment class. G3BNL/M was the winner in the mobile treasure-hunt, and G3PYI/M came second. The presentations were made by G5SY, President of the Torbay Amateur Radio Society.

### Derby Mobile Rally

The Derby Mobile Rally, held on August 16 at Rykneld Schools, Bedford Street, Derby, enjoyed fine weather and an attendance well up to expectations. About 450 cars arrived, of which at least 200 were equipped for mobile operation. The programme was up to the standard of previous events, and included the well-known mammoth junk sale and large raffle. Unfortunately, however, the holder of the winning raffle ticket No. 1882 has not yet come forward to collect his prize. The prize for the lucky programme No. 085 has also not been claimed.

## Scout Station GB3GP

At the invitation of the International Department of the Boy Scouts Association, the newly formed Baden-Powell House Scout Radio Group operated a temporary station under the call-sign GB3GP during the International week-end, June 13-14, 1964, at Gilwell Park in Essex.

The station was a great success both from the radio and scouting aspects. No less than nine of the operators were also Scouts. The interest created amongst the spectators present was evident by the fact that at all times the crowd was two or three deep in front of the operating tent. In fact during a five-hour thunder-storm on June 12 the onlookers still arrived.

**Bill Hayes, G3CJQ operating GB3GP, while Jeff. Bottom, G3SDG looks on.**

*(Photo by R. Flower)*

In all 21 different nationalities were represented at the camp and, oddly enough, the station worked the same number of countries. Operation was chiefly on 20m s.s.b. and 80m a.m. A National NCX3 (kindly loaned by Ad Auriema Ltd.) and a Heathkit DX100 with an RA1 receiver were used. A G8KW trap dipole and a 20m ground plane aerials were installed. DX contacts on 20m were difficult, with European and even G short skip predominant. At times 20 was more like 80m on a Sunday morning. Two two-hour watches were kept for VE3WSB, the World Bureau station in Ottawa, without success, though two VE stations were worked.

All concerned were impressed by the 140-odd contacts made, and in particular with the number of QSO's where the station turned out to have some past or present connection with Scouting. One 'G' was able to relate in detail his experiences at the famous 1921 Jamboree at Olympia, while other old timers were contempories of Baden-Powell.

G2CAJ.

## Special Events Station

The call-sign **GB3UCL** will be used by the University College London Amateur Radio Society when a station is put on the air during the College Freshers' Conference. This is expected to continue for 10 days, commencing on October 5. It is hoped to operate on all bands between 80m and 2m inclusive, and special QSL cards will be issued. Cards for the station should be sent via G3SUX.

### Bulletin Contributors and the Copyright Position

The Finance and Staff Committee wish it to be known generally that there has been a long-standing arrangement between the Member Societies of the International Amateur Radio Union that material published in the Journal of one society may be reproduced in the Journal of any other society provided acknowledgment to source is given. It is not often that articles which have appeared in the RSGB BULLETIN are reproduced in the Journal of another IARU Member Society but when that happens the Society is normally approached beforehand by the Editor of the Journal in question and permission sought.

The Society purchases the copyright of all articles published in the RSGB BULLETIN and other publications unless the author specifically asks for the copyright to be reserved.

# FOUR METRES AND DOWN

By F. G. LAMBETH, G2AIW *

IN the course of correspondence with G5UM arising from "The Quickstarter," but developing along the general theme of converter design, Brian Priestley, G3JGO, makes some thought provoking comments about selectivity requirements. He says:

"Recently, as a result of reading W2PUL, and discussion with G3HJK, I was led to wonder if the average 145 Mc/s receiving system concentrates too little on effective selectivity. While the demands of noise factor preclude special anti-cross modulation valves, in the average set-up the selectivity is no better than 100 kc/s or so for the first five stages (r.f., r.f., mixer, r.f., mixer), assuming the main receiver is a single superhet (it *could* be one of those modern designs which puts the selectivity so far back as to be useless in combating cross modulation).

"However, we could put a crystal filter straight after the first mixer, as in commercial practice, except that the first oscillator must now be variable. It needn't be an s.e.o. with attendant frequency drift. It would be possible to mix a low-frequency v.f.o. with the output of a conventional crystal multiplier chain, thus getting the same stability as the conventional tunable i.f. system, but with the selectivity much nearer the aerial.

"This sort of set-up would, I think, reduce the problem of the 2m field day station where, it is alleged, bitter complaints were made because someone else had set up a station only 100 kc/s away, and only 100 miles distant. (This probably lost nothing in the telling!)"

The problem of v.h.f. selectivity is bound to become more acute as occupancy increases on 2m, and cross-modulation in areas of high amateur population becomes aggravated. The views of other technically minded members would make interesting reading.

## V.H.F. Propagation

**G2WS** (Coventry) has recently been doing considerable research into conditions on the amateur bands, and points out that normally, much effort is put into analysing conditions which produce good v.h.f. propagation—but, he muses, what of the reverse? The conditions which lead to bad propagation are surely of equal scientific interest. For example, on 2m recently, over a 34 mile good path, signals in one direction were S8 with QSB to S3, and in the other S7 to S0, and this on a warm and fairly calm summer evening. Why, when some degree of ducting might have been expected, was this excessive dissipation and upward signal path being experienced? If anyone else is looking into this aspect of propagation, we shall be glad to hear of his comments on the subject.

## Two Metre News and Views

**GM2CHN** reports that there was an opening on July 29, with European and G stations audible in Glasgow. However, at the time of writing there were no reports of any QSOs.

**GM3OFY,** whilst in Germany recently, stumbled on a group of DLs on a 2m Field Day working with 250mW transistorized equipment and a 2 element Yagi. They were getting QSOs at over 50 miles distance.

**G2JF** (nr. Ashford, Kent) continues to break new ground, and his operation statistics show how the band is still growing. Twenty-two new UK stations and 24 new continentals over one month is really a very impressive number of QSOs, even for this fine station. Among the new Gs are newcomers G3TCG, G3TEJ and G3TDR, whom we heartily welcome to 2m. G2JF's recent DX QSOs include F1EN, PA0NN (QRA Locator DN71), F8LU (La Rochelle), HB9WB/P, F2TU (DI55) and GW3STW/P. G2JF also informs us that during August, F8VN (Chartres) worked

**HB9RF adjusting the 432 Mc/s dipole on his dish aerial.**
*(Photo via G2AIW)*

* 21 Bridge Way, Whitton, Twickenham, Middlesex. Please send all reports for the **October** issue to arrive by **September 11**, and for the **November** issue by **October 2.**

GM3EGW, GM3FYB and GM3NG. It is not often that F/GM contacts occur, and this time it is even more remarkable for F8VN is well inland and not on the French Coast.

**G3YH** (Bristol) heard OK3KCR during the Sporadic *E* period on June 9. He was not, however, completely sure of the call, for although the CQs were S6 the signals disappeared completely every time the call-sign was given. There was a later QRZ, but again a fade when the call-sign came up. The frequency was about 144·150 Mc/s. This news was immediately passed to G2JF and G3EDD, but apparently all were unlucky.

**G3LHA** (Coventry) has again returned to serious operating on 2m. This coincided with the completion of the new aerial system: a 16 element stack array. It has certainly performed well, and up to expectations, and much GDX never heard before has been worked, although conditions have been only slightly above average. DX stations worked during July include G3RK (Bungay), G3CDK (Wallington), G6QN (South London), G3OBB (Christchurch), G3OBD (Poole), G3ION (Southampton), G5ZT (Plymouth) and G3ICO (Yeovil). On August 4, six London stations, all in poor locations to the north-west were worked, and on the 5th, G3XC (Newquay, Cornwall) and G6XM (Christchurch) were also welcome QSOs. The GW4LU/GW3BA Expedition was worked in all the seven Welsh Counties visited. The total counties worked since July 16 is 30.

**G3EGK** tells us of the activities of G8SB/P (and others) during the second 144 Mc/s Field Day on July 5 which took place at a site four miles north of Leek, where rain was just beginning at 07.00, and the long grass lay horizontal in the wind. The first calls, however, which led to a series of QSOs, proved that the gear was working, although the contest as a whole was hard work, caused, in some cases, to lack of speed on going over by some participants. A total of 149 QSOs was made, meaning a claimed score of just over 20,000, and a number of stations heard were never worked.

As mentioned above, conditions at Leek were not good. Every time the clouds closed in, conditions folded up except for comparative locals. The DX appeared again when the clouds lifted. Little activity was heard to the north, and very few QSOs over 200 miles took place, although EI2A was worked. G3KCB became GD3KCB/P and gave many welcome points, particularly to southern stations. G3AOS was working hard at G6AG/P in Bucks., and G3MAX was out about 10 miles north of G8SB/P. This was a very good effort by the North-west V.H.F. Group, which will be out as G3OHF/P for the September event using the same gear.

It appears that a number of Czechoslovak reports on G stations, heard during the Sporadic *E* opening, were not so one-sided after all. Apart from G3HY's report, we now hear from G3IRS (RAF, Locking), that the logbook shows that OK1KPR was being received at strengths peaking S9 between 18.20 and 18.50 GMT on June 9, while G3IRS was in QSO with G3AHB and G2JF. After these QSOs were finished, attempts were made to raise OK1KPR but with no success.

### Second 144 Mc/s Portable Contest 1964

The claimed scores for the Second 144 Mc/s Portable Contest 1964 are as follows. They are not official results.

| | | | | |
|---|---|---|---|---|
| 1 | G8SB/P | 20,449 | 8 GW4LU/P | 12,834 |
| 2 | G3IGV/P | 17,818 | 9 G3NJF/P | 12,200 |
| 3 | G5ZT/P | 15,756 | 10 GW3OXD/A | 11,894 |
| 4 | G3KMT/P | 15,667 | 11 GW3RUF/P | 11,488 |
| 5 | G2HIF/P | 14,281 | 12 G3BNL/P | 10,979 |
| 6 | G3OBD/P | 14,051 | 13 GD3KCB/P | 10,880 |
| 7 | G6AG/P | 13,173 | | |

### Four Metres

**G2WS** (Coventry) tells us that the Midlands are experiencing a problem: nobody comes on because nobody *is* on, and he therefore asks for a 4m activity period each week. Comments would be appreciated.

**GM3JJN** has a new 4m transmitter (12AT7, 5763, 807), which is more powerful, at 15w, than its predecessor. A new converter is also being built.

**GM3OFY** (Monkton) is equipped for the band, and uses an 832 p.a.

**GM3EGW** operated portable whilst on holiday in Kirkcudbrightshire, and worked a couple of Gs, a number of Irish stations, and GM2UU and GM3FYB. On August 2 he was heard again on 4m c.w. in contact with G3OHH (Macclesfield).

**G3YH** (Bristol) is active on Sunday mornings, and also in the evenings when Channel 5 closes early.

### 70 Mc/s Contest

The following are the 10 highest claimed scores for the 70 Mc/s Contest held on June 20-21. They are subject to checking.

| | | | | |
|---|---|---|---|---|
| 1 | G3PIA/P | 9,133 | 6 G3IMG/P | 5,865 |
| 2 | G3AYT/P | 7,337 | 7 G3OCB/P | 5,786 |
| 3 | G8PD/A | 7,264 | 8 G3KEU/P | 5,533 |
| 4 | G3OXD/A | 6,043 | 9 GWAHD/P | 5,505 |
| 5 | G3FDW/P | 5,977 | 10 G3POI/P | 5,009 |

### Seventy Centimetres

**GM2CHN** tells us that GM3FYB at last made a long-awaited QSO with G2XV on June 15. The skeds lasted about 18 months, and it is a matter for congratulation that such perseverance was finally rewarded.

Dutch activity on 70cm is growing rapidly. Regular stations on the air include PA0GER, PA0TR, PA0KPO, PA0MSH, PA0AKA, PA0NL, PA0FE, PA0LWJ and PA0II, and also a number of others which are listed here. Frequencies are given where known. PA0EZ, 432·52 Mc/s; PA0COB, 432·825 Mc/s; PA0TBE, 432·5 Mc/s; PA0LH, 432·75 Mc/s; PA0AKD, v.f.o.; PA0JMS, 432·76 Mc/s; PA0KT, 432·36 Mc/s; PA0OS, 432·34 Mc/s; PA0DBQ, 432·1 Mc/s; PA0VDE, 431·977 Mc/s; PA0HRH, not known. Nearly all the frequencies lie between 432 and 432·9 Mc/s. Aerials used are 14 element Yagis, and also broadside arrays. Saturday nights after 18.00 GMT is activity night, but c.w. is rarely used.

**G3LHA** (Coventry) refers to views on contests expressed by G3EKF and G3OBD and is fully in agreement. His opinion is that two shorter contests each year are needed, and that more people would then take serious interest, and more portable stations would participate.

**G3YH** (Bristol) has supported "Saturday at 7" for several months, beaming east from 19.00/20.00, but without results. Usually, the only contact is with G3OYM/T who has also kept this sked most weeks. They are still trying, however.

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

| Call-sign | Location | Nominal Frequency | Emission | Aerial Direction |
|---|---|---|---|---|
| GB3CTC | Redruth, Cornwall | 144.10 Mc/s | A1 | North-East |
| GB3VHF | Wrotham, Kent | 144.50 Mc/s | A1 | North-West |
| GB3GEC | Hammersmith, London | 431.5 Mc/s | A1 | East |

### RSGB V.H.F. BEACON STATION GB3VHF

The frequency of the Society's v.h.f. beacon transmitter at Wrotham, Kent, when measured by the BBC Frequency Checking Station, was as follows (nominal frequency 144.50 Mc/s):

| Date | Time | Error |
|---|---|---|
| July 21 ... ... ... ... | 14.10 GMT | 1220 c/s high |
| July 28 ... ... ... ... | 11.07 GMT | 1000 c/s high |
| August 4 ... ... ... | 10.00 GMT | 570 c/s high |
| August 11 ... ... ... | 10.01 GMT | 130 c/s high |
| August 14 ... ... ... | 13.40 GMT | 1400 c/s high |
| August 25 ... ... ... | 18.50 GMT | 15 c/s low |

**G5BQ** (Cambridge) writes "When the Cambridge Club was asked to provide a club station at Bottisham Fête, it was decided to include an Amateur TV demonstration. This really sparked off a spate of activity in what was, for some, a completely new field. The neighbouring March club has long been TV minded, but now G3NOX/T, G3KKD/T, and G3PGF/T have an increasing number of viewers in the Cambridge area. G3BBY/T is also able to put out vision, though his range is somewhat limited at present, and G3OWB/T is actively preparing to do so. G5BQ and G3IIT receive sound and vision regularly, G5JO expects to be completely equipped in a few days, while G3IAG and several others are also preparing to view. G3RGX/T is transmitting sound and vision, though QRP at present, and G3KKD/T has a new tower on order ready for when he changes his QTH in the near future."

Cambridge has always been in the forefront of activity and it is very pleasing to note that the spirit waxes stronger.

### Mopping them up on 70

All who have heard of the success of Gerald Jeapes, G2XV, of Cambridge, in working into Scotland on the 432 Mc/s band will have been wondering how this feat was achieved, remembering that it was performed under average conditions.

It was a case of persistence rewarded. The nightly schedule between G2XV and GM3FYB in Dunfermline was set up about 18 months ago, and kept every night between 21.45 and 22.15. On more than a score of occasions G2XV was heard in Dunfermline, and a dozen times GM3FYB was heard in Cambridge. Then on the night of June 15 success was achieved, in a contact in which signals averaged RST 449, although on occasions GM3FYB would have been readability 5 on telephony. The distance is almost 300 miles.

In addition to an input of 100 watts to a QQV06/40 feeding a 40 element aerial of square configuration, G2XV had recently commissioned a specially potent converter with two r.f. stages using an EC88 in each.

This success crowns the G2XV feat of not only working ten countries on the 70 cm band but seeing all but three English counties fall into his net.

As a tailpiece it might be added that G2XV enjoys no particular advantage in site. His station is only 50 ft. above sea level in the flat lands of Cambridgeshire.

### Twenty-three Centimetres

**PA0VLP** (1297·56 Mc/s), **PA0OS** (1297 Mc/s) and **PA0VDE** (1296 Mc/s) are all equipped for the band, and PA0VLP made the first ON/PA contact with ON4ZK on March 8, 1963.

**PA0COB** and **PA0KT** are also active, and use 2C39As, or the equivalents, in the final. PA0VDE and PA0OS are using helical beams, wound clockwise when viewed from the feed-point. On June 26, PA0COB had 23cm QSOs with G3LQR and G3LTF. Congratulations are offered to all concerned for these PA/G firsts.

**DL3FM** is active on 23cm under the call DL0RF, and is particularly interested in possible Moonbounce QSOs.

### Recent Meetings

On August 1, at the Kingsley Hotel, London, W1FRR, W1LMZ and K1BRO exhibited a most interesting collection of photographs and colour transparencies of events, equipment and aerials which were taken in the USA. Particularly impressive were shots of simultaneous six band /P operation atop a 3,500 ft. mountain, and the most mouth watering aerial arrays seen for some time. Many of the aerials reached a height of 170 ft., and the prices were within reach of many British amateurs, the only difficulty, however, being the ground space they occupy. The KP4BPZ tape of moonbounce QSOs on 70cm and 2m with G3LTF, G2HCG and HB9RG was played back to the rather small gathering; it was indeed a great pity that more were not there to hear the results of this historic v.h.f./u.h.f. achievement.

G3LTF addressed the London U.H.F. Group on August 6, and presented a simplified version of his talk at the earlier London V.H.F. Convention by describing his Moonbounce efforts and the way he achieved his transmitting and receiving success using his special aerial. The power was only 80 watts, and the signals, which were recorded by him and played back to the meeting surprised everyone by the clarity and strength of the transmissions. This was without doubt one of the largest and most enjoyable London U.H.F. Group meetings for a long time.

### "Four Metres and Down" Certificates

The following is an up-to-date list of those who have qualified for these certificates. A leaflet giving details of the conditions of issue may be obtained from Headquarters on request.

#### 70 Mc/s Transmitting Section

| | | |
|---|---|---|
| 1 G3EHY | 5 G3KEU/P | 9 G8PD/A |
| 2 G3PJK | 6 G3NUE | 10 G5FK |
| 3 G2AIH | 7 G3IUD | 11 G3NDF |
| 4 G3OHH | 8 G6NB | |

#### 144 Mc/s Transmitting Section

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

#### 144 Mc/s Receiving Section

| | |
|---|---|
| 1 BRS22550 | 3 BRS15822 |
| 2 BRS22322 | 4 BRS15744 |

#### 144 Mc/s Senior Transmitting Section

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

#### 420 Mc/s Transmitting Section

| | | |
|---|---|---|
| 1 G3NNG | 2 G3KPT | 3 G3LHA |

### Miscellaneous News

Amateur stations in Luxembourg are now permitted to operate portable and mobile. Stations using these types of operation will add /P and /M respectively to their normal call-signs.

Dutch Amateur TV interest is growing apace. PA0SW, PA0LAM, PA0COB and PA0ZR are now equipped for /T transmission, using the CCIR Standard of 625 lines and working in the 434/440 Mc/s section of the 70cm band.

# Ingang - 1964

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

"THE Grey Beards among us recall with pleasure a certain week-end spent in Paris during 1925 when the International Amateur Radio Union was formed. Since then International Amateur Radio has made much progress and many meetings have been recorded but those who were fortunate enough to visit Belgium during the August Bank Holiday weekend will be ready to challenge all comers that no previous amateur gathering has been so successful."

In such wise an anonymous contributor to the September 1935 issue of *The T & R Bulletin* described a memorable visit by a party of RSGB members and their ladies to Antwerp and Brussels. "Ingang" became a catch-word after the party, which included amateurs from seven IARU Member Societies, had been lined-up for a press photograph outside the entrance to the Brussels Exhibition—high light visit of the weekend.

Twenty-nine years later—on August 7, 1964 to be precise—that visit was reciprocated, when a party of UBA members and their ladies came to London for a weekend of ragchewing, sight-seeing and history-making. Led by UBA Immediate Past President, René Vanmuysen, ON4VY, the party, 12 strong, were met at Fenchurch Street Station, London, by the President of the RSGB (Geoffrey Stone, G3FZL), the Executive Vice-President (Eric Yeomanson, G3IIR), RSGB-IARU Region I Liaison Officer (Roy Stevens, G2BVN) and others and escorted to the Kingsley Hotel, adjacent to RSGB Headquarters, for an informal tea party and introductions.

In preparation for the visit a KW2000 Transceiver and KW500 Linear Amplifier, with trap dipole, had been installed at RSGB Headquarters, but not until René Vanmuysen (who has done so much to bring about Amateur Radio reciprocal licensing between Belgium and other European administrations) had been safely escorted into John Rouse's office was he told the good news that the Post Office had agreed to allow the Belgian amateurs in the party to operate the Headquarters' station GB3RS.

At 15.50 GMT, with Roy Stevens, G2BVN operating the KW2000, contact was made with G3GLQ on 3.5 Mc/s. Moments later, ON4VY made Amateur Radio history in the United Kingdom when he took over GB3RS and became the first licensed Belgian amateur to operate a British amateur station.

The terms and conditions of the special facility granted were set out in a letter from the Post Office which said, *inter alia:*

"... after very careful consideration of your request, we are prepared in all the circumstances and on this occasion only exceptionally to allow selected members of the Belgian party who hold Belgian amateur transmitting licences to operate station GB3RS during their visit under the direct supervision of any of the authorised operators of that station...."

Later in the day, at an informal gathering, also at the Kingsley Hotel, upwards of 50 RSGB members and their ladies joined the President in extending a welcome to the visitors. A running buffet, much talk and a few brief speeches added up to an enjoyable evening. Geoff Stone, in his best Flemish, expressed his pleasure and that of the Society that the visit had matured; René Vanmuysen thanked the Society for its hospitality and for the cordial reception he and his friends had received; Alfred Schädlich, DL1XJ, a member of the IARU Region I Division Committee on holiday in London, conveyed greetings from the Chairman and members of the Executive Committee to all present; John Clarricoats, O.B.E., G6CL, Honorary Secretary of IARU Region I Division, recalled a visit of RSGB members and their ladies to Belgium in 1935 when the Belgian Society was then known as Reseau Belge.

Bill Hayes, G3CJQ, acted as interpreter and Master of Ceremonies for the occasion, a service warmly appreciated by both visitors and hosts.

Within minutes the language barriers seemed to disappear as if by magic—moon-bounce, sideband, transceivers, mean the same in every language!

Saturday, August 8, was given over to sightseeing and shopping. A rapid tour of Central London was followed by a quick look at the main shopping streets and a rather more prolonged look at certain premises not a thousand miles from Tottenham Court Road. How much surplus radio gear left London for Brussels after the weekend is anyone's guess but suitcases certainly seemed to be a lot heavier than when they arrived in England and even pockets appeared to bulge!

As was the case 29 years ago many matters of mutual interest were discussed during the weekend and if rumour is right there is already talk of a reciprocal visit next year. Anyone interested?

The Society's Visitors' Book shows that the following members of UBA and their ladies enjoyed a visit to London during a warm summer weekend in August 1964: ON4ED, ON4KH, ON4LO, ON4UM, ON4UN, ON4VY/F9WA, ONL010, ONL495 and PA0LB.

* Honorary Secretary, IARU Region I Division, Honorary Historia to the RSGB, 16 Ashridge Gardens, London, N.13.

## Stereophonic Broadcasting

A review has recently been made by the BBC of the possible future of stereophonic broadcasting in this country, taking into account the results of the experimental work that has been done, the response to the experimental transmissions, and the fact that stereophonic broadcasting has been introduced in the USA and Canada and that regular experimental transmissions are being made in Germany and Holland.

The BBC believes that stereophony can produce a worthwhile improvement in reproduction, especially of music, and believes that there is a demand for it, which, though a minority demand, is nevertheless substantial. Stereophonic broadcasting on the v.h.f. network would encourage v.h.f. listening, would provide a new market for receivers and would no doubt assist the industry in its export trade. It is obvious, however, that no definite plans can be made to introduce stereophonic broadcasting until the system to be used has been decided upon.

The adoption of a common system for general use in Europe was considered by the CCIR in February, 1963, but no recommendation was made. The question will no doubt be considered again at the interim meeting of the CCIR Study Group in the Spring of 1965, but it now seems unlikely that the CCIR will agree upon a European system until its next Plenary Assembly in 1966. If a recommendation is made then it would be necessary to obtain the approval of the Postmaster General to the introduction of stereophonic broadcasting in this country and he would no doubt wish to receive the advice of his Television Advisory Committee.

Meanwhile the BBC proposes to continue the present experimental dual transmitter transmissions during the winter months up to the time of the CCIR meeting in 1966 and also to continue the experimental compatible transmissions from Wrotham. In each case it may be necessary to alter the schedule of transmissions as a result of changes in the hours of transmission of normal programmes.

The BBC will continue to study the technical problems affecting the introduction of a stereophonic service, so that the situation can be reviewed if there are any significant developments.

# Society News

## Election of Council, 1965

In accordance with Article 52 of the Society's Articles of Association the Council has nominated the following Corporate members to fill the vacancies in the Council which will occur on December 31 next:

Ordinary Members:

Mr. E. G. Ingram, GM6IZ.
Mr. J. C. Foster, G2JF.
Mr. R. F. Stevens, G2BVN.
Mr. J. W. Swinnerton, G2YS.

Not later than **October 10** next 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 General Manager and Secretary, together with the written consent of such nominee to accept office if elected, but each nominator shall be debarred from nominating any other person for this election.

### Zonal Representation on Council

Not later than **October 10** next any 10 Corporate Members resident in Zone A (Regions 1 and 2) and the new Zone G (Regions 12, 13 and 14) 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 General Manager and 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 present Zone A Representative is Mr. L. N. Goldsbrough.

### New Zone G Representative on Council

The Council has accepted a recommendation of the Membership and Representation Committee that Northern Ireland and Scotland should in future form two separate zones. With effect from January 1, 1965, Northern Ireland will therefore be Zone F and Scotland will be Zone G. Mr. A. D. Patterson, GI3KYP, will continue in office as the Zone F Representative.

Details of the election procedure for the representative for the new Zone G are given above.

### RSGB Amateur Radio Call Book

The 1964 edition of the Society's *Call Book* is now out of print, and copies can no longer be supplied. The new 1965 edition will become available at the end of October and full details will appear in the October issue of the RSGB BULLETIN. The price will be 5/-, plus 6d. postage and packing.

### Mobile Register

Mr E. Fish, G2HCZ, considers that the Mobile Register, which occupies nearly four pages in the 1964 Edition of the RSGB *Amateur Radio Call Book*, and is likely to occupy up to five pages in the 1965 Edition, now serves no useful purpose. He would prefer the space to be used for maps of call areas within countries which zone their calls, etc.

What do other users of the *Call Book* think? Postcards *only* please, to Headquarters.

### Region 1 Field Day

The Region 1 Field Day will take place on Sunday, September 10. Individual RSGB members may compete provided they are resident in Region 1. Rules and further information are available from the Region 1 Representative, Basil O'Brien, G2AMV, 1 Waterpark Road, Prenton, Birkenhead.

## Silent Keys

We record with sorrow the passing of the following amateurs:

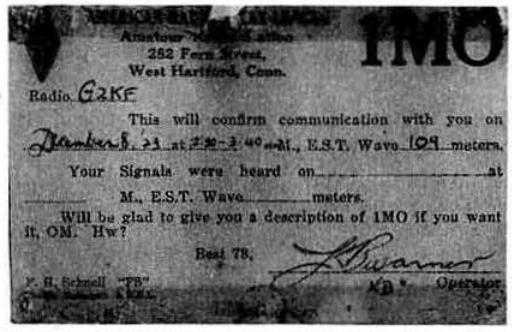
H. R. Morey, G3GUA, of Newbury, Berks.
R. P. Shenton, G3EPC, of Stoke-on-Trent.
S. M. Jones, VE7XX, of Victoria, British Columbia.
R. C. Edwards, BRS22992, of Ewell, Surrey.
D. W. Lennox, BRS24450, of Bournemouth, Hants.

## Obituary

### Jack Partridge, G2KF

It is with profound sorrow that we record the death of Jack Partridge, G2KF, an eminent figure in the early days of Amateur Radio.

Perhaps his greatest achievement was on December 8, 1923, when he made the first two-way contact between Britain and America by exchanging messages with the ARRL amateur station 1MO operated by the late Ken Warner. This was undoubtedly one of the most important records in Amateur Radio, and raised wide interest. It




gave the amateur movement a stature which has perhaps never since been equalled. The contact was made on 110m, a wavelength which was not, incidentally, available to amateurs at the time, although in view of the nature of the achievement and the press coverage given on both sides of the Atlantic, this did not antagonize the GPO. An input of 100 watts was used, and fed an aerial suspended between two 50 ft. steel masts. The QSL card which was received from 1MO as proof of the memorable contact is reproduced above.

Everyone who knew Jack Partridge will join with us in mourning one of the great Old Timers.

To his widow we offer on behalf of all amateurs sincere condolences.

K.A.

## ARRL Fiftieth Anniversary

To mark the fiftieth anniversary of the foundation of the American Radio Relay League, the Council has presented to ARRL a Visitors' Book bound in English pigskin and embossed on the front cover with the League's emblem.

The following message was conveyed to the League at its National Convention in New York on August 22, 1964, by Mr Roy Poeton, G3CTN:

"The President, Governing Council and members of the Radio Society of Great Britain send heartiest congratulations to the American Radio Relay League on its fiftieth anniversary. May the many past achievements form a sound foundation for the future and may the bond between the League and the Society become even closer in the years to come."

### Another Pirate Fined

On May 8, at Nottingham Magistrates' Court, Mr David Gosling pleaded guilty to two offences under Section 1 of the Wireless Telegraphy Act, 1949. Mr Gosling was fined £5 on each charge and ordered to pay £3 3s. costs. In addition, he was ordered to forfeit his transmitter to the Postmaster General.

### Advanced Course for Amateurs

An informal series of lectures and discussions covering techniques of and above the RAE standard will be held at the 1st Centre, Ilford Literary Institute, Cranbrook Road, Ilford. The following subjects will be covered, in this order:

Circuit fundamentals; valve circuits (mainly test equipment and techniques); transistor techniques; transistor circuitry; transmission principles; discussion; single sideband; receiving techniques; aerials; v.h.f. techniques; discussion; testing techniques; workshop, laboratory and shack techniques; pulse techniques; amateur television; lecturing techniques; discussion; amateur radio educational activities; social activities; leadership—the contribution of experience to the guidance of amateurs; discussion of any controversial topics.

Applications, which should include a preference for meetings on either Thursday or Friday evenings, should be sent to the Principal of the Institute.

### Claims for RSGB Certificates

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

### *Vacancy on RSGB Bulletin*

**There is a vacancy on the editorial staff of the RSGB BULLETIN and associated publications.**

**A good command of English, the ability to write quickly and lucidly on a wide variety of subjects, and enthusiasm are essential. A knowledge of Amateur Radio, preferably as a licensed amateur, would be an advantage.**

**Applications for this interesting post on the Society's Headquarters staff should be addressed to the General Manager, Radio Society of Great Britain, 28 Little Russell Street, London, W.C.I.**

## REGION 10 LECTURE

**Saturday, September 19, 1964, at 3 p.m.**

**"A PHILOSOPHY OF OSCILLATORS"**

**by**

**Professor Emrys Williams, B.Eng., Ph.D., M.I.E.E., M.I.E.R.E.**

**(Professor of Electrical Engineering, University College, Cardiff)**

**at**

**University College, Newport Road, Cardiff, in the New Department of Electrical Engineering.**

**Members will be conducted around the laboratories at the conclusion of the Lecture.**

**Admission will be by ticket, obtainable free of charge on receipt of s.a.e., from the Regional Representative, Mr C. H. Parsons, 90 Maesycoed Road, Heath, Cardiff.**

**Ample car parking facilities are available.**

*The Council will be represented by the Zonal Representative, Mr R. H. James, GW3BFH, and by the Chairman of the Technical Committee, Mr R. F. Stevens, G2BVN.*

# BOOK REVIEW

**THE RADIO AMATEUR'S HANDBOOK** (41st Edition, 1964). By the Headquarters Staff of the ARRL. 640 pages, over 1300 illustrations, including some 300 valve-base diagrams. Obtainable from RSGB Publications, 28 Little Russell Street, London, W.C.1. Price 37s. 6d. postpaid.

The present 50th anniversary year of the ARRL sees the 41st edition of this unique *Handbook*, which has sold 3½ million copies to radio amateurs, engineers, and students, all over the world. It is an impressive thought that this "new" thing, Amateur Radio and electronics, is no longer so new; this manual of short wave communication was bringing a peculiar joy, sound technical advice, enthusiastic instruction, and a plethora of technical information to radio amateurs nearly a quarter of a century before many of today's active amateurs were born. It has indeed become part of Amateur Radio, and to most of us an old and trusty friend.

What is different this time? The "Inexpensive 75 watt Transmitter" has been re-designed and, like the 900 watt "Grounded-Grid Amplifier," uses silicon rectifiers. The increasing use of silicon rectifiers has also caused some relevant material to be added to the sections on Power Supplies and Filters.

The popularity of co-axial feeders over balanced lines has seemingly caused some condensation in the treatment of coupling methods, and harmonic filters, and one is inclined to remember that the ideas of matching are not always easy for the amateur, and that the more pedestrian approach had advantages.

There is a new "40 watt Extended Band Mobile Transmitter" which can be arranged for any band from 1·8 Mc/s to 60 Mc/s by using the right coils: they are not switched or plug-in coils. It uses a 12GJ5 as p.a. and two 2N441 transistors as modulators. The mobile transmitters for 50 and 144 Mc/s do not appear in the new edition.

So change and improvement is seen here and there: and an up-to-date and extremely comprehensive data section on Valves and Semiconductors is still an invaluable part of the book.

T. P. A.

### Can You Help?

● R. Field, G3ITM/ZL1AWW, 106 Greyhound Road, Hammersmith, W.6, who requires the AR88D and HRO/R106?

● R. Wilson, 52 West Mead, Windsor, Berks., who wishes to borrow or purchase the handbook for the Avo Electronic Testmeter?

● H. E. Willis, BRS25268, 111 Laburnum Road, Strood, near Rochester, Kent, who requires information on the ex-Navy receiver R/T Pattern 4660?

# Society Affairs

*A digest of the business discussed at the June, 1964, meeting of the Council*

THE meeting held on June 15, 1964, was attended by Messrs G. M. C. Stone (President), N. Caws, J. C. Foster, L. N. Goldsbrough, J. C. Graham, R. C. Hills, R. H. James, A. O. Milne, L. E. Newnham, A. D. Patterson, F. K. Parker, R. F. Stevens, J. W. Swinnerton, L. Varney, E. W. Yeomanson (Members of Council), John A. Rouse (General Manager and Secretary), and P. C. M. Smee (Minuting Secretary).

Apologies for absence were submitted on behalf of Mr H. A. Bartlett and Mr E. G. Ingram.

### Membership

The Council approved 146 applications for membership (107 Corporate and 39 Associate). In addition, 10 applications for transfer from Associate to Corporate grade were approved.

Applications for Life Membership from Miss J. G. Fish, GM3NYG, and Mr P. L. Hovenden, BRS12123, were approved.

### European Satellite Project

The Council appointed the Society's V.H.F. Manager, Mr R. C. Hills, to represent the Society on the ad hoc Committee for the IARU Region I V.H.F. Committee's European Satellite Project. The ad hoc Committee will meet in the latter part of 1964 to discuss the arrangements for the European Amateur Radio Satellite.

### ARRL National Convention

It was decided that, owing to the expense involved, the Society could not accept invitations to send a representative to the New York International V.H.F. Convention which is being held in New York as part of the ARRL National Convention to celebrate the fiftieth anniversary of the League's foundation.

### International Amateur Radio Club

It was agreed that the President should accept an invitation to attend the Convention of the IARC to be held in Geneva on September 5-6, 1964. The International Amateur Radio Club is located in the ITU building in Geneva and the Convention is expected to attract visitors from all over the world.

### The Surrey Trophy

The Council accepted with pleasure an offer by the Surrey Radio Contact Club to donate a trophy for award to the overall winners of the Society's V.H.F. National Field Day event each year.

### Visit of Belgian Amateurs

In connection with a proposed visit to London of a party of Belgian radio amateurs, it was agreed to arrange an informal evening get-together with a running buffet and to announce the details on GB2RS when the visit became definite so that members wishing to might attend.

### GPO CCIR Committees

The Council agreed to nominate Mr A. D. Patterson to represent the Society on Study Group 14 (Vocabulary) and Mr John A. Rouse to represent the Society on the General Purposes Committee.

### Reports of Committees

On May 13, 1964, the Mobile Committee discussed the policy for future rallies and on May 27, discussed plans for the Society's Rally at the USAF Base at Wethersfield and considered a number of matters relating to the rally at Woburn Abbey in September.

The Membership and Representation Committee met on May 15, 1964, to discuss the guidance on the duties of the Society's representatives in the Scheme of Representation, drafts of new leaflets on the benefits and conditions of Affiliation and methods of recruiting new members.

In connection with a recommendation of the Membership and Representation Committee that Council members should be allowed limited expenses for visits to RSGB Groups and Affiliated societies, Mr Yeomanson stated that he disagreed.

At its meeting on May 21, 1964, the Contests Committee dealt with the results of the Low Power Contest, 1964, and of the BERU Contest, 1964, the rules for this year's Low Power Field Day, the Second 144 Mc/s Portable Contest and the RSGB 21/28 Mc/s Telephony Contest. Preliminary consideration was given to a suggestion that a Listeners' V.H.F./U.H.F. Championship should be held during 1965.

*The Council was in session for nearly five hours.*

* * *

The meeting held on June 27, 1964, was attended by Messrs G. M. C. Stone (President), N. Caws, J. C. Foster, L. N. Goldsbrough, J. C. Graham, R. C. Hills, E. G. Ingram, R. H. James, L. E. Newnham, F. K. Parker, R. F. Stevens, J. W. Swinnerton, L. Varney, E. W. Yeomanson (Members of the Council), John A. Rouse (General Manager and Secretary) and P. C. M. Smee (Minuting Secretary).

Apologies for absence were submitted on behalf of Messrs H. A. Bartlett, A. O. Milne and A. D. Patterson.

### Reports of Committees

The Council considered reports of Committees which had not been dealt with on June 15.

The RAEN Committee met on April 25, 1964, and dealt with a number of organisational matters including the proposed formation of a group in Grimsby, the Raynet Rally, operation on 4 metres under the new regulations and a proposal to issue a quarterly newsletter. The Committee also discussed liaison with Hospital Management Boards and correspondence received by the Chairman and Honorary Secretary.

The Finance and Staff Committee met on June 13, 1964, to discuss various matters relating to the draft new Articles of Association, a number of staff matters including terms of service to be communicated to members of the staff, travelling expenses for Council members and allowances for meals for Council and Committee members attending meetings. The Committee also reviewed the Society's insurance cover in the light of a discussion between the General Manager and the Society's insurance brokers.

The Education and Training Committee at its meeting on May 23, 1964, decided to write to Directors of Education listed in an HMSO list for details of RAE courses, and to send a questionnaire to affiliated societies and clubs for information on Amateur Radio training facilities. The Committee also discussed means of promoting interest in Amateur Radio and of sending material aid to amateurs in Africa.

The TVI/BCI Committee dealt with a number of individual cases in which members were experiencing difficulty with interference problems or with refusal of planning permission for aerial masts, at a meeting of the Committee held on May 27, 1964.

The meeting of the Exhibition Committee held on May 29, 1964, was devoted to plans for the RSGB Radio Communications Exhibition in October. Among the matters discussed were the Exhibition stations, new publications, and a proposed exhibit showing the work of the Society.

### Assistance to Emergent Nations

The Council discussed ways and means by which British amateurs might be able to help the spread of interest in Amateur Radio in the emergent nations, particularly those in Africa. While it was agreed the Society could do little itself, it was felt that publicity should be given to the idea through the RSGB BULLETIN in the hope that individual members may take the matter up. (The Society's effort in this direction is limited to supplying literature to libraries in centres most likely to have an effect on most people, for example, schools and universities.)

### Reciprocal Licensing

It was reported that the General Manager had discussed the US bill on reciprocal licensing with the General Manager of

ARRL. As soon as confirmation of the signing of the bill by President Johnson had been received, the British authorities had again been asked to give further consideration to allowing foreign amateurs to operate in the United Kingdom.

### ARRL National Convention

After careful consideration, it was agreed that, due to the expense involved, the President should decline with regret an invitation by the Hudson Amateur Radio Council to attend the ARRL National Convention in New York.

### Band Occupancy Check

It was reported that Mr Clarricoats, Honorary Secretary, IARU Region I Committee, had suggested that a band occupancy check should be carried out in preparation for the next International Telecommunications Conference. It was decided to accept the suggestion in principle and to ask other national societies in Region I to carry out similar observations.

* * *

*The Council was in session for three hours.*

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# RAE COURSES OF INSTRUCTION

Courses in preparation for the City and Guilds Radio Amateurs' Examination in May, 1965 will be held at the following centres during the session beginning in September, 1964.

**Barnsley.** College of Technology, Church Street, Barnsley.
**Barry.** College of Further Education, Colcott Road, Barry. Barry 3251.
**Bath.** City of Bath Technical College, Lower Borough Walls, Bath. Bath 64441-2.
**Birkenhead.** Birkenhead Technical College, Borough Road, Birkenhead.
**Birmingham.** Central Institute of Further Education, Lee Mason School, Bell Barn Road, Birmingham 15. MID 2350.
**Blackburn.** Blackburn Technical College.
**Bournemouth.** Bournemouth College of Technology and Commerce, The Lansdowne, Bournemouth.
**Bracknell.** South-East Berkshire College of Further Education, Church Road, Bracknell, Berks.
**Brentford.** Brentford Evening Institute, Clifden Road, Brentford, Middlesex.
**Brighton.** Brighton Technical College, Richmond Terrace, Brighton.
**Bristol.** Bristol Technical College, Ashley Down, Bristol 7. Bristol 41241.
**Bromley.** Bromley Technical College, Rookery Lane, Bromley, Kent.
**Bury.** Bury Technical College, Market Street, Bury.
**Bury St. Edmunds.** West Suffolk College of Further Education, Out Risbygate, Bury St. Edmunds.
**Cannock Chase.** Cannock Chase Mining and Technical College, Stafford Road, Cannock.
**Carlisle.** Carlisle Technical College, Victoria Place, Carlisle.
**Carshalton.** Carshalton College of Further Education, Nightingale Road, Carshalton. WALlington 1086.
**Chester.** Chester College of Further Education, Eaton Road, Handbridge, Chester.
**Chesterfield.** Chesterfield College of Technology, Infirmary Road, Chesterfield. Chesterfield 76761-4.
**Chichester.** Chichester College of Further Education, Westgate Fields, Chichester. Chichester 86441.
**Cleethorpes.** Cleethorpes Technical Institute, Elliston Street School.*
**Coalville.** Coalville Mining and Technical College, Coalville, Leicester.
**Colchester.** North-East Technical College and School of Art, Sheepen Road, Colchester, Essex. Colchester 5571.
**Corbridge.** Corbridge Evening Institute, Corbridge, Northumberland.
**Cottingham.** Cottingham Institute of Further Education, East Riding, Yorks.
**Coventry.** The Technical College, Coventry.
**Croydon.** Croydon Technical College, Fairfield, Croydon. CROydon 9271/5.
**Crawley.** Sarah Robinson Evening Institute, Ifield, Crawley.
**Derby.** Derby and District College of Technology, Kedleston Road, Derby. Derby 47181.
**Doncaster.** Doncaster Technical College, Waterdale, Doncaster.
**Dudley.** Dudley and Staffordshire Technical College, Dudley. Dudley 53585-7.
**Eccles.** Monton Evening Centre, Park Road, Monton, Eccles.
**Erith.** Erith Technical College, Erith Road, Belvedere, Kent. Erith 36661-3.
**Farnborough.** Farnborough Technical College, Boundary Road, Farnborough, Hants. Farnborough 1940-2.
**Fleetwood.** Fleetwood Navigation School, Orient Buildings, Station Road, Fleetwood. Fleetwood 2054.
**Glasgow.** Allan Glen School, Montrose Street, Glasgow.
**Halifax.** Percival Whitley College of Further Education, Francis Street, Halifax.
**Heanor.** Heanor Technical College, Ilkeston Road, Heanor.
**Huddersfield.** Huddersfield College of Technology. Huddersfield 30501.
**Ilkeston.** Ilkeston College of Further Education, Field Road, Ilkeston. Ilkeston 2301.
**Kingston-upon-Hull.** College of Technology, Queen's Gardens, Kingston-upon-Hull.
**Leicester.** Leicester College of Technology, The Newarke, Leicester. Leicester 50181.
**Lincoln.** Lincoln Technical College, Cathedral Street, Lincoln. Lincoln 24416.
**Liverpool.** Riversdale Technical College, Riversdale Road, Liverpool 19.
**London.**
- Battersea Institute, Latchmere Road, Lavender Hill, S.W.11. BATtersea 5876.
- Chamberlayne Wood Evening Institute, Chamberlayne Wood School, Chamberlayne Road, N.W.10.
- East Ham Technical College, High Street South, East Ham, E.6. Grangewood 1430.
- Finchley Institute of Further Education, Northside School, Percy Road, North Finchley, N.12.
- Holloway Institute, Montem School, Hornsey Road, Holloway, N.7. ARChway 1987.
- Pound Lane Evening Institute, Pound Lane School, Pound Lane, N.W.10.
- Wesley Evening Institute, Wesley School, Wesley Road, N.W.10.

**Loughborough.** Loughborough College of Further Education, Loughborough, Leicestershire.
**Luton.** Luton College of Technology, Park Street, Luton.
**Maidenhead.** East Berkshire College of Further Education, Boyn Hill Avenue, Maidenhead, Berks.
**Malvern.** Malvern College of Further Education and School of Art, Albert Road North, Malvern, Worcs.
**Manchester.** Openshaw Technical College, Whitworth Street, Openshaw, Manchester 11.
**Merthyr Tydfil.** College of Further Education, Ynsfach, Merthyr Tydfil, Glam.
**Newbury.** South Berkshire College of Further Education, Oxford Road, Newbury, Berks.
**Newport, I-o-W.** Isle of Wight Technical College, Hunnyhill, Newport, I-o-W.
**Northampton.** Northampton College of Technology, St. George's Avenue, Northampton.
**Northwood.** Northwood Evening Institute, Potter Street School, Northwood Hills, Middlesex.
**Norwich.** Thorpe Evening Institute, St. Andrew's School, Longfields Road, Thorpe, Norwich.
**Oldham.** Municipal Technical College, Portland Street, Rochdale Road, Oldham.
**Peterborough.** Peterborough Technical College.

* Subject to sufficient demand.

**Plymouth.** College of Technology, Tavistock Road, Plymouth. Plymouth 68000.
**Pontypool.** East Monmouthshire College of Further Education, Blaendare Road, Pontypool, Mon.
**Portsmouth.** North End Evening Institute, Drayton Road, Portsmouth.
**Preston.** Harris College, Corporation Street, Preston.
**Reading.** Reading Technical College, King's Road, Reading, Berks. Reading 54451.
**Redditch.** Redditch College of Further Education, Archer Road, Redditch, Worcs.
**Romford.** Romford Evening College.
**Scarborough.** Scarborough Technical College, Lady Edith's Drive, Scarborough.
**Solihull.** Lode Heath Evening Centre, Lode Heath High School, Lode Lane, Solihull.
**South Shields.** South Shields Marine and Technical College, St. George's Avenue, Westoe, South Shields, South Shields 60403.
**Southampton.** Southampton College of Technology, East Park Terrace, Southampton.
**St. Helens.** St. Helens Technical College. St. Helens 25441-4.
**St. Leonards-on-Sea.** Hastings College of Further Education, Archery Road, St. Leonards-on-Sea, Sussex.
**Stafford.** Stafford College of Further Education, Tenterbanks, Stafford.
**Stockport.** Avondale Evening Institute, St. Lesmo Road, Cheadle Heath, Stockport.
**Swindon.** The College, Regent Circus, Swindon. Swindon 21251.
**Trowbridge.** Wiltshire and Trowbridge College of Further Education.
**Walsall.** Walsall and Staffordshire Technical College.*
**Wembley.** Wembley Evening Institute, Copland County Secondary School, Cecil Avenue, Wembley.
**Windsor.** East Berkshire College of Further Education, Claremont Road, Windsor, Berks.
**Wolverhampton.** Wolverhampton and Staffordshire College of Technology.*

The following details of RAE Courses are supplementary to those published on page 535 of the August issue of the RSGB BULLETIN.

**Cannock Chase.** Cannock Chase Mining and Technical College, Stafford Road, Cannock. A course of instruction in preparation for the RAE and Morse Test will begin in September. Classes will be held from 7 to 9 p.m. on Tuesdays and Fridays, with Morse tuition during the first 45 minutes of each session. C. J. Morris, G3ABG, will conduct the course.

**Colchester.** North-East Technical College and School of Art, Sheepen Road, Colchester, Essex. A course for the RAE and Morse Test will commence on September 22. Classes will be held on Tuesdays at 6.30 p.m., and the lecturer will be F. R. Howe, G3FIJ.

**Crawley.** Sarah Robinson Evening Institute, Ifield, Crawley. Instruction for the RAE will be held during the session commencing in September. Full details may be obtained from A. J. Gibbs, G3PHG, 6 Dairyfields, Gossops Green, Crawley, Sussex, or from R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley, Sussex. Crawley 23359.

**Glasgow.** Allan Glen School, Montrose Street, Glasgow. An RAE and Morse Instruction course will begin on September 15. Instruction for Radio Theory will be given on Tuesdays from 7 to 9.30 p.m., and Morse Instruction, GPO Regulations, Aerials, BCI and TVI on Thursdays from 7 to 9.30 p.m. The fee for the course is £1, and enrolment will take place on September 7-10 at 7 p.m. The instructors will be A. M. Fraser, GM3AXX (Theory), and J. Sey, GM6MS (Morse).

Closing date for the October issue
**September 11**

Closing date for the November issue
**October 2**

*Copy received after these dates may be held over to the following issue if still topical*

**Leicester.** Leicester College of Technology, The Newarke, Leicester. The Department of Electrical Engineering will be running a Wednesday evening course for the RAE and Morse Test during the session beginning in September. Enrolment will commence on September 14. Morse tuition will be given by N. Booth, G2DSF, and Radio Theory by G. N. Harvey, G3PSL.

**London, North Finchley.** Finchley Institute of Further Education, Northside School, Percy Road, North Finchley, N.12. A course for the RAE will commence on September 23, and will be held on Wednesday evenings, from 7.30 to 9.30 p.m. Morse instruction will be provided later in the session. The lecturer will be E. D. Turpin, G3MNK.

**Plymouth.** College of Technology, Tavistock Road, Plymouth. Subject to sufficient applications, instruction for the RAE and Morse Test will be provided at the College between 6.30 and 9 p.m. on Thursdays. Enrolment for the course, which will begin on September 17, will be between 6 and 8 p.m. during the previous week.

## Area Representatives

The following is an addition to the list of Area Representatives published in December 1963:

REGION 14
GLASGOW
A. HORNBY, GM3HBY, 93 Croftfoot Road, Glasgow S.4.

## Affiliated Society Representatives

The following are additions to the list of Affiliated Society Representatives published in December 1963:

CIVIL SERVICE RADIO SOCIETY
H. Reeve, G3JXZ, 284a Barking Road, London, E.6.
MAGNUS RADIO SOCIETY
R. C. Cottrell, G3SHY, 18 Maple Grove, Newark, Notts.
MITCHAM AND DISTRICT RADIO SOCIETY
D. Johnston, G3NFA, 59 Acre Lane, Carshalton, Surrey.

## Affiliated Societies

The following club is now affiliated to RSGB:

GLENROTHES AMATEUR RADIO CLUB
c/o W. Stephen, 43 Ryan Road, Glenrothes, Fife, Scotland.

## Can You Help?

● K. Harvant Singh, BCRS 886, 31 (774) Upper Museum Road, Taiping, Perak, Malaysia, who requires manuals for the Eddystone 640 and 750, and the Hammarlund Super Pro 120?

● H. W. Craine, G3NLS, 19 Moss Side, Liverpool 14, who requires the manuals, or information, on the R220 Mk 2 receiver and the B44 Mk 2 transmitter-receiver?

## GB2RS SCHEDULE

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

| Frequency | Time | Location of Station |
|---|---|---|
| 3600 kc/s | 9.30 a.m. | South East England |
| | 10 a.m. | Severn Area |
| | 10.15 a.m. | Belfast |
| | 10.30 a.m. | North Midlands |
| | 11 a.m. | North West England |
| | 11.30 a.m. | South West Scotland |
| | 12 noon | North East Scotland |
| 145·30 Mc/s | 10.30 a.m. | Beaming north west from Sutton Coldfield |
| | 10.45 a.m. | Beaming south west from Sutton Coldfield |
| 145·50 Mc/s | 11.00 a.m. | Beaming north from Leeds |
| | 11.15 a.m. | Beaming east from Leeds |
| 145·8 Mc/s | 11.30 a.m. | Beaming west from Belfast |
| | 11.45 a.m. | Beaming north east from Belfast |
| 145·10 Mc/s | 12 noon | Beaming north from London area |
| | 12.15 p.m. | Beaming west from London area |

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

# CONTEST NEWS

RESULTS — REPORTS — RULES

## Low Power Contest 1964

The Low Power Contest, held on April 5, 1964, attracted 18 entries, the highest for a number of years, but it was disappointing to find that no check logs were submitted by non-transmitting members.

The winner was G6VC, who has also won this contest before, and was second last year. He worked 24 counties and 9 countries in 72 QSOs. Second was G3JVJ who was third last year: his 45 QSOs covered 21 counties and five countries. Conditions were reasonable, with plenty of activity on the band, but became difficult towards evening when strong continental signals appeared. The longest-distance QSO was between G3RBP (Berks.), and OK2BCJ. Only three contestants used transistor transmitters, and these were G3NEO, G3ORU and G3KZR, although only the latter operator used his throughout the duration of the contest.

### Equipment Used

An analysis of the rigs used is rather interesting, for G6VC used his 6AC7 v.f.o. and 6AC7 p.a.; G4JW, G3FM, G4AL and G2BP used EF91s in various configurations, whilst G3JVJ used a 1T4 v.f.o., 1T4 buffer, and DL93 p.a. G3RBP and G3SFR used TT11s; and G3NEO, G3JKY, and GW3SOQ used 807s. It may not be generally realised that it is possible to use a Top Band transmitter on 80m by doubling in the p.a. stage and reducing the p.a. anode voltage to bring it within the power limits of the contest. Some contestants work at about 500mW for maximum points, but increase power up to 5 watts for some contacts, this being within the rules. Aerials varied from 280ft. for G6VC, to a lash-up only 10ft. high at one end, which was used by G3KZR at a temporary QTH.

### Comments from Competitors

Only two entrants made comments, G3BRP and G3NEO, who both thought that each new country should collect 20 bonus points. G3NEO would like to see transistor transmitter bonus points brought back as in the 1963 contest, and an incentive arranged for northern members. These points will be considered by the Contests Committee when compiling rules for the 1965 Contest. It should be noted, however, that 20 points per contact for a power input of up to 500mW could be considered as a bonus for transistor transmitters.

RESULTS

| Position | Call-sign | Points | Power (Watts) |
|---|---|---|---|
| 1 | G6VC | 1784 | 0·5–1 |
| 2 | G3JVJ | 1320 | 0·5 |
| 3 | G4JW | 1240 | 0·48 |
| 4 | G3RBP | 1072 | 1–3 |
| * | G3NEO | 1064 | 0·5–5 |
| 6 | G3ORU | 1019 | 0·5–5 |
| 7 | G3FM | 980 | 0·9 |
| 8 | G3IGU | 900 | 0·45 |
| 9 | G3RQZ | 720 | 0·32 |
| 10 | G3JKY | 692 | 0·4–3·6 |
| * | G3ORB | 634 | 0·5–5 |
| 12 | G3GDW | 448 | 0·98 |
| 13 | G4AL | 380 | 0·48 |
| 14 | GW3SOQ | 360 | 2·8 |
| 15 | G2ATD | 290 | 2 |
| 16 | G3SFR | 278 | 4 |
| 17 | G3KZR | 180 | 0·24 |
| 18 | G2BP | 160 | 1 |

* Late entries.

## First 144 Mc/s Portable Contest 1964

THE first 144 Mc/s Portable Contest of 1964, which took place on May 3, was in many respects similar to the 1963 Contest. In particular there were 54 accepted logs this year against 53 in 1963, and the weather was just as bad as before with rain and gale force winds.

Once again, the Northampton Short Wave Radio Club, G3GWB/P, under the guidance of its President, B. Sykes, loaded all the gear and five members into a car and travelled to the Isle of Wight on Saturday, ready for the battle on Sunday. The four operators logged 112 contacts with a score of 16,373 points giving a lead of more than a thousand over the Midland Radio Contest Club GW3RUF/P whose four operators carried their gear to the summit of Mount Snowdon in a gale force wind, constant rain and visibility of some twenty yards.

In third place is G3KMT/P, R. J. Thomas who logged 122 contacts for 12,392 points as a single operator station. G3KMT was fifth last year and he must be most heartily congratulated on his success.

There are only five entries from GM stations and it is

RESULTS

| Position | Call-sign | Points | Location |
|---|---|---|---|
| 1 | G3GWB/P .. | 16,373 | 3 miles S Ryde, I.O.W. |
| 2 | GW3RUF/P .. | 15,289 | Summit of Mt. Snowdon |
| 3 | G3KMT/P * .. | 12,392 | 6 miles E Ludlow |
| § | GW3JPB/P * .. | 12,323 | 5 miles W Wrexham |
| 4 | GW3MAR/P .. | 10,691 | 3 miles SE Welshpool |
| 5 | GW3OXD/P .. | 10,005 | 2 miles NW New Radnor |
| § | GW3KMS/P * .. | 9,749 | 5 miles W Wrexham |
| 6 | G2HIF/P .. | 9,238 | 4 miles W Wantage |
| 7 | G3LHA/P * .. | 9,136 | 8 miles E Rugby |
| 8 | G3NJF/P * .. | 9,083 | Claxby, Lincs. |
| 9 | G3UCB/P .. | 8,886 | 3 miles E Baslow |
| 10 | GW5PI/P .. | 8,252 | 4 miles N Hay-on-Wye (Rads. |
| 11 | G3SVR/P .. | 7,986 | 3 miles W Bridgnorth |
| 12 | G3EFX/P .. | 7,822 | 10 miles NE Oxford |
| 13 | G3KUJ/P .. | 7,786 | 12 miles SW Bristol |
| 14 | G3BDS/P * .. | 7,691 | 1 mile W Malvern |
| 15 | G3NUE/P .. | 7,393 | 7 miles SE Evesham |
| 16 | G3ION/P .. | 7,234 | 4 miles SE Shaftesbury |
| 17 | G3FFV/P .. | 6,980 | 15 miles E York |
| 18 | G6UQ/P .. | 6,836 | 4 miles NW Leek |
| 19 | G3KEY/P * .. | 6,696 | 6 miles NE Romsey |
| 20 | G3OBD/P * .. | 6,563 | 5 miles NW Blandford |
| 21 | G3FD/P * .. | 6,496 | 2 miles SW Dunstable |
| 22 | G3IFV/P .. | 6,432 | 2 miles W Marshfield (Glos.) |
| 23 | G3BNL/P .. | 6,075 | 10 miles S Nottingham |
| 24 | G3JZW/P .. | 5,838 | 5 miles N Luton |
| 25 | G3LMG/P * .. | 5,819 | 5 miles S Okehampton |
| 26 | G3BJD/P .. | 5,673 | 6 miles N Millom |
| 27 | GW2HIN/P * .. | 5,605 | 3 miles NW Pontypool |
| 28 | G2CPM/P .. | 5,465 | 5 miles SW Newbury |
| 29 | G3OSC/P .. | 5,352 | 5 miles S Aylesbury |
| 30 | G3FIJ/P .. | 5,234 | 3 miles NW Clare |
| 31 | G4DC/P * .. | 5,058 | Whipsnade |
| 32 | G3PWU/P .. | 5,054 | 4 miles S Goring |
| 33 | G3REI/P .. | 4,560 | 5 miles N Brighton |
| 34 | GW3PTM/P .. | 4,350 | 3 miles W Knighton |
| 35 | G3RCV/P .. | 4,223 | 1¼ miles N Westerham |
| § | G3RAL/P .. | 4,144 | 3¼ miles SSW Loughborough |
| 36 | G3KEP/P * .. | 3,998 | 5½ miles W Bradford |
| 37 | G3ERD/P .. | 3,952 | 5 miles N Derby |
| 38 | G3MA/P * .. | 3,710 | 5 miles E Gloucester |
| 39 | G2DCI/M * .. | 3,675 | 4 miles NE Leek |
| 40 | G3LSF/P .. | 3,428 | 5 miles W Wigan |
| 41 | G3RXK/P .. | 3,264 | 5 miles SE Stourbridge |
| 42 | G3FCY/P * .. | 3,096 | 9 miles W Hull |
| 43 | GW3CBY/P * .. | 3,022 | 9 miles N Bridgend |
| § | GW3MDK/P* .. | 2,678 | 5 miles S Colwyn Bay |
| 44 | G8LM/P .. | 2,517 | 3 miles S Royston |
| 45 | G3EMU/P * .. | 2,404 | 3½ miles NW Folkestone |
| 46 | G3DIT/P .. | 2,015 | 3 miles N Portsmouth |
| 47 | GM6XW/P * .. | 1,903 | 9 miles SW Stirling |
| 48 | GM3IQL/P .. | 1,581 | 3 miles N Leslie |
| 49 | G2DHV/P * .. | 1,457 | 4 miles E Caterham |
| 50 | G3JDM/P * .. | 1,369 | 5 miles NW Wolverhampton |
| 51 | G5CP/M * .. | 1,265 | 5 miles S Chesterfield |
| 52 | GM3KYI/P * .. | 817 | 4 miles S Forfar |
| 53 | GM3LCP/P * .. | 532 | 11 miles NE Lanark |
| 54 | GM3BCD/P * .. | 115 | Braid Hill, Edinburgh |

* Single Operator § Late Entries

interesting (and disheartening) to see that these stations with a total of 80 contacts worked only two GWs and two Gs—all other contacts were GMs!

Although GM3LCP/P and GM3BCD/P appear at the bottom of the table, these entries warrant special mention. Both entries were from the Radio Club of George Watson's College, Edinburgh. The gear at GM3LCP included a 6-over-6 slot fed aerial built by one of the boys, Alec Ross, and the receiver, fully transistorized, was also built by one of the boys, David Ewert. One unfortunate occurrence which should be a warning to others was a number of very heavy static discharges which destroyed the 2N1742 transistor in the r.f. stage.

The other station, GM3BCD/P had only four contacts but the transmitter was only running 0·04 watt input to a 2N716 transistor.

John Hughes, who sent the report in, comments on the lack of activity in Scotland (on the Sunday) and suggests that to get a true picture of v.h.f. activity in Scotland one must spend a wet Sunday on a Scottish mountain during a Contest!

**Comments from Competitors**

There were some very interesting points made by the entrants and, despite the weather, all seemed to enjoy the contest. Conditions appear to have been fairly good with plenty of activity though no outstanding DX was worked. Most comments included the bad weather conditions which helped to make the attractive high spots in the Welsh mountains even more inaccessible than usual!

There are only two comments on the rules and these are both concerned with out of zone operation—in this connection it is worth quoting from the comments of the winner.

"This year the Band Plan was adhered to, and the station was operated on 144·15 Mc/s plus or minus a few kc/s to clear QRM. The effect of operating low in the band was that the initial rush of short range stations, followed by the afternoon lull, changed to a more steady rate of contacts throughout the day."

Very useful logs were received from G2WS/P, G3KKP/P, G3SLF, G5FK, G6XA/P, BRS15744 and BRS24643.

**Contacts over 200 miles by Leading Stations**

**G3GWB/P:** G5YV (4 miles SW Leeds), ON5DK (Kortryk), ON4LQ (Ghent), G3LHQ (4 miles S Bradford), G3FFV/P (15 miles E York), G5HA (10 miles W Hull), G3RND (Pontefract), G3LSF/P (5 miles W Wigan).

**GW3RUF/P:** GM6XW/P (9 miles SW Stirling), G3JHM/P (6 miles N Worthing), G3OJY (6 miles E Penzance), G5MA (Great Bookham, Surrey).

**GW3JPB/P:** G3PHW (Margate), G2JF (7 miles NE Ashford, Kent), G3KMP (Hastings).

**G2HIF/P:** G3BJD/P (6 miles N Millom, Cumberland).

**GW3KMS/P:** GM3IQL/P (3 miles N Leslie), GM6XW/P (9 miles SW Stirling).

## Wirral D/F Qualifying Event

Eight teams assembled at Thornton Hough, Wirral, for the start of the Wirral D/F Qualifying Event held on July 19. Although it had been raining heavily the previous day and during the night, the weather remained fine from about noon onwards.

The two hidden stations were located at Capenhurst and Irby Common, the former being in a spinney and the latter in dense undergrowth in a small wood.

Only four teams located both stations, the first being A. Hitchcock of Derby but as he had previously qualified the other three became qualifiers for the Final.

The following members of the Wirral Society are thanked for their valuable assistance in manning the hidden stations and loaning equipment: G3CSG, G3FOO, G3NTI, G3PYU and G3SFJ.

**RESULTS**

| Position | Name | Club | Time of Arrival Station A | Time of Arrival Station B |
|---|---|---|---|---|
| 1 | A. Hitchcock | Derby | 14.28 | 15.56 |
| 2 | P. Williams* | Slade | 15.06 | 16.10 |
| 3 | D. Coller* | Slade | 15.01 | 16.15 |
| 4 | S. W. Smith* | Derby | 16.25 | 15.26 |
| 5 | J. Grant | Rugby | 15.07 | — |

* Qualify for the D/F National Final

## Salisbury D/F Qualifying Event

Sunday, July 26, was a warm and sunny day when 15 teams assembled at Stonehenge. Good signals and clean bearings gave the prospect of an easy run, and thirty minutes after the start an obvious belt of trees four miles to the east had attracted several teams.

Forty feet up, in a platform erected in the top branches of a tree silently sat the three men team of the A station. A 550 ft. aerial stretched in the trees and over the approach track confused D/F sense and remarks such as "I get the same b . . . way every time" were heard from below. However, it is better to draw a veil over the eventual discovery, the plan for form signing without tree climbing, and the weighted line episode.

The B station eight miles south of the start, more traditionally sited, was entirely surrounded by water except for one muddy overgrown track. The team was amazed to hear vigorous splashing and to see two competitors crossing the deepest obstacle: the Salisbury Avon. They professed to find it a refreshing change.

The afternoon finished when 50 sat down to an excellent tea at Amesbury. Sir Evan Nepean, G5YN, and Mr Newman, G2FIX, of the Salisbury and District Short Wave Club spoke, and views were expressed by Mr Mollart and the operators at G3PQY/P and G3PAV/P.

**RESULTS**

| Position | Name | Club | Time of Arrival Station A | Time of Arrival Station B |
|---|---|---|---|---|
| 1 | E. L. Mollart | Oxford | 15.02 | 15.57 |
| 2 | A. Bristow | Oxford | 15.01 | 16.02 |
| 3 | M. P. Hawkins | Oxford | 15.02 | 16.03 |
| 4 | G. H. Taylor | Rugby | 15.03 | 16.05 |
| 5 | I. A. Jackson | Rugby | 16.08 | 15.08 |
| 6 | R. J. P. Boby* | Oxford | 16.08 | 14.52 |
| 7 | R. J. Parsons* | Oxford | 14.58 | 16.10 |
| 8 | E. W. Bristow* | Oxford | 15.05 | 16.22 |

* Qualify for the D/F National Final.

### Writing to Headquarters?

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# Letters to the Editor

*Neither the Editor nor the Council of the Radio Society of Great Britain can accept responsibility for views expressed by correspondents. Letters for inclusion in this feature should be concise and preferably not more than 200 words in length.*

### Exploration of the 70 Mc/s Band

DEAR SIR,—May I hasten to take up the cudgels on behalf of the 4m fraternity in the frozen north.

G6NB's division of the 70 Mc/s spoils, with the entire activity centred around the lucky old Londoners in the middle, would perhaps have more sense than would at first appear.

From observations both from this remote point and from the "highly" active south (see page 41 of the January, 1964, BULLETIN) it would appear that the active and well equipped stations up in the north will know exactly the 200 kc/s of the band from which little but noise will emerge. On the other hand the London mob will know just where to set their s.e.o.s and and super-regens, right bang in the middle of the band were they can't stray (or drift) into trouble.

G6NB was joking of course, when he said that the majority of activity would be in the south, not so far OM, for the north is the area were the very amount of activity has bred the 70 Mc/s v.f.o. and s.s.b.

I know it's kind of G6NB, but come off it lads, if I had my way I'd put the lot of you in the top 50 kc/s of the band to shake you out of your lethargic state and I bet that even then the only one heard up here would be G6NB!

An investigation, by all the 4m boys down south, of the stations who have worked 20 or more counties will reveal that very, very, few stations around London even appear in the lists. The north must also lay claim to the first V.H.F.C.C. on 4m, and that, anyone must agree, takes a bit of doing.

But seriously, may I suggest that just this once we plan the band not by areas but by the services or modes of operation which we intend to use. I can see no merit in any band plan such as that on 2m. In fact I would say that the 2m band plan is most probably the reason why so little technical progress has been made on that band. It is, for instance, no use to develop such things as really stable v.f.o.s if you are stuck in zone 9! You have no one to avoid and no one to net on to. Whereas, I can say that as soon as I produced a v.f.o. on 4m, the number of QSOs went up overnight by a factor of four. In fact, I could count on contacts with stations at a 100 miles plus who had never even heard me before.

I feel that we should plan this band with an eye to the future. It must be obvious that v.h.f. v.f.o.s, s.s.b. and RTTY will be commonplace things in a few years' time, that is if we encourage progress and do not bury our heads in the sands of old-fashioned ideas.

Dare I suggest therefore that we plan, say for c.w. only, on the segment 70·1 to 70·25 (this would I imagine be used for DX working), 70·25 to 70·35 for s.s.b., 70·35 to 70·45 for mobile and the disaster relief frequency, and 70·45 to 70·7 for a.m., and n.b.f.m., with possibly RTTY in the last 25 kc/s of the band.

I do think that this form of plan will produce not, as has been predicted, chaos, but a steady technical progress with as much use made of the v.h.f. bands as is made of the d.c. bands. The thing we must guard against is a band which is only used to any extent when it is wide open for GDX working. Let's face it, the thing that stops a great number of the h.f. lads from trying v.h.f. is the complaint "I'd have no one to talk to."

73s de

MIKE GIBBINGS, G3FDW

Gosforth, Seascale, Cumberland.

DEAR SIR,—I read with interest G6NB's article in July's issue of the BULLETIN on the exploration of the 70 Mc/s band, but with concern when it comes to band planning.

First of all I think G6NB has overlooked the point that the GPO has allocated 70·35 Mc/s ± 25 kc/s for operation of RAEN. Thus if his band plan were accepted, it would place RAEN throughout the country in the London and Southern England area of the band plan.

Secondly, there are many mobile stations already established on 70·26 Mc/s and this frequency seems to have been accepted in EI/GI land as the mobile frequency. Planning to put EI/GI in different sections of the band, I feel certain, would not go down very well from the mobile point of view over here.

Thirdly, talking to our v.h.f. members one often hears the complaint that they can hear stations on 2m in zones 1 to 5 calling CQ but they never seem to listen from 146 Mc/s down the band, but go back to the first station they hear calling them whilst tuning from 144 Mc/s h.f. This has been proved by GI stations moving to the l.f. part of the band with the result of getting a QSO. I think this would happen on 4m if a band plan were adopted.

From these points I say leave 4m alone and let's take pot luck on whom we work. After all we are paying to operate on the whole band, not 200 kc/s of the band.

Yours sincerely,

I. L. CROXFORD, GI3OIC

*RAEN Belfast Area Controller*

Lambeg, Co. Antrim.

DEAR SIR,—In the article by G6NB, on page 462, July BULLETIN, it is suggested that GM etc., stations should operate between 70·5 to 70·7 Mc/s. On page 449 of the same issue, Footnote 3, of Amateur (Sound) Licence A, it is stated that frequencies 70·1 to 70·3 Mc/s inclusive and 70·5 to 70·7 Mc/s inclusive, must not be used on the north-west side of the line, Firth of Lorne to the Moray Firth.

Surely therefore, it would be logical for all GM, etc., stations to operate between 70·3 to 70·5 Mc/s.

Yours faithfully,

A. D. LAMB, GM2UU

Stranraer, Wigtownshire.

DEAR SIR,—I was very disappointed to read in the July BULLETIN that it had been suggested that 4m stations should operate according to a band plan. This suggestion appears to have been made without the consideration of three facts which would cause difficulties experienced by stations using the plan:

(i) For some time, many groups of amateurs have been using the frequency of 70·260 Mc/s for mobile and net working. This arrangement has proved to be extremely useful to all concerned in decreasing the number of unanswered CQ calls, facilitating quick-break operation, and numerous other advantages.

Under the suggested plan, these nets would have to be moved, and would be on different frequencies in different parts of the country. The advantage, for mobile operation in particular, of a common frequency for the whole of the British Isles is obvious, and I think there is every reason to continue with the present frequency.

(ii) The 70 Mc/s band, is, during the summer months, subject to sporadic *E* propagation, as a result of which many European broadcast stations become audible at signal strengths sometimes exceeding those of local amateur signals.

These broadcast signals, almost without exception use wide band f.m. with deviations of 50-100 kc/s. This results in QRM over a very large part of the band, 200-300 kc/s of which can thus be rendered useless for amateur communication. All stations should be free to move around over the whole band in order to clear such QRM which, because of its wide-band nature, could easily wipe out a complete zone of 200 kc/s.

(iii) According to the licence regulations, stations in the north of Scotland are only allowed to use the frequencies 70·3-70·5 Mc/s. They would therefore not be able to comply with the band plan and would have to use the sub-band used by the South-East. QRM from signals in this area would make contacts between the two areas difficult. While it is appreciated that there will not be many fixed stations in Northern Scotland, portable expeditions to this area would suffer by the scheme.

In my opinion these three reasons alone are sufficient for scrapping the suggested plan, and I hope that more suggestions are considered from 4m operators around the country before a plan (if one is really necessary) is decided. My own idea, which has been agreed by other operators, is that the band should be divided according to modes, as on the l.f. bands rather than on a regional basis; c.w. being preferred near the low end, and phone in the rest of the band, with any two-way s.s.b. at the very top. This would satisfy the operator who wants to tune for weak DX, and also the station who wants to develop v.f.o. and single-

frequency operation. I would also suggest that the frequency 70·260 Mc/s plus or minus about 20 kc/s should be preferred for mobile and net operation on a national basis, i.e., the same channel to be used all over the British Isles.

Yours sincerely,

Liverpool. J. P. MARTINEZ, G3PLX

DEAR SIR,—In *The Month on the Air*, July issue, G2BVN states that—" The ideal state of affairs would be the existence of a common amateur licence with similar qualifications throughout all countries " but hastens to point out that " this ideal is unlikely to be reached in the foreseeable future."

Let us be quite clear that this ideal is by no means necessary. These are no common qualifications for the driving licence. The driving tests in different countries are not identical. Some countries may well have no driving tests at all. Nevertheless the Motoring Organizations have worked out a scheme whereby motorists licensed in one country have been able for decades to drive in most other countries without any uniformity of driving test whatever.

Any efforts devoted to the unattainable ideal of a common amateur radio licence would, therefore, be a waste of effort. Far better to concentrate the effort, as the Motoring Organizations do, on arranging for a licensed amateur in one country to drive his transmitter in any other as the motorist drives his motor car.

Yours faithfully,

E. M. WAGNER, G3BID

London, N.W.3.

## Coaxial Plug Adaptor

DEAR SIR,—Having read the article by R. J. Hughes in the July "BULL" on co-ax adaptor plugs, I would like to suggest a much simpler method as used by a number of local amateurs (with due respect to Mr. Hughes).

The thread on the inside of a Pye co-ax plug is the same as that used on standard Belling-Lee plugs and sockets (lead fixing), and with a short piece of copper wire connected between the two, they just screw together, forming a neat adaptor that is very quick to make up.

Yours faithfully,

JOHN E. MALT, G3SMP

Gorleston-on-Sea, Gt. Yarmouth, Norfolk.

## Pirates

DEAR SIR,—Is the 160m amateur band, and other bands in fact, in danger of invasion by high powered pirate broadcasting stations? It is not unknown now that many more pirate stations such as Caroline, and the Dutch Veronica stations are planned (some new ones may even be operating by the time this letter appears in print).

Why in the first place have the existing stations chosen to operate below 200m? Possibly because the medium wave band is already fully occupied and the chances of finding a clear channel for *day and night* transmitting are remote or impossible. The Veronica station is only a few kilocycles off the lower end of the 1·8 Mc/s band. At least six new pirate broadcasters were announced by June 25 which are backed by large business combines who have little or no regard for GPO or any other regulations concerning frequency allocation. Having invested large sums of money in these projects, will they stop at 200m or thereabouts and since the medium wave band seems an unlikely part of the frequency spectrum in which to settle, will Top Band be invaded? With big business backing it would not be a difficult step to introduce transistor radios that will tune down to 2 Mc/s or thereabouts. In fact Japanese models are already on the market and since the largest audience for these pirate stations are teenagers with money to spend, there seems to be a very real danger that pirate stations and transistor radio manufacturers may try to cash in on one of our most coveted bands; one needs only to put two and two together to visualize this happening.

The licensed radio amateur who works hard to get his licence and who is already bound all too closely by GPO restrictions looks like getting yet another raw deal like the 7 Mc/s intrusion of broadcast stations. What happens if Top Band is invaded?

Eventually perhaps the pirate broadcasters may be forced to move off the air by international regulations enforced by proper authority. Eventually perhaps the GPO will permit local commercial broadcasting that will give the big business combines the service they require. Meantime it seems we have cause to be concerned, but not only with pirate broadcasters. Many retail shops and mail order concerns are happily selling transmitting equipment to any and everyone who wants to buy it. One concern recently boasted about sales of 100 or more a week of 28 Mc/s walkie-talkies of Japanese manufacture and blithely intimated that on " receive " these things were capable of wiping the picture off local TV sets. Who gets the blame for the interference? I should add that unsuspecting purchasers of this and other transmitting equipment are usually given the impression that " no licence is required." Some advertise in such a way as to create this impression. For instance " Licence *should* be obtained for use in UK." This leaves the purchaser in doubt of course especially when the advertisement clearly states the equipment is for " 27 Mc/s Citizens Band " for which there is no allocation in the UK. Some dealers even say that " You don't need a licence for these " when asked about this, and even go so far to infer that the same applies to much higher power transmitters such as type 19 sets.

Evidently no rules or restrictions can be enforced, such as the production of a transmitting licence to effect purchase.

Yours faithfully,

F. C. JUDD, A.Inst.E., G2BCX

London, E.18.

## Contest Scoring

DEAR SIR,—Why is it that, when a GW tops the list in a Contest, the cry " not fair " is heard? The letter from G6GN and Co. in the March BULLETIN was no doubt prompted by the fact that GW5BI had made his score in the January C.W. Contest known. If he heads the list, I say good luck to him. How many non-portable 2m contests in the past decade have given a GW the slightest hope of winning? Now that the rules for only two, out of several, 2m contests have put GW in with a chance, the G's who have always had it their own way begin to grumble like the little boy whose toffee apple has been taken away (no doubt if he shouts loud enough he will get it back!)

For everyone to get a fair chance of winning a v.h.f. contest is *impossible* without making the rules so complicated that no one would take the trouble to enter. We all know that a station say 300 ft. a.s.l. and centrally placed has an advantage over others not so fortunately sited. Are we then to handicap these stations or cry " not fair " when they win contests? Where siting is concerned, GW's in South Wales have a mountain barrier to their north which screens them from 50 per cent of the v.h.f. population. Well sited Bristol stations are not thus handicapped and should be able to work twice as many, if not more, stations than a GW in the same contest, whether it be points per mile, per QSO or any other scoring system.

Finally, I think it would have been more to the point and contributed more to the contest concerned, had *all* the authors of the letter operated in, and sent entries for, the contest.

Yours sincerely,

W. M. LEE, GW3MFY

Bridgend, Glamorgan.

## NFD Scoring

DEAR SIR,—I have competed in NFD with some success in both G and GM. I know that the Croydon Group will not feel hurt if I remark that I am now using more efficient gear and better aerials, and at a much better site. This year we spent quite a lot of time on 14 Mc/s at Ayrshire B, with these not very encouraging results:

G portables: precisely 6 heard, 5 worked.
USSR: one UA1 worked, no UA3 or UB5 even heard.
VE: VE3KX and VE3BWY worked, no other VE's heard at all.
W: 14 worked, including 5/7/0 without trouble, reports up to S8; two others heard, not working out of W.
Other DX heard: nil.

At 19.25 for instance, G6LX/P came up, S6, and gave us S8. Our next G contact was at 08.35. Where were all the other /P's within 25 miles of Croydon?

In my opinion, therefore, no GM station stands a chance of winning the contest: the stuff just isn't there. Equally in my opinion, we accept this cheerfully. We enjoy the contest thoroughly, and that's all that matters.

Yours with 73,

J. B. ROSCOE, GM4QK

Strathaven, Lanarkshire.

# CLUBROOM

*A Monthly Survey of Group and Club Activities*

It is pleasing to be able to begin this month's reports from the clubs with news of a new group. The inaugural meeting of the **Baden-Powell House Scout Group** was held at Baden-Powell House on July 23, when the business of electing officers, discussing the best methods of promoting interest in Amateur Radio amongst Scouts, and organizing a station for the Jamboree-on-the-Air on October 17 and 18 were considered. The Articles of Association, the Club Station, G3TGS and the Jamboree station, G3BPH were to be discussed further at the meeting on August 20. Meetings are held at 7.15 p.m. on the third Thursday in each month at Baden-Powell House, Queens Gate, London, S.W.7. The Honorary Secretary, A. H. Watts, G3FXC, 8 Thorneycroft Court, Kew Road, Richmond, Surrey, would particularly like to hear from other amateurs who are members of the Boy Scouts Association.

**Barnsley and District ARC.** The Honorary Secretary of this club, P. Carbutt, G2AFV, has changed his address, which is now 17a Potter Hill Lane, High Green, Nr. Sheffield.

**Basingstoke ARC.** The AGM will be held on September 12, when new members will be welcome to attend. A constructional competition will be held on October 10. Meetings are held at the Emanuel Hall, Wate Street, Basingstoke, and the Honorary Secretary, P. Jackson, G3ADV, 11 Oaklands Way, Basingstoke, will be pleased to supply further details.

**Bradford RS.** During recent meetings, members have displayed their own apparatus, and have heard lectures on Civil Defence and the RAE. September 15 will mark the first meeting of the new session. The Honorary Secretary is E. G. Barker, G3OTO, 63 Woodcot Avenue, Baildon, Nr. Shipley, Yorks.

**Bristol Group.** On July 24, about 35 members and visitors met to hear talks on that very popular subject, home-constructed equipment. These were given by G3SJI, G3KUJ, G3PFD, G3NKR and G3IFV. Honorary Secretary, E. C. Halliday, G3JMY, 4 Parkside Avenue, Winterbourne, Bristol.

**Cambridge and District ARC.** On July 11, the club operated a station at the Bottisham Church Fête, and an amateur TV demonstration, provided by G3NOX/T at Saffron Walden, and G3PGF/T at the Fête, proved to be a main attraction. On July 18, Dennis Barnes, G2CNT, gave an interesting account, illustrated with many splendid slides, of his travels to foreign parts. Because of their impending move to Norwich, G3PTB, a very popular member of the club, and his XYL were entertained to dinner on July 18.

**A record number of 42 members, wives and YLs attended Welwyn Garden City Group's annual sausage supper. Among them was a strong contingent of the younger set, most of whom are on their way to the RAE or have already passed it. Among them is Philip Painter, second from right at the centre table, now G3TEX since May, and almost a thousand contacts in the log-book. At right: Brian Gibbs, G3OZH, the Group's treasurer, collects sixpences for the radio raffle which is always an important feature of this annual social event at Welwyn.**

*(Photo by G5UM)*

**Crawley ARC.** Owing to the holiday season, activity has been low in Crawley, but plans have been laid for a full programme for the coming year. For the first meeting on September 23, a film show and a visit from members of the Southampton Group has been scheduled. Now that the RAE results are out, several members are happily planning their first rigs, but for newcomers and those who unfortunately could not make it the first time, a new course under the guidance of G3PHG will begin in September.

**Cray Valley RS.** This society regularly holds a 160m net on Fridays at 9 p.m., and the weekend of October 3 and 4 will be a special activity period for licensed members, who will be active on all the bands from 160m to 70 cm. This should help other amateurs to obtain the Worked Cray Valley Award. Further details are available from D. F. Owen, G3MCA, 13 Greenfield Gardens, Orpington, Kent.

**Durham City ARS.** The first AGM held on June 18 saw the election of the following officers: Chairman, A. Smith; Vice-Chairman, J. Hogg, G3NUA; Honorary Secretary, M. Allenson, G3TGD; Honorary Treasurer, R. Cary, G3DYY; and the Junior Representative, J. Pounder. The society holds meetings on alternate Thursdays at the Bridge Hotel, North Road, Durham. Visitors and prospective members are always welcome, and may obtain further details from the Honorary Secretary, M. B. Allenson, Physics Dept., University of Durham, South Road, Durham.

**Echelford ARS.** An RAE Course for junior members will be held at 7.30 p.m. on September 16, and a Special General Meeting and lecture on Micro-miniaturization by F. Hoyle on September 30. The latter meeting will begin promptly at 7.30 p.m. The Honorary Secretary is L. Seaman, G3ATF, 40 Park Road, Ashford, Middlesex.

**Ex-G Club.** G2FUX recently visited the USA, and was very impressed with the warm feelings expressed towards Great Britain by members of the club. A reciprocal visit to England was paid by W1QCO, and it gave great satisfaction to many of the UK amateurs to meet him in person. Regular weekly nets will again be held on Sundays at 19.00 GMT on 14345 kc/s, commencing on September 6. Further details of membership of the club are available from either the President, W3HQO, or from H. J. Basterfield, G4MJ, 1 Manor Abbey Road, Quinton, Birmingham 32.

**Glasgow.** The group now meets on Wednesday nights at the Christian Institute, 70 Bothwell Street, Glasgow C.2, at 7.30 p.m.

**University of Keele RS.** Meetings will be resumed on the first Monday of term, October 12, at 7.30 p.m. in Sneyd Annexe. It is hoped that many new members will be enrolled during the coming year, licensed amateurs in particular. Those interested should contact either G3COY or G3SMD, who will provide further details.

**Kingston and District ARS.** The next meeting will be on September 3, followed by a surplus equipment sale on September 17. Both meetings will be held at 8 p.m. in the YMCA Annexe, Eden Street, Kingston.

**Lothians RS.** The Society will begin its new programme on September 10, and will meet thereafter on the second and fourth Tuesdays in each month. With a complete programme of lectures, films, competitions and surplus sales now arranged, they seem confident of a successful season. The new Honorary Secretary is Tom Spears, GM3OWI, 24 Priestfield Road, Edinburgh 9.

**Loughton and District RS.** A most successful week was enjoyed when GB3LOU was put into operation as a feature of Debden Community Week. A larger room was at the Society's disposal this year, which naturally meant a much larger display and a more efficient station, S9 reports being received consistently from GC, GW, GM, and EI. The closed circuit TV system of G3MJZ/T drew large crowds, and also the local press who gave the Society excellent coverage. Local retailers and component manufacturers also helped to swell the event and made it more interesting by offering prizes to a value of £35. As a finalé, a modest, experimental mobile rally, the first the society has

organized, was held on the Saturday afternoon, and despite the thunderstorms it proved to be quite enjoyable. Honorary Secretary, A. W. Shepherd, G3JBS, 11 Barfields, Loughton, Essex.

**Northern Heights ARS.** During the last two months, the society has been very active, with visits to the Bradford Fire Station, the Wharfedale Loudspeaker Factory, and the BBC Transmitting Station at Moorside Edge, near Huddersfield. A number of recent demonstration stations have also had the effect of increasing the membership. One more demonstration station is planned, and will be in operation at the Percival Whitley College of Further Education during the enrolment week for the RAE course: September 7 to 10 inclusive. It is expected that the meeting on October 21 will attract a large number of visitors from neighbouring clubs, for Stew. S. Perry, W1BB, has agreed to tape-record a lecture on " DXing on 160," and this will be played at the meeting. Anyone who wishes to attend is invited, and further details will be announced nearer the date. Honorary Secretary, A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.

**Members of the Burton-on-Trent and District Radio Society and their friends on a visit to Chloride Batteries Ltd. earlier this year.**

**Preston ARS.** The meeting which will be held on September 8 at the Clubroom, St. Paul's School, Pole Street, Preston, at 7.45 p.m., will be devoted to discussion on transmitters. Basil O'Brien, G2AMV, RSGB Region 1 Representative, has been invited to the meeting on September 22, and will speak about " RSGB Matters." All RSGB members in the Preston district are therefore invited to attend. Honorary Secretary: W. K. Beazley, G3RTX, 9 Thorngate, Penwortham, Preston, Lancs.

**Reading ARC.** Because the original date of the Reading Mobile Picnic coincided with the RSGB Rally at Woburn Abbey, it has been changed to September 20. The venue is the same as in previous years: the Childe Beale Trust Pavilion, Lower Basildon, near Pangbourne, Berks., on the banks of the River Thames. The club particularly hopes for a large number of visitors from neighbouring societies and clubs. The next meeting will be at the Palmer Hall, West Street, Reading, at 7.30 p.m. on September 26, when Messrs. Green and Davis will demonstrate some of the equipment they produce. Honorary Secretary, R. G. Nash, G3EJA, " Peacehaven," 9 Holybrook Road, Reading.


**A. Williams, G3MHD, operating G3EUR/A at the Aveley Electric Ltd. open day held in June.**
*(Photo by courtesy of Aveley Electric Ltd.)*

**Reigate ATS.** The British Amateur Television Club, represented by John Tanner, G3NDT/T, the Secretary, and John Noakes provided a most interesting evening at the July meeting. Amongst the audience were six visitors from Crawley, and Sue Miller, W9CNW, and her husband Don, W9NTP, from Indianapolis. The society wishes to express its deepest sympathy to Peter Seaman, G3PWW on the death of his wife, both of whom have been staunch supporters of the society. Honorary Secretary, F. D. Thom, G3NKT, 12 Willow Road, Redhill, Surrey.

**South Birmingham.** An exhibition station run during a Horticultural Society Show at Barnt Green, on Bank Holiday Monday, provoked much interest amongst the visitors. Activity had to be restricted to one transmission at a time, owing to the proximity of the aerials for the 160 and 80m rigs, but about 30 QSOs per band were made. Success is recorded in a recent inter-club Top Band Contest, won this year by South Birmingham. The Honorary Secretary is A. E. Bishop (Snr.), 40 Cecil Road, Birmingham 29.

**South Dorset RS.** The society provided a comprehensive display of Amateur Radio equipment at the Weymouth Model Engineering Society's Exhibition at Weymouth from July 30 to August 4. A 150 watt 80m station was run for the full period of the exhibition, and at special times this was supplemented by 2m, 70cm, and RTTY transmissions. The call-sign G3SDS/A was used. The society will be taking part in the V.H.F. NFD from Batcoombe in Dorset.

**Stockport RS.** S. J. Scarbrough, 95 Cavendish Road, Hazel Grove, Stockport, Cheshire, is now the Honorary Secretary of the society.

**Surrey Radio Contact Club.** Rules and entry forms for the Two Metre D/F Hunt to be held on September 20 are available from the Honorary Secretary, S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon, Surrey.

**Torbay ARS.** Being situated in a popular holiday area, the Torbay society welcomed three visitors, G3LYB, G2CCH/M and G3OCC/M to its meeting on July 25. Meetings are held regularly on the last Saturday in each month at the HQ, rear of 94 Belgrave Road, Torquay.

**Worcester and District ARC.** Earlier this year the club moved to new Headquarters, which have now been completely redecorated and rewired by the members. Meetings are held at 7.30 p.m. every Saturday at the Headquarters, Hut 35 Perdiswell Park, Droitwich Road, Worcester. Several exhibition stations have been put on at local fêtes during the summer, the most recent being on August 15, when both h.f. and v.h.f. transmitters were in use, using the club call-sign G3GJL. Details of meetings may be obtained from the Honorary Secretary, G. W. Tibbetts, G3NUE, 108 Old Hills, Callow End, Worcester.

**Yeovil ARC.** Members were recently given a lecture on the RSGB, by R. E. Griffin, G5UH, RSGB Representative for Region 9. Other activities included visits to the mobile rallies at Weston-super-Mare and Pentire Headland, Newquay.

# Forthcoming Events

**Details for inclusion in this feature should be sent to the appropriate Regional Representatives by the first of the month preceding publication. A.R.s and club secretaries are reminded that the information submitted must include the date, time and venue of the meeting and, whenever possible, details of the lecture or other event being arranged. Regional Representatives are requested to set out the copy, preferably typed double spaced, in the style used below. Standing instructions for more than three months ahead cannot be accepted.**

## LOOKING AHEAD

**September 12.**—BATC Convention 1964.
**September 19.**—Region 10 Lecture, "A Philosophy of Oscillators."
**September 20.**—Surrey Radio Contact Club 2m D/F Hunt.
**October 28-31.**—RSGB Radio Communications Exhibition.
**December 18.**—RSGB Annual General Meeting.
**May 30, 1965.**—RNARS Mobile Rally at RN Signal School, HMS Mercury.

### REGION 1

**Ainsdale (ARS).**—September 9, 23, 8 p.m., 77 Clifton Road, Southport.
**Blackburn.**—Fridays, 8 p.m., West View Hotel, Revidge Road.
**Blackpool (B & FARS).**—September 7 (Junk Sale), September 14 ("Questions & Answers"), September 21 (Lecture and Demonstration of s.s.b. apparatus by G. R. B. Thornley, G2DAF), September 28 (Open Night), October 5 (Visit by Regional Representative), 8 p.m., Pontins Holiday Camp, Squires Gate.
**Bury (BRS).**—September 8 ("Stabilized D.C. Supplies," by J. Bennett, G3PVG), 8 p.m., Knowsley Hotel, Kay Gardens.
**Chester.**—Tuesdays, 8 p.m., YMCA.
**Eccles (E & DAC).**—Tuesdays, 8 p.m., The Congregational Mission Church, King Street.
**Liverpool (L & DARS).**—Tuesdays, 8 p.m., Conservative Association Rooms, Church Road, Wavertree.
**Macclesfield.**—September 15, 29, October 13, 42 Jordongate.
**Manchester (M & DARS).**—Wednesdays, 7.30 p.m., 203 Droylesden Road, Newton Heath, Manchester 10.
**(SMRC).**—Fridays, 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.
**Morecambe.**—September 2, October 7, 125 Regent Road.
**Preston.**—September 8, 22 (All meetings start with Morse practice at 7.30 p.m.), St. Paul's School, Pole Street.
**Southport (SRS).**—Wednesdays, 8.30 p.m., Sea Cadets Camp, The Esplanade.
**Stockport.**—September 9, 23, October 7, The Blossoms Hotel, Buxton Road, Stockport.
**Wirral.**—September 2, 16 (Chairman's Night), 7.45 p.m., Harding House, Park Road West, Claughton, Birkenhead.

### REGION 2

**Leamington Spa** (MWARS).—Alternate Mondays, recommencing on September 7, 7.45 p.m., Civil Defence Training Headquarters, Newbold Terrace, Leamington Spa.

### REGION 3

**Birmingham (MARS).**—September 15 (AGM), 7.30 p.m., Midland Institute, Paradise Street, Birmingham.
**(Slade).**—September 18 ("Television Spectacular," Closed Circuit TV Programme), 7.45 p.m., The Church House, High Street, Erdington.
**(South).**—September 17 (Lecture), 7.30 p.m., Friends Meeting House, Balsall Heath.
**Coventry.**—Mondays, 8 p.m., Westfield House, Radford Road, Coventry.
**Stourbridge (STARS).**—September 22 ("Hi-Fi," by J. M. Butcher of R. & A. Ltd.), 7.45 p.m., Foley College, Stourbridge.
**Stratford-upon-Avon (S-u-AARS).**—Fridays, 7.30 p.m., Flat 1, Bird's Commercial Motors, Stratford-upon-Avon.
**Wolverhampton (ARS).**—Mondays, 8 p.m., Neachells Cottage, Stockwell End, Tettenhall.

### REGION 4

**Burton on Trent (B-o-TARS).**—September 9 (AGM), Wednesdays, 7.30 p.m., Club Rooms, Stapenhill Institute, Burton on Trent.
**Chesterfield (C & DARS).**—September 2, 7.30 p.m., Newbold Observatory, Newbold Road, Chesterfield.
**Derby (D & DARS).**—September 2 (Surplus Sale), September 5/6 (Harboro Rocks), September 9 (Visit to STD Telephone Exchange), September 15 (Guests of Heanor & DARS), September 16 (D/F Practice Run), September 23 ("Workings of a Language Laboratory," by J. Anthony), September 30 (Open Evening: Juniors Night), October 4 (President's Trophy Contest), October 7 (Surplus Sale), 7.30 p.m., Room No. 4, 119 Green Lane, Derby.
**(DSW Exp Soc.).**—Fridays, 7.30 p.m., Sundays, 10.30 a.m., Club Rooms, Nunsfield House, Boulton Lane, Alvaston.
**Grimsby (GARS).**—September 10, 24, 8 p.m., Model Engineers Club Rooms, Fletchers Yard, Wellowgate, Grimsby.
**Heanor (H & DARS).**—September 15 (Hosts to Derby & DARS), Tuesdays, 7.30 p.m., Room No. 5, Heanor Technical College, Ilkeston Road, Heanor.
**Leicester (LRS).**—Mondays, 7.30 p.m., Sundays, 10.30 a.m., Club Rooms, Old Hall Farm, Braunstone Lane, Leicester.
**Lincoln (LSWC).**—First Wednesday in each month, 7.30 p.m., Lincoln Technical College, Cathedral Street, Lincoln.
**Loughborough (RCL).**—Fridays, 7.30 p.m., September 18 ("Fifty Years of Radio," by F. C. Ward, G2CVV), Corporation Hotel, Wharncliffe Road, Loughborough.
**Mansfield (MRS).**—Fridays, 7.30 p.m., ATC Headquarters, Sutton Road, Mansfield.
**Melton Mowbray (MMARS).**—September 24 (AGM), 7.30 p.m., St. John's Ambulance Hall, Asfordby Hill, Melton Mowbray.
**Nottingham (ARCN).**—Tuesdays, Thursdays, Room No. 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham.
**Northampton (NSWC).**—Thursdays, 7 p.m., Allen's Pram Works, 8 Duke Street, Northampton.

### REGION 5

**Cambridge (C & DARC).**—September 4 (Reopening and Junk Sale), September 11 (Activity Night, "Aerials"), September 18 (Activity Night, "Cleaning up"), September 25 (Visit by Luton Club, "Any Questions?"), October 2 (Activity Night, "Equipment"), 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.
**Haverhill (H & DARC).**—Mondays, 7.30 p.m., Secondary Modern School, Haverhill, Suffolk.
**Luton (L & DARS).**—September 1 (Mobile Contest), September 8 (Test Gear Demonstration), September 15 (Mullard Film Strip), September 25 (Visit to Cambridge Club), September 29 (S.S.B. Evening), 8 p.m., ATC Headquarters, Crescent Road, Luton, Beds.
**March (M & DARS).**—Tuesdays, 7.30 p.m., rear of Police Headquarters, High Street, March, Cambs.
**Royston (R & DARC).**—Wednesdays, 8 p.m., Manor House Social Club, Melbourn Street, Royston, Herts.
**Shefford (S & DARS).**—September 3 (Mullard Film Strip Lecture), September 10 (Film Show), September 17 ("Modern Printing Methods," by M. Taylor), September 24 ("Computers," by R. D. Cox), October 1 ("Satellite Tracking Methods," by Wing Commander Pennington), 7.45 p.m., Town Recreation Centre, Hitchin Road, Shefford, Beds.

### REGION 6

**Cheltenham.**—First Thursday in each month, 8 p.m., Great Western Hotel, Clarence Street, Cheltenham.

### REGION 7

**Acton, Brentford & Chiswick (ABCRC).**—September 15 ("Application of Theory to Practice," by G3IGM), 7.30 p.m., AEU Club, 66 High Road, Chiswick.
**Ashford (Middx.) (Echelford ARS).**—September 30 (RAE Course, "Micro-miniaturization," by F. Hoyle and Special General Meeting), 7.30 p.m., Ashford Grammar School.
**Bexley Heath (NKRS).**—September 10, 24, 7.30 p.m., Congregational Hall, Chapel Road, Bexley Heath.
**Barnet (BRC).**—September 29, 8 p.m., Red Lion Hotel, Barnet.
**Chingford (Group).**—September 11, details from the Hon. Secretary, Loughton 2397.
**Chingford (SRC).**—Fridays (except first), 8 p.m., Friday Hill House, Simmons Lane.
**Croydon (SRCC).**—September 8 (Sale of Members' Surplus Gear), 7.30 p.m., Blacksmiths Arms, South End, Croydon.
**Dorking (D & DRS).**—September 8, 8 p.m., "Wheatsheaf," Dorking. September 29, 8 p.m., "Star & Garter," Dorking.
**East Ham.**—Tuesdays fortnightly, 7.30 p.m., 12 Leigh Road, East Ham.
**East Molesey (TVARTS).**—September 2, Carnarvon Castle Hotel, Hampton Court.
**Edgware and Hendon (EARDS).**—September 14, 28, 8 p.m., John Keble Hall, Church Close, Deans Lane, Edgware.
**Enfield.**—August 20, 7.30 p.m., George Spicer School, Southbury Road, Enfield.
**Gravesend (GRS).**—September 16, 7.30 p.m., RAFA Club, 17 Overcliffe, Gravesend.
**Guildford (G & DRS).**—September 4 and 5, (Guildford Show), September 11 ("Amateur Matters," by S. W. Smith), September 19 and 20 (lecture by the GPO Radio Interference Branch at the Club Station at Guildford Model Engineering Society Open Day), 8 p.m., Stoke Park.
**Harlow.**—Tuesdays, 7.30 p.m., rear of G3ERN (G. E. Read), High Street, Harlow.
**(SRC).**—Wednesdays, 7 p.m., Edinburgh Way, Harlow.
**Harrow (RSH).**—Fridays, 8 p.m., Roxeth Manor County School, Eastcote Lane, Harrow.
**Holloway (GRS).**—Mondays and Wednesdays (7 p.m., RAE and Morse), Fridays (Club), 7.30 p.m., Montem School, London, N.7.
**Hounslow (HADRS).**—September 7, 21 ("V.H.F. Theory," by G3TDR), Canteen, Mogden Main Drainage Dept., Mogden Works, Isleworth.

**LONDON MEMBERS' LUNCHEON CLUB**

will now meet at the White Hall Hotel, Bloomsbury Square, London, W.C.1

**at 12.30 p.m. on Fridays, September 18 and October 16, 1964**

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

**Ilford.**—September 20 ("Transistorized Oscilloscope Circuitry," by J. Erskine), 3 p.m., The Lambourne Room, Ilford Town Hall. Meetings on Thursdays, 8 p.m., 579 High Road, Ilford (Nr. Seven Kings Station).
**Kingston.**—September 3, 17 (Sale of Members' Surplus Gear), 8 p.m., YMCA, Eden Street, Kingston. Fridays (weekly Morse classes), 2 Sunray Avenue, Tolworth.
**Leyton & Walthamstow.**—September 29, 7.30 p.m., Leyton Senior Institute, Essex Road London, E.10.
**Loughton.**—September 11, 25, 7.30 p.m., Loughton Hall (Nr. Debden Station).
**Mitcham (M & DRS).**—September 11, 7 p.m., "The Canons," Madeira Road, Mitcham.
**New Cross (CARS).**—Wednesdays and Fridays, 8 p.m., 225 New Cross Road, London, S.E.14.
**Norwood & South London (CP & DRS).**—September 19 ("Air Traffic Control," by John Graham, G3TR), CD Training Centre, Bromley Road, Catford, S.E.6.

**Paddington (P & DARS).**—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2 Warwick Crescent, London, W.2.
**Purley (P & DRC).**—September 18, 8 p.m., Railwaymen's Hall (Side Entrance), Whytecliffe Road, Purley.
**Reigate (RATS).**—September 19, 7.30 p.m., Club Night, "George & Dragon," Cromwell Road, Redhill.
**Romford (R & DRS).**—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road, Romford.
**Science Museum (CSRS).**—September 15 (Informal), October 6 ("Construction of Magnetic Tape and Tape Decks), October 20 (Informal), 6 p.m., Science Museum, South Kensington. Hon. Secretary, G. Lloyd-Dalton, Bayswater 3456, Ext. 364.
**Scout ARS.**—Thursday, September 17 ("Articles of Association"), 7.15 p.m., Baden Powell House, Queens Gate, Cromwell Road, South Kensington.
**Sidcup (CVRS).**—September 3 (talk by G2MI), October 7 ("My Shack," illustrated lectures), 7.30 p.m., Eltham Congregational Church, 1 Court Road, Eltham, S.E.9.
**Slough (SARS).**—First Wednesday in each month, 8 p.m., United Services Club, Wellington Street, Slough.
**Southgate & District.**—September 10 (Film Show), Atlasta Lodge, Tottenhall Road, London, N.13.
**St. Albans (Verulam ARC).**—September 16, 8 p.m., Hedley Road.
**Sutton & Cheam (SCRS).**—September 15, 7.30 p.m., The Harrow, High Street, Cheam.
**Uxbridge.**—September 7, 21, 8 p.m., St. Andrews Church Scout Hut, Uxbridge Road.
**Welwyn Garden City.**—September 10 (Mobile Symposium), October 8 (Tape Night), 8 p.m., Backhouse Room, Handside Room, Handside Lane, Welwyn Garden City.
**Wimbledon (W & DRS).**—September 11, 8 p.m., Community Centre, St. Georges Road, Wimbledon, London, S.W.19.

### REGION 8

**Crawley (CARC).**—September 9 (Informal), for details contact G3FRV, September 23 (Film Show by G3NIM; Visit from Southampton Group), 8 p.m., Trinity Congregational Church, Ifield.
**Tunbridge Wells (WKARS).**—September 11 (Test Gear Demonstration, and "The Hows and Whys of some useful Test Equipment"), September 25, 7.30 p.m., Culverden House, Culverden Park Road, Tunbridge Wells.

### REGION 9

**Bath.**—For details of September meeting, contact the Area Representative, J. Russell, G2ZR.
**Bristol.**—September 25 ("Civil Defence Radio Equipment"), "Charnwood," 30 Cotham Park, Bristol 6.
**Burnham-on-Sea (B-o-SARS).**—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford Street, Burnham-on-Sea.
**Camborne (CR & TC).**—First Thursday in each month, Staff Recreation Hall, SWEB Headquarters, Pool, nr. Camborne.
**Exeter.**—First Tuesday in each month, 7.30 p.m., George and Dragon Inn, Blackboy Road, Exeter.
**Plymouth (PRC).**—Tuesdays, 7.30 p.m., Virginia House, Bretonside, Plymouth.
**South Dorset (SDRS).**—First Friday in each month, 7.30 p.m., Labour Rooms, West Walks, Dorchester.
**Torquay (TARS).**—Last Saturday in each month Club HQ, Belgrave Road, Torquay.
**Weston-super-Mare.**—First Tuesday in each month, 7.15 p.m., Technical College, Lower Church Road.
**Yeovil (YARC).**—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil.

### REGION 10

**Cardiff.**—September 14 (Visit to GPO Microwave Station), meet at 7.30 p.m., outside TA Centre, Park Street, Cardiff.

### REGION 11

**Llandudno (CVARC).**—September 10 (AGM), 7.30 p.m., Cross Keys, Madoc Street, Llandudno.
**Prestatyn (FRS).**—September 15 (RAE Discussion, "Electricity and Magnetism"), September 29 (talk by an Old Timer), 7.30 p.m., Clubroom, Railway Hotel, High Street, Prestatyn.

### REGION 14

**Glasgow.**—First and third Wednesdays in each month, 7.30. p.m., The Christian Institute, 70 Bothwell Street, Glasgow, C.2.

### REGION 16

**Basildon (BDARS).**—September 24 (AGM), October 6 (Social Evening at the Van Gogh), details from G3IJB.
**Chelmsford (CARS).**—October 6 (AGM), 7.30 p.m., Marconi College, Arbour Lane, Chelmsford.
**Great Yarmouth (GYRC).**—Fridays, 7.30 p.m., the Manager's Office, The Old Power Station, South Quay, Swanstons Road, Great Yarmouth. Details from G3HPR.

## TRADE WIND

An effective **Course of Morse Instruction**, in the form of LP records, is produced by S. N. Bennett, G3HSC, 45 Green Lane, Purley, Surrey. It is claimed that a 14-year-old boy was able to read all the letters of the alphabet at 21 w.p.m. after three weeks, and a man of 71 achieved the GPO standard after practising one hour a day for six weeks. He had previously been unable to get out of the 8-10 w.p.m. groove, but is now licensed. The beginners' course comprises a 12 in. LP and a 7 in. EP test record, and costs £3 0s. 6d. A 12 in. LP advanced course is also available, and the price of the two courses together is £4 4s. Individual records can, however, be supplied at £2 10s. for the 12 in. LPs, and 11s. 6d. for the 7 in. EP. The records are intended for use at 33⅓, 45 and 78 r.p.m.

## BATC CONVENTION 1964

**Saturday, September 12, from 10 a.m. to 6 p.m.**

**at**

**ITA Headquarters, 70 Brompton Road, London, S.W.1. (near Knightsbridge Tube Station).**

The General Meeting will be held at 2.30 p.m. During the afternoon, the following lectures will be given.:

"Semiconductors at 70 cm." by D. Mann, G3OUO/T.
"Pulse Generators," by J. Noakes.
"Camera Tubes," by J. Tanner, G3NDT/T.
"Video Testing Techniques for Amateur Television," by M. H. Cox.

Further details may be obtained from M. H. Cox, 135 Lower Mortlake Road, Richmond, Surrey.

## CONTESTS DIARY

| | |
|---|---|
| September 5-6 | - V.H.F. National Field Day. |
| September 5-6 | - Labre (c.w.) Contest (see page 529, August, 1964). |
| September 5-6 | - Region I IARU V.H.F. Contest (see page 471, July, 1964). |
| September 12-13 | - Labre (phone) Contest. |
| September 13 | - D/F National Final. |
| September 19-20 | - SAC (c.w.). |
| September 20 | - Low Power Field Day (see page 471, July, 1964). |
| September 26-27 | - SAC (phone). |
| October 3-4 | - RAEN Rally. |
| October 3-4 | - VK/ZL/Oceania Contest (phone). |
| October 10-11 | - VK/ZL/Oceania Contest (c.w.). |
| October 10-11 | - VU2/4S7 Contest (phone). |
| October 17-18 | - Second 420 Mc/s Contest (see page 471, July, 1964). |
| October 17-18 | - VU2/4S7 Contest (c.w.). |
| October 24-25 | - CQ WW DX Contest (phone). |
| October 31-November 1 | - RSGB 7 Mc/s DX Contest (phone). (see page 328, May, 1964). |

November 21-22 — RSGB 7 Mc/s DX Contest (c.w.) (see page 328, May, 1964).
November 28-29 — Second 1·8 Mc/s Contest (see page 539, August, 1964).
November 28-29 — CQ WW DX Contest (c.w.).
December 5-6 — RSGB 21/28 Mc/s Telephony/Receiving Contests (see page 472, July, 1964).
December 13 — 70 Mc/s C.W. Contest (see page 539, August, 1964).

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| | | | 10mA .. | 22/6 | 50V. DC .. 22/6 |
| | | | 50mA .. | 22/6 | 100V. DC .. 22/6 |
| | | | 100mA .. | 22/6 | 150V. DC .. 22/6 |
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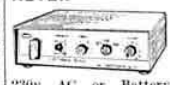

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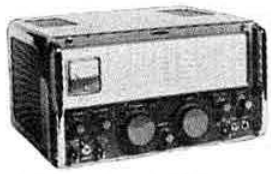

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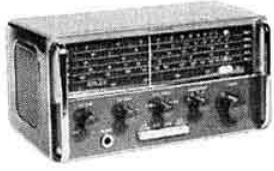

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## FOR SALE

**CATALOGUE No. 15.**—Government Surplus Electrical and Radio equipment. Hundreds of items at bargain prices for the experimenter and research engineer, 2/6 post free: catalogue cost refunded on purchase of 50/-.—Arthur Sallis Radio Control Ltd., 93B North Road, Brighton.

**BAMBOO POLES** FOR CUBICAL QUAD ANTENNAS, ETC. ALL SIZES. S.A.E. BRINGS LIST.—WHINES & EDGELER, BAMBOO PEOPLE, GODMANSTON, DORCHESTER, DORSET.

**METALWORK.**—All types of cabinets, chassis, racks, etc., to your own specifications.—Philpott's Metalworks Ltd. (G4BI), Chapman Street, Loughborough.

**COMPLETE** 150 watt AM/CW station. HQ120 with preselector. B4/40 driving pair 35Ts rack mounted with power supply and z-match coupler. VFO unit with master control panel and automatic changeover. Vibroplex super bug. Handbooks, crystals and other equipment. The lot in perfect order, £50. Buyer collects.—G2VD, Watford 27142.

**KW 2000** Transceiver with or without 12v. d.c. power supply. Little used. Makers recently overhauled. Offers to F. J. Armstrong, 36 Hallamshire Road, Fulwood, Sheffield, 10.

**AR77E** with handbook £20 small fault in audio output stage otherwise good condition. Delivery 25 miles. G. King, 20 Dronfield Gardens, Dagenham, Essex. Tel. DOMinion 7012.

**COMPLETE 10-160** metre rig. 100 watt cw/phone TX and AR88 RX. First £50 secures. Buyer collects Hants/Wilts. (or may be able to deliver). Write BM/HWMO, London, W.C.1.

**FOR SALE** complete antenna equipment 45ft. steel tower 3 band quad, magslip indicators prop-pitch motor all transformers. Offers Mr. Boothroyd, 55 Bank End Lane, Almondbury, Huddersfield.

**HRO** with 3 bandspread coils, 5 G.C. £15. DST100 £15. Geloso converter £6. Signal generator 52A 6-52m/c £5. R109 £2. G3VW, COLindale 1443.

**840C** early 1963 immaculate condition £40 o.n.o. Wright, 16 Atholl Gardens, Kilwinning, Ayrshire.

**HRO MANUAL INFORMATION.** Theoretical circuit and pictorial diagram adjustment points all stages with complete re-alignment procedure. Component lists values, etc. Installations, operation, special features, notes, etc., 15/6d. Send S.A.E. for indexed details, G3ANK, 145a Station Road, Sidcup, Kent.

**BARGAIN PARCEL** including small Oscilloscope, Stroboscope, Ventaxia, two teleprinter motors, relays, microswitches, keyswitches, jackplugs, microphones, transformers, valves, CRTs, EHT kit, condensers, resistors, etc. All new or mint. £10 the lot. No lists. Box No. C.7149, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

## FOR SALE (contd.)

**BNRS RAE** Correspondence Course. Excellent condition. 31 lessons, with questions, answers, etc. £5 including carriage. Lear, G3TKN, 49 Cliff Road, Wallasey, Cheshire.

**MINIMITTER DE-LUXE** 150w Transmitter, F.B. condition £50, Mike Key. Poole, 69 Oxford Street, Coalville, Leicester.

**ELECTRONIC BUG KEYS TRANSISTORISED.** SEND FOR LISTS. ELECTRONIC DEVICES, WELLINGTON ROAD, CHELTENHAM.

**FOR SALE.** Lg. Wideband Multiplier unit 80110 £2.10.0 including post. G3LKT, 8 Douglas Haig Road, Salisbury, Wilts.

**MARCONI ELECTRA** with P.S. £65, also Marconi CR.100/8, fitted 6SG7 H.F. stages and "S" meter £25. Both RX's in pristine condition and with manuals—Buyer collects—No offers. Monkhouse, Pinner 9124.

**SALE.** 1250v. 200mA. PSU and T1154 £5. New 30 Mc/s L.P. filter, R107, W/T 19, Offers? Andrew, 29 Elsee Road, Rugby, Warwicks.

**FOR SALE.** Erskine type 13 oscilloscope. Condition good. Prefer buyer collects. £20 o.n.o. Gemmill, 85 Kingston Road, Teddington, Middlesex. TED 5673.

**G.E.C. BRT400E** 150 kc/s-32 Mc/s. Crystal Calibrator. Overhauled, re-valved, perfect condition £70. Stabilised PSU kit £3. Barry, 15 Fairlawn Court, London, W.4.

**FOR SALE.** Elizabethan TX (10-80 metres), with components and case for power supply and modulator, spare valves £17.10.0, also new DT1 Driver Transformer £1.10.0. Buyer collects. Newman, 112 Norbiton Avenue, Kingston-upon-Thames, Surrey. (KIN 9865 after 8 p.m.)

**HALLICRAFTERS SX100 Mk. 2.** General coverage and amateur bands bandspread, xtal controlled second conversion oscillator, temperature compensated first, very stable, selectable sidebands, notch filter, 100Kc calibrator. In new condition, with handbook. **HALLICRAFTERS HT37,** 144 watts plate input (P.E.P. two-tone), five band output, 80-10 metres C.W., A.M., or S.S.B. Precision V.F.O., full V.O.X., excellent c.w. keying. Little used, with handbook. Best offer over £80 for either, will deliver up to 100 miles. Thompson (G3EFD), Hillcrest, Leazes Lane, Hexham, Northumberland.

**FOR SALE.** Cossor Signal Generator 150 kc/s-390 Mc/s £20. Mullard capacity Inductance Bridge £5. 4ZU beam, mast, rotator, indicator, £20. R.F. field indicator, £1. Also several small components. G3RDN, address as callbook.

**COLLINS** 30L-1 Linear Amplifier, £175. Heathkit Monitor Scope HO-10, £30. Hammarlund HK1-B Electronic Keyer, £12. G & D Falcon 144 Mc/s Transmitter, 230v. and 12v. PSUs, mike and set spare valves, £40. Mark IV Converter, £11. Jennings Vacuum Variable Capacitor, 5-110 pF, with dial, £10. Sundry books, valves, components. G5RP, Old Gaol House, Abingdon, Berks.

**COLLINS** 75S-3 Rx. 312B-3 speaker. Both as new, £240. Eddystone 840A, £25. R209 mobile Rx, £20. 35 ft. Telescopic Mast, £5. Mosley TA 33 Jnr. complete. Never used for transmission, £18. Box No. B.7143, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

**PYE MOBILE** TX/RX type P.T.C. 112; FB 4 metres £5 each; three only complete with control unit, microphone, circuit and manual, but less TX xtal. 12 volt input. G3IKL, 103 Clifton Road, Rugby.

**GELOSO VFO** 4/102, brand new in modern styled, well screened metal cabinet, input leads fully TVI filtered—£6. RF24, variable tuning—10/-. *WANTED* all knobs for CR100 xtals 9000, 11,500, 11,750, 12,000, 12,250 Kc/s. G3SJX, 42 Gravel Hill, Addington, Croydon, Surrey.

## FOR SALE (contd.)

**SX111,** 8 months old, little used, list £125, accept £75. Eddystone 750, recent £12/10/- factory overhaul, good condition, £40. A2273, 72 Rosemary Crescent, Woodsetton, Dudley.

**AR88, CR100, 640, SX-28, DST100, R206, HRO, BC221,** R1155, R1392, etc. etc. Most types of brand new equipment also supplied. Hire purchase. Generous part exchange allowances. Write for full details to new address: Brian J. Ayres, 21 Victoria Road, Surbiton, Surrey. (Elmbridge 5164/2833 or Lower Hook 2000.)

**SUB-MINIATURE PRE-SET** fully enclosed 1K Carbon Pots ½ in. diameter at 2/6 each. Mullard Pot Cores: LA1 Wound, LA5 and LA6 Unwound at 6/- each. Erie Miniature 1000 Pf Disc Ceramics at 4/- doz. New ex-equipment General Electric Unijunction Transistors, 2N 493 at 7/6 ea. TCM Nut Fixing Co-Ax Sockets at 7/6 doz. J. Birkett, 9 Steep Hill, Lincoln. Phone 20767.

**SALE** AR88 LF unmodified £22/10/-, 3 Pye 703 Receivers 4 metres £3 each. R1475 with PSU £5. New RCA FS Keying unit with handbook and spares £12. Carriage extra or delivered free London area. Box No. C.7152, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

**LG.300** new condition. Modulator power supply L.V. only. Cabinet to match. Extras. £45 o.n.o. BC.221 uncalibrated. Blank book £10. Goodmans Axiom 101 new £4/10/-. HRO coils bandspread £2 each. Pair 35 T's £1. 813's £2 each. UM.2 Mod. Tran. £2/10/-. BC.455 35/-. RF.26 12/6. 640 xtal filter £1. G3GHS, LOWer Hook 3741 evenings. J. G. Holland, 164 Hook Rise North, Tolworth, Surbiton, Surrey.

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